APPENDIX A

Independence Mine and Mill Site, Old Triumph (Shaft) Mine Site, North Star Mine Site and Triumph Tunnel Site Conditions

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INDEPENDENCE SITE CONDITIONS

The Independence Mine can be accessed via two routes. The first and best is up Independence Gulch from Elk Horn Village. The second is from the Village of Triumph up Triumph Gulch past the Old Triumph (Shaft) over a 6400 foot summit and down into Independence Gulch. Both are 4wd seasonally closed routes which are heavily used by recreationists.

The above panoramic view is of Elk Horn Village (center) and Sun Valley Ski Area (Bald Mountain, upper left, Photo by Schuld May 2007)

This photo of Independence Mine (upper right) and Mill Site (center) and Bonanza Tunnel (upper left) was taken from the Triumph Gulch Road between the Old Triumph (Shaft) and the Independence. (Photo by Schuld May 2007).

The Independence mine and mill facilities are located on numerous patented mine claims in this steeply incised gulch. Generally speaking the Independence mine adits and waste dumps are located on the steep north facing slope of the gulch. The Independence mill site and foundation is located midway up the gulch where the Triumph-Independence road turns sharply westward towards Elk Horn Village. The Independence mill tailings are contained in a number of benches that have been landscaped, perhaps a number of different times, to form dams and settling basins or tailings ponds. The Bonanza Tunnel is actually tied to operations at the Baltimore-Victoria Mine. It is the only adit and waste dump feature on the south facing slope of the Independence Gulch above the Millsite.

Panoramic view of Independence Mine and Mill site from the road to the Baltimore-Victoria Mine site (Photo by Schuld May 2007)

It is obvious that the landscape surrounding the Independence Mill Site has been modified numerous times as the result of early development, the burning of the mine buildings and latter development or exploration projects. Although the landscape has many obvious scars, and there are indications of deeply eroded rills and gullies, the vegetation appears very lush and responsive to the point of significantly containing erosion and sediment transport. The only areas where erosion appears to be a dominant force is on mine waste dumps and tailings piles. This may be due to the fact that the waste dumps are too steep for the accumulation of fine organic chafe, too phytotoxic, or they are constantly destabilized by recreational use by motorcyclists and bike riders.

Looking down on the Independence Mill tailings impoundments and the concrete on/off heap leach pad for the piloted cyanidation mill. (Photo by Schuld May 2007). This dump has been removed and this location is currently being developed as a waste repository by DeNovo Independence LLC.

Independence repository site development (Photo by Schuld 6/15/09)

Excavation for the Independence tailings Repository uphill of the Independence Tailings Impoundment #1 (Photo by Schuld 6/15/09)

Independence Mill site during excavation of repository (Photo by Schuld 6/15/09)

Independence Millsite during excavation of repository (Photo by Schuld 6/15/09)

Independence Millsite during excavation of repository (Photo by Schuld 6/15/09)

Apparently there are some mineral values remaining in the Independence Mill tailings. According to Carl Massaro (verbal communication 2006) the site was leased out by an unidentified Professor of Metallurgy during the early 1980's, who developed a crude concrete on-off heap leach and activated charcoal process for the tailings. The process involved a well drained concrete pad, a series of PVC tricklers and hoses, numerous dumpsters for recovery cells, and a series of HDPE lined tailings ponds constructed out of the previously deposited tailings piles. Until DeNovo Independence LLC (DeNovo) began implementation of its approved Remedial Action Work Plan (RAWP) a large

quantity of these materials remained at the site, most were either deteriorated or had been shot up. Because there may be some residual contamination in these solid wastes, they are going to be disposed in the Independence repository.

Looking south across Independence Gulch. The distant mine workings include the Independence Mine adits and waste dumps #1 through #5 (Photo by Schuld May 2007).

The Independence Mine is contains at least five levels that "day lighted". These were designated for the PA as Adit/Waste Dumps #1 - #5 and were so designated starting at the top of the ridge line. Dumps #3 - #5 were the most significant and were sampled. There is considerable evidence of subsidence feature(s) existing along side of Waste Dumps #1 - #3 which extends from below Waste Dump #3 upwards some 50 yards past the Waste Dump/Adit #1. This subsidence feature(s) may be a physical hazard during equipment operation or foundation construction, to recreationists and wildlife. These features will be closed or otherwise access restricted during implementation of DeNovo's VCP.

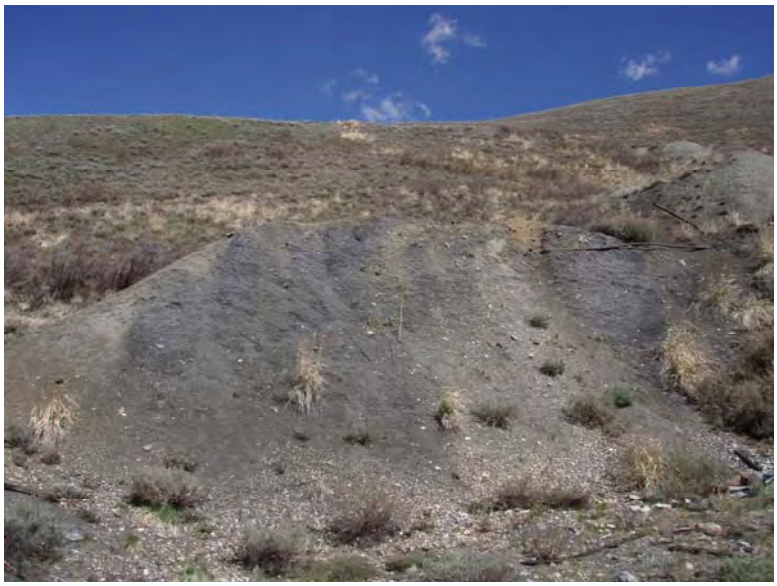
The south slope of Independence Gulch beneath the Triumph Gulch-Independence Road is dissected with cat cuts and explorations. (Photo by Schuld May 2007).

The subsidence features, possibly open stope or caved adits above IM Waste Dump #2. (Photo by Schuld May 2007)

Subsidence feature along side of IM Waste Dump #2 (Photo by Schuld May 2007)

Looking down on IM Waste Dump #4. IMWD #4 and caved IM Adit #4 which is topped by the road from Triumph Gulch to the Independence Mine and Mill site. (Photo by Schuld May 2007)

Outside of caved IM Adit #4 was a small but deep pond that appears to be a perennial drain to the upper Independence workings. Sample IMAD4SW-1 was collected.



Looking up at the Independence Mine Waste Dump #3 from the Triumph Gulch-Independence Road. (Photo by Schuld May 2007)

This very unusual crusher is located on the IM Waste Dump #4. (Photo by Schuld May 2007)

This hoist wheel, with wooden brake system, was found on IM Waste Dump #5, below what was either a caved shaft or decline designated as IM Shaft #1. (Photo by Schuld May 2007)

Minor drainage (approximately 1 gpm) flowing from the Bonanza Tunnel, which was designated as IM Adit #6 in IDEQ's field notes. Orange precipitates, prompted collections of IMWD6SW-1. (Photo by Schuld May 2007)

The waste Dump for the Bonanza Tunnel has remnants of a building foundation, which was likely the "Dog House" and Shifter's Shack. (Photo by Schuld May 2007)

The Bonanza Tunnel, which was referenced in IDEQ's field notes and sample log as Independence Waste Dump #6 contains approximately 15,000 yd^3 of waste rock located on both patented and unpatented claims. The wastes contain some massive sulfides. The adit drainage forms a small pond on the dump, but no drainage appears at the bottom of the waste dump.

Collapsed Independence Flotation Mill. (Photo by Schuld May 2007)

The Independence Mill ruins are fairly typical of floatation mills. They contain remnants of floatation cells, thickener tanks, plumbing and foundations. There are however, no indications of abandoned chemicals or other deleterious substances.

One of the benches at the Independence Mill Site was used recently as the location for, presumably, an office and home for workers on the cyanidation facilities (Photo by Schuld May 2007)

Beneath the Independence Mill building is a bench that probably housed historic offices. Recently, perhaps during the use of the heap leaching operations, this site housed residents and/or employees as evident from the natural gas pipeline, electrical conduit, and septic plumbing. However, the base of this benched area resembles jig tails, which were sampled (IMM-SS-1).

Motorcycle and 4X4 tracks on the upper Independence Mill Tailings Pile (Photo by Schuld May 2007)

The Independence Mill tailings were discharged into a series of impoundments that were altered during the site's development as an on-off cyanide heap leaching operation in the 1980's. Although it is difficult to clearly distinguish between the impoundments five (5) were designated as IM Mill Tailings Impoundments 1 through 5 starting at the uppermost pile.

Prior to the DeNovo, IM Mill Tailings Impoundment #1 was approximately 300' long x 150' wide x 50' thick. Accounting for the slope of the valley walls and drainage, the impoundment contained approximately 30,000 yd^3.

Prior to the DeNovo, IM Mill Tailings Impoundment #2 was approximately 125' long x 125' wide x 30' thick. Accounting for the slope of the valley walls and drainage, the impoundment contained approximately 8,000 yd^3.

Piles of trickler hoses used for leaching processes were found on a bench behind the concrete on/off heap leach pad. (Photo by Schuld May 2007)

Concrete foundation for On-Off Heap Leach Pad (Photo by Schuld May 2007)

The Independence On/Off Heap Leach Pad, which was adjacent to IM Mill Tailings Impoundment #2, was constructed of concrete and sloped into PVC drains. It is not evident where the recovery systems (dumpsters) were located, but lined ponds were constructed down gradient of this structure.

Typical Independence Mill site tailings impoundment (Photo by Schuld May 2007)

The above photograph is of an intermediate pond is located between IM Tailings Impoundments #3 and #4. It appears that it was bull dozed up from IM Tailings impoundment #4 and then was lined presumably to be used with the leach system.

Between IM Mill Tailings Impoundment #4 and IM Mill tailings Impoundment #5 (pictured above), another pond was constructed and lined, presumably, for use in the heap leach process. (Photo by Schuld May 2007)

The Independence Mill Tailings impoundments were marred by various natural and anthropogenic erosional features. Human and animal foot tracks abound. Deep ruts from motorcycles, ATVs, and pickups are particularly destructive. Each of which are indicators of how unstable the site was and how frequently receptors used the site prior to exclusion under the DeNovo actions. (Photo by Schuld April 2007)

Presumably these foundations were used in connection with the cyanidation process. (Photo by Schuld April 2007)

Old computer monitors appear to be a favorite target for some shooters at the Independence Mill site. (Photo by Schuld April 2007)

Information technology wastes, spent ordinance and recent motorcycle tracks indicate that there were trespass and illegal dumping issues at the Independence mine and mill sites, and that the use of the abandoned facilities for these purposes was frequent.

IT Waste on Independence mill tailings impoundment. (Photo by Schuld May 2007)

Motorcycle tracks indicate recent and frequent used of the tailings impoundment, and that there were significant exposures due to fugitive dust originating in the impoundments. (Photo by Schuld April 2007)

Evidence of vandalism to site access controls, illegal dumping of solid wastes including IT waste, and erosion was prevalent on all of the Independence mill tailings impoundments. (Photo by Schuld April 2007)

IT waste on Independence mill tailings impoundments. (Photo by Schuld April 2007)

Spent ordinance and sporting clays on Independence mill tailings impoundments (Photo by Schuld April 2007)

View of Independence Gulch and Upper Tailings Impoundment from building sites, which was presumably the center of operations (Photo by Schuld April 2007)

Apparently the USDA Forest Service Boundary splits the Bonanza Tunnel waste dump. View north from building area center of operations. (Photo by Schuld April 2007)

This specimen of Rubber Boa (*Charina bottae*), was found adjacent to the concrete cistern below the Independence Mill site (Photo by Schuld April 2007)

A diverse community of wildlife, or signs of that wildlife, was observed throughout the Independence Mine and Mill sites. For instance, while collecting data along the main road through the site, IDEQ have a rare opportunity to observe a not so rare Rubber Boa snake. Rubber Boas (*Charina bottae*), are one of the smallest members of the boa family, and are one of the northern most ranging of the family. Adults are generally a uniform color dorsally, ranging from tanned leather brown (southern population are almost always light tan), olive brown, medium brown, to a dark chocolate brown.

NORTH STAR MINE SITE CONDITIONS

North Star Gulch contains numerous features attributed to mine and mill development and operations. The North Star Mine contains numerous adits, structures and a complex roadway system all of which were connected to operations at the triumph Shaft in Triumph Gulch, and the Independence Mine and Mill Site in Independence Gulch. Although North Star Gulch is pre-dominantly on private or patented mining claims, there are numerous unpatented “fractions” in North Star Gulch. To further complicate understanding o North Star Gulch, recent activities by owners prior to DeNovo Independence resulted in the release of mine tailings down the gulch to private properties near Triumph Village. Furthermore, there is a number of small underground developments, waste dumps and loading chutes in lower North Star Gulch, that appear to be related to the development of the Triumph Tunnel Site. These workings in lower North Star Gulch will be discussed later in eth Triumph Tunnel Site section of this Site Conditions Appendix.

Looking headward in North Star Gulch from just beneath the main North Star Mine waste Dump (Photo by Schuld October 2006)

While evaluating potential surface expressions (springs) that may have developed in North Star Gulch as a result of placing the mine plug in the Triumph Tunnel, IDEQ first met, the owner (at that time) of the North Star Mine, Carl Masaro. Mr. Massaro had begun the work of recontouring mine wastes in North Star Gulch in October of 2006.

Karst Drive in lower North Star Gulch (October 2006).

Because of the public concerns and the County's intervention regarding the instability of the site, and unknown metals concentrations in the wastes that were exposed in North Star Gulch, DEQ began an investigation to evaluate how metals contamination may be spread throughout the Gulch and towards residences in the Village of Triumph. With Mr. Massaro's permission, IDEQ began its work to complete a site assessment of all of Mr. Massaro's properties in and around the North Star, Triumph and Independence mines.

This photo was taken from adjacent to the closest residence in North Star Gulch to the mine, which may be seen high on the hill above and right of center in the photo. (October 2006).

Samples of disturbed areas that were affected by the North Star project were evaluated and sampled. This location adjacent to the Bradford property was sampled (Photo by Schuld October 2006)

Looking down into North Star Gulch from the Upper North Star Gulch Road. IDEQ and Mr. Masaro agreed that temporary waterbars and ditches should be placed for erosion control. (Photo by Schuld October 2007)

Subsequent to expression of DEQ's concerns that spring runoff in 2007 would erode and transport wastes from the disturbed areas, Mr. Masaro installed rolling drain ditches across the North Star Gulch road to shorten slope distances, and channel runoff into the adjoining vegetated buffer areas and sediment basins.

This photo was taken of the North Star Waste Dump #1 (right) North Star Waste Dump #3, center diagonal feature, and North Star Waste Dump #4, left hand feature (Photo by Schuld June 2007).

Mr. Massaro's or his predecessor's efforts to regrade mine waste is most evident along the bottom of the North Star waste dumps #1 #3 and #4. The dumps contained in excess

of 150,000, 30,000 and 1500 cubic yards of mine wastes, respectively. Most of the wastes appears to be dolomitic and shaley country rock containing massive sulfides. Although the dumps contain significant sulfides they were probably not of any economic value and were consequently wasted.

Looking down at the bottom of WD#3 (right), WD#4 (center) and WD#5 (left) which was developed at the opening of the Plummer Tunnel. Note the open Adit below WD#3, it is a dangerous opening that will be closed under the DeNovo RAWP (Photo by Schuld May 2007)

Repository development in upper North Star Gulch adjacent to the North Star Waste Dumps #6 and #7 (Photo by Schuld 6/15/09)

Repository development in upper North Star Gulch adjacent to North Star Waste Dumps #3, #4, and #5 (Photo by Schuld 6/15/09)

Lower North Star Gulch (Photo by Schuld 6/15/09)

North Star Waste Dumps #7 & #8(Photo by Schuld 6/15/09)

Mine wastes from WD#1 - #6 were dozed across a large area in the bottom of the upper gulch (Photo by Schuld, 5/15/2006)

The Plummer Tunnel, which may be a series of openings and adits, connected the Old Triumph and Independence mines, with the Old Triumph (North Star) Mill at the mouth of North Star Gulch via an aerial tramway. North Star waste Dump #5 contains greater than 15,000 cubic yards of waste. However, it appears that some of the waste may have been transported down hill to North Star Waste Dump #6.

Waste Dumps #3, #4, #5 and #6 are being regraded and consolidated in order to combine the wastes in a capped and covered repository with an armored interception trench above the repository and armored drain ditch at the base of the repository (Photo by Schuld, 6/29/09)

From the access road to the upper North Star Mine workings, the Maintenance Shed and Ore Chute can be seen on North Star Waste Dump #1 and below North Star Waste Dump #2.

On top of the North Star #1 Waste Dump and at the base of the North Star #2 waste Dump there is a vacant maintenance shed. (Photo by Schuld May 2007).

The North Star #2 Waste Dump was generated by what may have been a decline. Although the opening is caved, the angular configuration of the timbers and track protruding from the caved feature make this probable. (Photo by Schuld May 2007)

According to DeNovo's approved RAWP, North Star waste dumps #1, #2 and #3, and the archeologically significant "Dog House" and Ore Bins will not be removed. Instead, access to these facilities will be restricted by degrading and revegetating the roads to these dumps from above and below. To accommodate future uses of the area by bikers and hikers, DeNovo is considering provision of an alternate road or trail around the

dumps to Courier Gulch on the east and Triumph and Independence gulches to the northwest and north, respectively.

During the1970s and 1980's these trenches in NS gulch were developed to borrow top soil for commercial sales (Photo by Schuld April 2007)

The remnant of an ore chute on the North Star Waste Dump #1 contained less than 100 cubic yards of waste. Sample NSWDSS01 was collected here. (April 2007).

At the base of North Star Waste Dump #3 is an open adit (below) that was uncovered possibly during the regrade. Because of the unstable nature of the waste dump and brow of the adit, this opening is very dangerous and will be closed under DeNovo's RAWP. (Photo by Schuld April 2007)

Open Adit below WD #3. Because of the unstable nature of the waste dump and brow of the adit, this opening is very dangerous and will be closed under DeNovo's RAWP. (Photo by Schuld April 2007)

Remnants of the “dog house” power poles and tram facilities on WD#5 near the main entrance to the Plummer Tunnel. These features have already been obliterated during recontouring according to DeNovo’s RAWP. (Photo by Schuld April 2007)

Subsequent to a range fire, the facilities at the Plummer Tunnel were destroyed. Prior to implementation of the RAWP, there were remnants of a foundation for the “dog house” a power pole and perhaps one of the up rights for the aerial tramway. The opening is caved, but the large volume of debris made Waste Dump #5 around the Plummer Tunnel very treacherous.

Mr. Massaro’s 1997 work on Karst Drive began by scraping the contaminated soils away from adjacent private properties, and placing the soils in piles so it could be loaded into trucks. Removal of material went to the marker fabric left by the previous remedial

actions at Triumph. Generally speaking trucks were filled only about halfway, which prevented spilling of materials in transit to the repository in upper North Star Gulch.

As part of an agreement between Carl Masaro and the adjacent land owner, Mike Morgan, buildings and other materials were removed from the true Karst Drive plat boundaries to make way for re-construction of the road.

The peripheral areas on Mr. Raabe's and TMI's properties were also scraped to ensure that all contamination was removed. Once the contaminated materials were removed crushed road mixed was compacted to prepare Karst Drive for surfacing. This included Mr. Raabe's driveway.

All of the contaminated soil was removed from the property boundary and lawn adjoining the Bradford's property, and the upper Bradford driveway was prepped for resurfacing with clean gravel.

In 1997 a repository area was prepared by Mr. Masaro in upper North Star Gulch adjacent to a mine waste dump to accommodate approximately 200 cubic yards of contaminated soils and other soil removed from lower North Star gulch, Karst Drive.

Although the weather was exceptional during the 1997 removal work, storm water BMP's were put in place to prevent runoff from carrying contaminated soils and dirt down hill. These BMP's included straw bales and silt fence.

Once contaminated soils from the 1997 work were placed in the repository, clean top soil was hauled to the site for use as a cap and cover.

A shale borrow source was used to backfill and compact a layer of between 8” and 12” above the marker fabric on Karst Drive. (Photo by Schuld October 2007)

While placing shale and gravel as a road base, most of the plus 4” rock were removed to get a better placement and compaction of the road base. Once the road base material started to dry out a little, some dust was generated. The material was immediately and continuously wet down to suppress the dust and get better compaction.

A large berm was constructed to separate TMI's property from Mr. Morgan's, and to provide a retention barrier for seasonal runoff from the road. The berm was treated with top soil seeded with native seed mix and mulched. (Photo by Schuld October 2007)

On the west side of Karst Drive is an exposed outcrop of contaminated soils that may have been contaminated by the historic milling operations in this area. The road cut was regraded to conform to the contours of the hillside, and then seeded and mulched. (Photo by Schuld October 2007)

Clean top soil and gravel (upper left) was also shipped in from an off sight borrow source to supplement road fill and be used to amend topsoil for revegetation. (Photo by Schuld October 2007)

Clean gravel and shale were initially spread on the 30’ wide roadway using a front end loader. The area was continuously hosed down to reduce fugitive dust, and optimize moisture content and compatibility. The wide tires of the front end loader provided for mechanical compaction. (Photo by Schuld October 2007)

The road fill was placed and graded to approximately 10% except in the armored channel that was being developed along the berm to provide for clean stormwater runoff. (Photo by Schuld October 2007)

Coarse dolomite (3”-18”) was hand picked from the North Star Gulch road and placed in the channel to armor it. Karst drive was constructed so that runoff would be shed diagonally into this armored channel rather than down its entire length. This should protect the surface integrity of the roadway. (Photo by Schuld October 2007)

Armoring of the channel next to the new road will prevent some of the erosion on the road. Small check dams were placed in the channel to slow the velocity of runoff and allow fines to drop out in the channel rather than pouring out onto the East Fork Road. These check dams may also help preserve the entrance of Mr. Morgan's driveway on Karst drive. (Photo by Schuld October 2007)

Mulched berm between drain ditch on Karst drive and the adjoining private property (Photo by Schuld October 2007)

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Reclaimed road that led to the Triumph (most recent) Mill building. This area was regraded top soiled, mulched and seeded with a native seed mixture (Photo by Schuld October 2007)

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After the repository was filled, topsoil was graded over the top, seeded and mulched (Photo by Schuld October 2007)

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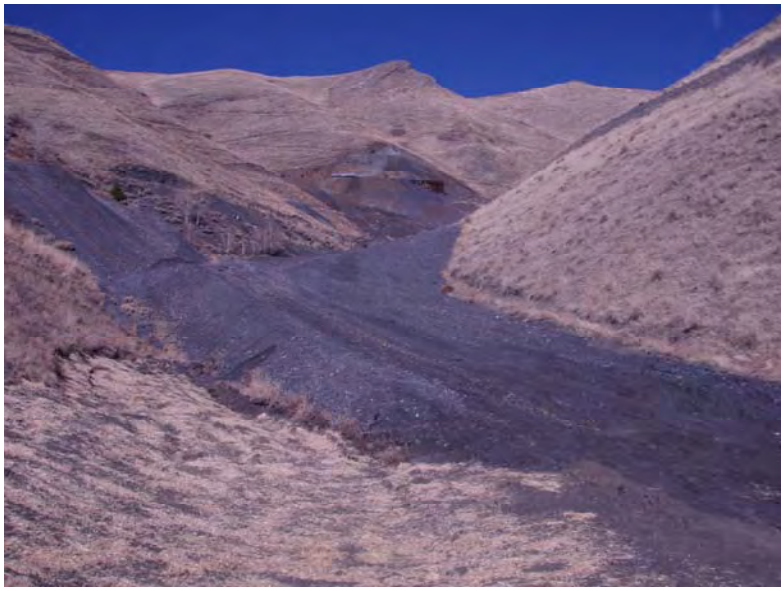

2007 Repository site, post cleanup(Photo by Schuld October 2007)

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In 2007 Triumph Mining Incorporated (TMI) replaced many of the water bars constructed in 2006. These waterbars were supplemented by the development of additional sediment basins in North Star Gulch(Photo by Schuld October 2007)

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Final Surface (2007) of Karst Drive and BMPs(Photo by Schuld October 2007)

Final Surface (2007) of Karst Drive and BMPs (Photo by Schuld October 2007)

This is the final surface (2007) of Karst Drive and BMPs. Note the gate and fence above Mr. Bradford's property. This and the driveway improvements for Mr. Morgan allow them to use TMI's Karst Drive for access to their properties (Photo by Schuld October 2007)

OLD TRIUMPH (SHAFT) AREA SITE CONDITIONS

The Old Triumph (Shaft) area is located in both the northeast ad northwest extensions of Triumph Gulch. The area contains the remnants of very expansive mine and mine related facilities including head frames, hoist rooms, crusher building, operations sheds and offices, and probably homes. The area also contains large volumes of contaminated mine wastes derived from the Milligen Formation. Outcrops of the Milligen Formation and soils in the area contain highly variable concentrations of metals, some of which were targeted for exploration.

View west from the Old Triumph #1 Waste Dump into the center of the historic facilities. All of the roads in the upper left hand corner of the photo were likely either exploration drill roads or for avalanche abatement. (Photo by Schuld April 2007)

View eastward through the site where the Triumph Shaft (right) and crusher sheds were located. (Photo by Schuld April 2007)

Remnant of the Water Tank above the Old Triumph (Shaft) and the road to the Independence Mine and Mill site through Triumph Gulch. (Photo by Schuld April 2007)

This is the structure (#1) bellow the tank may have been one of the lift stations for filling the tank. (Photo by Schuld April 2007).

Apparently there was considerable plumbing and pumping systems running south westward down the ridgeline from the Water Tank at the Old Triumph. The purpose of these facilities, seem to provide for a host of auxiliary facilities including offices, maintenance sheds and perhaps houses.

Structure #2 of the Old Triumph plumbing system appears to be a header house for water distribution and control. (Photo by Schuld April 2007)

The “stair-step” contours of the foundations for the Old Triumph water facilities can be seen on the ridgeline. This view is from an exploration “dog hole” looking southeast towards the Old Triumph. (Photo by Schuld April 2007)

This is a fairly typical caved “dog hole” that was probably driven as an exploration of a massive sulfide out crop north west of the Old Triumph. The dump was unremarkable in volume, but the sulfides were impressive. The “dog hole” does have rather unstable brow, which represents a significant physical hazard that should be approached with caution. (Photo by Schuld April 2007)

This opening was discovered in the outcrop on the south facing slope behind the foundation and collapsed structure of the mill (?) building that overlooks the Triumph Shaft collar. Although this is not a very deep dog hole, it is a dangerous opening beneath and unstable rock face, which will be closed under DeNovo’s RAWP (Photo by Schuld April 2007)

This building, located just east of the Old Triumph Shaft, appears as though it may have been constructed as a new hoist room, perhaps for re-opening the Triumph Shaft. (Photo by Schuld April 2007)

The hoist room for the Triumph Shaft was modified and used as a core shed for the most recent exploration work done by Getty. The floor is strewn with old drill core and boxes. It represents a minor physical hazard with and unstable roof and lots of rat feces.

Looking westward from the Old Triumph #3 Waste Dump towards the processing facilities. The site of what may have been a collapsed raise is located in the right center of the picture. Although partially filled, the feature may be a physical hazard that warrants caution in approach. (Photo by Schuld April 2007)

Looking west from the toe of Waste Dump #3, the roof of the "core shed" (left of center) and collapsed buildings (upper right of center) of the Old Triumph can be seen. (Photo by Schuld May 2007)

The northwest extension of Triumph Gulch (above) along the road to Independence Gulch, was initially targeted for a top soil borrow source to cap and cover the Triumph Repository (DeNovo RAWP 2009, Photo by Schuld 6/29/09).

The northwest extension of Triumph Gulch (above) along the road to Independence Gulch, was initially targeted for a top soil borrow source to cap and cover the Triumph Repository (DeNovo RAWP 2009). However, soils testing by Golder Associates indicated that large area of soils exceeded the removal and capping materials criteria. Based on this data it was presumed that these soils were contaminated by mine wastes.

While that may be partially true, IDEQ staff believes that consistent with other mineralized portions of the Milligen Formation, which underlies this area, these high levels are more likely due to natural mineralization similar to ore emplacements.

The northwest extension of Triumph Gulch during soils stripping (Photo by Schuld 6-29-09)

Two large stockpiles of “hot” soils in the northwest extension of Triumph Gulch. According to DeNovo’s RAWP these soils will be placed in the Triumph Repository (Photo by Schuld 6-29-09).

TRIUMPH TUNNEL (MILL) SITE CONDITIONS

The Triumph Tunnel (Mill) site is characterized by several distinctive features and areas related to numerous activities. The Triumph Tunnel was driven to numerous ore bodies, and was intended to connect the workings on those ore bodies with the (New) Triumph Mill that replaced the Triumph (North Star) Mill. Until the implementation of the DeNovo RAWP the Tunnel area was characterized by a large bench, remnants of a shower house, office, compressor shed, power station, and a "bone yard". Adjacent to the main dump is a trestle which leads to numerous ore bins from. Beneath the ore bins is a large "foot print" of what had been the mill buildings, and the mill tailings impoundments beneath the village of Triumph. Those facilities beneath the ore bins, particularly the mill site and tailings impoundments are not part of this assessment as they were subject to remedial actions in the 1990's.

At least ten other mine adits are located on public and private properties in lower North Star Gulch. These were evaluated with the Triumph Tunnel (Mill) site because of their proximity to the tunnel and apparent connection with the work done at the Triumph Tunnel site. Some are relatively insignificant because they were not extensively developed. However, at least six have sufficient waste volumes (containing massive sulfides) which were sampled. Several of them have mine openings that pose significant physical hazards that should be closed or restricted. Differentiating between these individual working is difficult because of the caving of adits and stopes, slumping or creep of the thick overlying soils, and overlap of waste dumps. Differentiation and remediation efforts are further complicated by the complexities of unpatented fractions inside blocks of patented claims. However, those on private properties will be closed according to the DeNovo RAWP. The mine openings and waste dumps on public lands are not being targeted for remediation**.**

There are several "newer" features located adjacent to the Triumph Tunnel (Mill) site that resulted from the work by Mr. Carl Masaro. These have been included in this assessment. Several hundred feet inside of the tunnel is a mine plug which was intended to back mine waters up into the underground workings to stifle ground water flow through the ore body and hence significantly reduce the acid generating process. Water quality monitoring and analysis of the residual drainage indicates that this has, thus far, been a success. The plug was connected by pipeline and a stainless steel header to the adit where flows are monitored and measured and then released through a buried pipeline to a surge pond and then into a natural wetlands. In 2007 the pipeline from the adit to the surge pond was plugged, presumably from iron/arsenic precipitates. Efforts to repair the plumbing have been stymied by the previous owner of the private properties, Carl Masaro, and the BLM who controls access across public lands. IDEQ is currently reviewing its legal authority to protect and maintain remedial actions under the 1997 Consent Decree.

Ore Bins and Trestle for the Triumph Tunnel and Mill Site (Photo by Schuld May 2007)

Shower House Office on the Triumph Tunnel landing. These facilities were removed by DeNovo in 2009 (Photo by Schuld May 2007).

Triumph Tunnel adit leads to the ore bodies and mine plug. Currently it houses the main components of the drainage control system. (Photo by Schuld May 2007)

In 2009, DeNovo rebuilt an adit drain at eth triumph Tunnel. The drain passes the water (approximately 5 gpm) to an open channel jut east of the BLM property (Photo by Schuld 6/29/09)

Flows from the Triumph Tunnel carry a heavy load of iron, which precipitates and “seals” the open drain. This phenomenon has, over the course of the last few years caused the drain ditch to be effectively sealed to the surge pond. (Photo by Schuld 6-29-09)

During the progression of the “sealing” adit water seeped through the mine waste dump until the ditch was completely sealed to the surge pond. At that point, the discharge went underneath the pond liner until it sealed that area too. Then the discharge found a hole in the lining system and it now enters the surge pond at approximately the same rate as it is discharged from the adit. (photo by Schuld 6-29-09)

Compressor and Power Shed for Triumph Tunnel. These facilities were target by vandals and slowly stolen. In 2009 DeNovo finished the removal of this equipment and facilities on their property (Photo by Schuld 6-29-09)

Abandoned equipment and Receptacles on Waste Dump at the Triumph Tunnel (Photo by Schuld November 2006)

Power Sub-Station at Triumph Tunnel (Photo by Schuld May 2007)

Storage shed and fuel tank on Triumph Tunnel bench (Photo by Schuld May 2007)

Half Pipe Drain from Triumph Tunnel to Surge Pond (Photo by Schuld May 2007)

Armored storm water drain from a catchment bench below the Surge Pond. In the event of overtopping at the pond, discharge may be conveyed to the wetlands below the East Fork Road (Photo by Schuld May 2007)

Remnants of the mill foundation beneath the ore bins. (Photo by Schuld May 2007)

Ore bins and trestle beneath the Triumph Tunnel bench (Photo by Schuld May 2007)

Ore bins and trestle beneath the Triumph Tunnel bench contain less than 100 cubic yards of ore, but because of the massive build up of metallic salts and other precipitates, waste sample TTWDSS-1 was collected. These ore bins are directly above the Morgan property and house (Photo by Schuld May 2007).

New Home Construction on the Morgan property beneath toe of Triumph Tunnel Waste Dump and Ore Bins. This is also the site of the Triumph Mill site.(Photo by Schuld October 2006)

View of Homes in Triumph Village from on top of the Triumph
Tunnel Waste Dump – Post remedial Action (Photo by Schuld October 2006)

Triumph Mill Tailings Impoundment Post Remedial Action
(Photo by Schuld April 2007)

There is a major access road that starts at the base of the Triumph Tunnel waste dump and goes west beneath the Surge Pond to a borrow source west of the Triumph Tunnel. Along this road is a primary cleanout for the pipeline that connects the Surge Pond with the wetlands.

The borrow source resembles a waste dump and/or tailings impoundment in its morphology, and consequently it was mapped and inventoried. The borrow source is several acres in size and although it has the morphology of a waste dump. There are no signs of phyto-toxic stress on the vegetation. Additional discussions with Rob Hanson, the DEQ Project Manager, revealed that this is a reclaimed borrow site.

View of Borrow Source from west to east and the Triumph Tunnel bench is in the background. (Photo by Schuld May 2007)

Discharge from the Surge Pond is plumbed beneath the East Fork Big Wood River Road through a corrugated pipe. (Photo by Schuld May 2007)

Mine adits and dumps in lower North Star Gulch were designated with adit numbers based on the sequence in which they were encountered and assessed. The locations of these dumps are mapped on exhibits at the end of this appendix.

TR Adit #1 is a completely caved adit that appears to have produced less than 50 yd^3 of waste. Triumph Waste Dump #1 (TRWD #1) was located but not sampled. DeNovo's RAWP provide for removal of the dump, and reclamation of the surface area, most of which has been completed as of 6/29/09.

TR Adit #2 was caved, built it appears to have been developed to a greater degree than Adit #1. TRWD#2 contains less than 500 yd^3 of waste. Triumph Waste Dump #2 was located but not sampled. DeNovo's RAWP provide for removal of the dump, and reclamation of the surface area, most of which has been completed as of 6/29/09.

TR Adit #3 was one of the most extensively developed explorations in lower North Star Gulch. It is partially caved, but has a large enough opening to represent a physical hazard. TRWD#3 contains greater than 1,500 yd^3 of waste bearing massive oxides and sulfides most notably chalcopyrite, malachite, and arseno-pyrite. It was sampled (TRWD3SS-1). DeNovo's RAWP provide for closure of the mine opening removal of the dump, and reclamation of the surface area, most of which has been completed as of 6/29/09.

Although partially closed, open Triumph Adit #4 does pose a significant physical hazard. (April 2007). TRWD#4 contained less than 1,500 yd^3 of waste and was not sampled. DeNovo's RAWP provide for removal of the dump, closure of the mine opening and reclamation of the surface area, most of which has been completed as of 6/29/09.

Triumph Adit #5 was caved, and does not appear to have been extensively developed. TRWD#5 contains less than 100 yd^3 of waste, and was not sampled. DeNovo's RAWP provide for removal of the dump, and reclamation of the surface area, most of which has been completed as of 6/29/09.

Triumph Adit #6 is an open adit that is a significant physical hazard. The adit was extensively developed and resulted in approximately 500 yd^3 of waste, which was dumped on TRWD#6. The dump was not sampled. **The mine opening and most of the waste dump may be on BLM administered public lands and are, at the present, not scheduled for any remedial actions or closures.**

Triumph Adit #7 is a series of small caved adits or excavations that do not make much sense regarding what the purpose and objectives of the work was. Very little (less than 50 yd^3 of waste) was generated, consequently TRWD#7 was not sampled. DeNovo's RAWP provide for removal of the dump, and reclamation of the surface area, most of which has been completed as of 6/29/09.

Copper Ore (Malachite) at BC Lot 21 beneath Triumph Waste Dump #7

Triumph Adit #8 is a caved adit. The adit was not extensively developed and resulted in less than 500 yd^3 of waste, which was dumped on TRWD#8. The dump was not sampled. **The mine waste dump may be on BLM administered public lands and are, at the present, not scheduled for any remedial actions or closures.**

Open Stope above Triumph Adit and Waste Dump #9 (May 2007) **The mine opening and most of the waste dump may be on BLM administered public lands and are, at the present, not scheduled for any remedial actions or closures.**

Triumph Waste Dump #11 produced greater than 1500 yd^3 of waste massive sulfides. It was sampled (TRWDSS11, Photo by Schuld May 2007) DeNovo's RAWP provide for removal of the dump, and reclamation of the surface area, most of which has been completed as of 6/29/09.

Although partially collapsed, Triumph Adit #12 poses a significant physical hazard. (Photo by Schuld May 2007). The adit was extensively developed and resulted in approximately 500 yd^3 of waste, which was dumped on TRWD#12. The dump was not sampled. DeNovo's RAWP provide for removal of the dump, and reclamation of the surface area, most of which has been completed as of 6/29/09.

Collapsed Triumph Adit and Waste Dump #12 (Photo by Schuld May 2007)

Triumph Waste Dump #12 (Photo by Schuld May 2007)

During implementation of the RAWP around Triumph waste dumps #1, #2, #3, #4, #5 and #7, DeNovo encountered and exposed an adit and stope that were buried by the waste dumps. The adit was discharging waters which were sampled and found consistent with that water from the Triumph Tunnel. Prior to closure of this and the other mine openings on DeNovo property, DeNovo will be conduct engineering and biological assessments of the opening to determine the best way to manage or close the openings. (Photo by Wicherski 6-29-09)

The previously discussed adit that was exposed while excavating Triumph Waste Dump(s) #1, #2, #3, #4, #5 & #7 is in the center of the photo. The rectangular area above and to the left of the adit contains Triumph Adit/Waste Dump #8, which is on BLM Lot 21. (Photo by Schuld 6-29-09)

Implementation of DeNovo's RAWP included removal of an ore chute and dump adjacent to BLM Lot 19. The DeNovo property is indicated by the disturbed ground, while the undisturbed footings and Triumph Adit/Waste Dump #6 are believed to be located on Lot 19. (Photo by Schuld 6-29-09)

Excavated Areas around Triumph Adit/Waste Dumps #1, #2, #3 #5, and #7. Waste Dumps #6, #8 and #9 which may be on BLM Lands are left intact. Adit #9 is open and should be closed. (Photo by Schuld 6-29-09)

APPENDIX B

TRIUMPH AREA

Chain of Custody/Sample Submittals And Laboratory Analysis

CHAIN OF CUSTODY RECORD

SVL Analytical, Inc. • One Government Gulch • Kellogg, ID 83837 • (208) 784-1258 • FAX: (208) 783-0891

Page 1 of 2

FOR SVL USE ONLY
SVL JOB #

TEMP on Receipt:

Table 1. – Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other_____

Report to Company: IDFG
Contact: Bruce Schuld
Address: 1410 N. Hilton
Boise ID 83706
Phone Number: (208) - 373 - 0554
FAX Number: (208) - 373 - 0154
E-mail: Bruce.schuld@IDFG.Idaho.gov

Invoice Sent To:
Contact: Same as
Address: Report to
Phone Number: Company
FAX Number:
PO#:

Project Name: Kirsch Knapp (Wasa Creek)
Sampler's Signature: Bruce Schuld

Indicate State of sample origination: Idaho **USACE?** ☐ Yes ☐ No

	Sample ID (Please take care to distinguish between: 1 and I, 2 and Z, 5 and S, Ø and O. Thanks!)	Collection: Date	Collection: Time	Collected by: (Init.)	Misc.: Matrix Type (From Table 1)	Misc.: No. of Containers	Preservative(s): Unpreserved	HNO_3 Filtered	HNO_3 Unfiltered	HCl	H_2SO_4	NaOH	Other (Specify)	Analyses Required: Total Metals, RCRA 7 + Cu, Zn, Mn	Rush Instructions (Days)	Comments
1	SSS 1	11/17/08		KH	3	1	X							X			-80mm mesh
2	SSS 2	11/17/08		KH	3	1	X							X			
3	SSS 3	11/17/08		KH	3	1	X							X			
4	SSS 4	11/17/08		KH	3	1	X							X			
5	SSS 4 (Duplicate)	11/17/08		KH	3	1	X							X			
6	SSS 5	11/17/08		KH	3	1	X							X			
7	SSD 1	11/17/08		KH	3	1	X							X			
8	SSD 2	11/17/08		KH	3	1	X							X			
9	SSD 3	11/17/08		KH	3	1	X							X			
10	SSD 4	11/17/08		KH	3	1	X							X			

Relinquished by: Julie Ellegen	Date: 11/12/08	Time: 1500	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sample Reject: ☐ Return ☐ Dispose ☒ Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

SVL-COC 9/05

CHAIN OF CUSTODY RECORD

SVL Analytical, Inc. • One Government Gulch • Kellogg, ID 83837 • (208) 784-1258 • FAX: (208) 783-0891

FOR SVL USE ONLY
SVL JOB #

TEMP on Receipt:

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other_____

Report to Company: IDEQ
Contact: Bruce Schuld
Address: 1410 N. Hilton
Boise, ID. 83706
Phone Number: (208) 373-0554
FAX Number: (208) 373-0154
E-mail: Bruce.Schuld@DEQ.Idaho.GOV

Invoice Sent To:
Contact: Same as
Address: report to
Phone Number:
FAX Number: Company
PO#:

Project Name: Kootenai River (Harrison Rd.)
Sampler's Signature:

Indicate State of sample origination: Idaho **USACE?** ☐ Yes ☐ No

Sample ID (Please take care to distinguish between: 1 and I, 2 and Z, 5 and S, Ø and O. Thanks!)	Collection: Date	Collection: Time	Collected by: (Init.)	Misc.: Matrix Type (From Table 1)	Misc.: No. of Containers	Preservative(s): Unpreserved	Preservative(s): HNO_3 Filtered	Preservative(s): HNO_3 Unfiltered	Preservative(s): HCl	Preservative(s): H_2SO_4	Preservative(s): NaOH	Preservative(s): Other (Specify)	Analyses Required: Total Mercury (EPA 1631)	Rush Instructions (Days)	Comments
1 SSD 5	11/7/08		RH	3	1	X							X		~80 mm mesh
2															
3															
4															
5															
6															
7															
8															
9															
10															

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Jane Ellen	11/12/08				
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sample Reject: ☐ Return ☐ Dispose ☒ Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

SVL-COC 9/05

10-00

NAME	Bruce Schuld DEQ
ATTENTION	
ADDRESS	1410 N Hilton
CITY	Boise STATE ID ZIP CODE 83706
PHONE #	208-373-0554 FAX #
SAMPLER (S)	B. Schuld
PROJECT OR SITE	P.N. / P.O. NUMBER

ALCHEM LABORATORIES

Alchem Laboratories, Inc.
104 West 31st Street
Boise, Idaho 83714
Phone (208) 336-1172

Chain of Custody Form

LAB NUMBER	DATE	TIME	SAMPLE IDENTIFICATION	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	TESTS (CIRCLE METHOD)	NUMBER OF CONTAINERS
10566	10/3	10 00	NSWDSS 6		X			
10567	10/3	9 30	NSWDSS 5		X			
10568	10/3	9 00	NSBGSS 1		X			
10569	10/3	8 45	NSWDSS 1		X			
10570	10/3	8 30	NSWDSS 4		X			
10571	10/3	8 15	UMMDSS 1		X			
10572	10/3	8 00	TSWDSS 3		X			
10573	10/3	7 45	NSWDSS 2		X			
10574	10/3	7 15	NSWDSS 7		X			

TESTS (CIRCLE METHOD): TPH - (418.1 / 8015M); BTEX (602 / 8020 / 8260) (+N +M); CL. SOLVENTS (601 / 8010); VOC's (601-602 / 8021); GC-MS VOC's (624 / 8260); PAH's (8270); PHENOLS (604 / 8040 / 8270); PESTICIDES (608 / 8081 / 8270); PCB's (608 / 8081); SEMI-VOLATILES (625 / 8270); TCLP-(DESIGNATE; 8 RCRA METALS; RBCA - NO LEAD GAS BTEX+N+M (8020 / 8260); RBCA - LEADED GAS EDB (8011) BTEX+N+M, EDC (8021 / 8260); RBCA - FUEL OILS BTEX (8020 / 8260), PAH (8270); RBCA - MOTOR OILS BTEX (8020 / 8260), PAH (8270) CL. SOLVENTS (8010); SEE ATTACHED LIST: T AS, T Pb, T Hg, T Zn

PCB's: X; SEMI-VOLATILES: X; 8 RCRA METALS: RCRA; RBCA - NO LEAD GAS: BTEX+N+M

RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)
Bruce Schuld			

Relinquished By (Signature)	Date/Time	Received for Laboratory By (Signature)	Date/Time	Received With Seal Intact? ☐ Yes ☐ No Label Tag, COC Agree? ☐ Yes ☐ No
		Barb Conklin	10-5-06	

ORIGINAL

LABORATORY POLICIES

CONFIDENTIALITY - Alchem recognizes that analytical results are confidential. No results or information will be given to other parties without the consent of the client unless mandated by applicable law, regulation, or court process. Written request is required from the client for the laboratory to submit information or copies of reports to other parties.

SAMPLE SUBMISSION - Alchem reserves the right to refuse any samples due to insufficient volume, improper containers or preservatives, health or safety risks, or other reasons. It is necessary for us to assume that the paperwork submitted with a sample describes the testing protocol desired. Any changes to this protocol must be submitted to Alchem in writing. However, if changes are made after the originally requested testing is initiated or has been completed, the client must accept payment responsibility. Please send all requests for changes by fax. Our fax number is (208) 336-7124.

Samples, which are submitted to lab but designated, as "Hold" (no tests requested upon submission) are logged into our tracking system for storage and future retrieval as required. A fee of $5.00 per sample is assessed to cover the costs of processing, tracking, storing and disposal. All samples need to be submitted with the following information on a Chain of Custody or other form:

* Name, address, and phone number of person to receive both the report and the invoice
* P.O. or project number if applicable
* Sample identification
* Date and time of collection
* Sample type and matrix
* List of analyses or methods required
* Any special instructions or requirements

Any preserved samples need to be clearly marked and known hazards identified.

PAYMENT TERMS - Payment in advance is required for all clients except those whose credit has been established or approved with our company. For clients with Alchem approved credit, terms are net 30 days from the date of invoice. Alchem reserves the right to ask for payment in advance, if the established payment terms are not adhered to.

BILLING - All fees are charged or billed directly to the client. The billing of a third party will not be accepted without approved credit in advance of sample submission. (Note: We will not be responsible for the re-collection of samples whose holding times have been exceeded due to late requests for third party billing). All third party billing requests must be made prior to invoicing, any changes made after invoicing will be subject to an additional charge for extra clerical work.

SAMPLE CONTAINERS - Containers can be provided as part of analysis cost. All shipping charges are the responsibility of the client. Any bottles or containers not returned to the lab will be billed to the client.

RUSH ANALYSIS - Samples to be analyzed on a rush basis are to be pre-arranged with the lab. Cost for such analysis is dependant upon the analysis, the time frame required, the sample matrix and the amount of routine work which must be interrupted or postponed.

REPORTS - The original copy of each report is sent to the client. A second copy may be sent if requested when the sample is submitted. Copies of all reports are retained in Alchem's files.

HAZARDOUS WASTE - Title to samples shall remain at all times with the client. Samples testing "non-hazardous" will be disposed of through routine responsible laboratory procedure. Alchem reserves the right to return any and all samples deemed hazardous to the client at their cost.

10-00

NAME	Bruce Schold DEQ
ATTENTION	
ADDRESS	1410 N Hilton
CITY	Boise
STATE	ID
ZIP CODE	83706
PHONE #	208 373-0554
FAX #	
SAMPLER (S)	B. Schold
PROJECT OR SITE	
P.N. / P.O. NUMBER	

Alchem Laboratories, Inc.
104 West 31st Street
Boise, Idaho 83714
Phone (208) 336-1172

Chain of Custody Form

LAB NUMBER	DATE	TIME	SAMPLE IDENTIFICATION	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	TESTS (CIRCLE METHOD)	NUMBER OF CONTAINERS
10575	10/3	9 45	NSWD SS3		X		BTEX, VOC's, PAH's, PHENOLS, PESTICIDES, SEE ATTACHED LIST: T. As, T. Pb, T. Zn, T. Hg	
10576	10/3	10 00	TSWD SS 2		X		BTEX, VOC's, PAH's, PHENOLS, PESTICIDES, SEE ATTACHED LIST: T. As, T. Pb, T. Zn, T. Hg	
10577	10/3	10 15	TSWD SS 1		X		BTEX, VOC's, PAH's, PHENOLS, PESTICIDES, SEE ATTACHED LIST: T. As, T. Pb, T. Zn, T. Hg	

RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)
Bruce Schold	10/5/06	11 10 am	

Relinquished By (Signature)	Date/Time	Received for Laboratory By (Signature)	Date/Time	
		Barb Conkin	10-5-06 11 10	Received With Seal Intact? ☐ Yes ☐ No Label Tag, COC Agree? ☐ Yes ☐ No

LABORATORY POLICIES

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Samples, which are submitted to lab but designated, as "Hold" (no tests requested upon submission) are logged into our tracking system for storage and future retrieval as required. A fee of $5.00 per sample is assessed to cover the costs of processing, tracking, storing and disposal. All samples need to be submitted with the following information on a Chain of Custody or other form:

* *Name, address, and phone number of person to receive both the report and the invoice*
* *P.O. or project number if applicable*
* *Sample identification*
* *Date and time of collection*
* *Sample type and matrix*
* *List of analyses or methods required*
* *Any special instructions or requirements*

Any preserved samples need to be clearly marked and known hazards identified.

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RUSH ANALYSIS - *Samples to be analyzed on a rush basis are to be pre-arranged with the lab. Cost for such analysis is dependant upon the analysis, the time frame required, the sample matrix and the amount of routine work which must be interrupted or postponed.*

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Alchem Laboratories, Inc.

104 West 31st Street
Boise, Idaho 83714

Phone (208) 336-1172
FAX (208) 336-7124

Water, Waste Water and Soil Analysis

LABORATORY REPORT

DEPT. OF ENVIRONMENTAL QUALITY
ATTENTION: BRUCE SCHULD
1410 N. HILTON
BOISE, IDAHO 83706

DATE COLLECTED: 10/03/06
TIME COLLECTED: 7:45
DATE RECEIVED: 10/05/06
DATE REPORTED: 10/12/06

PROJ:
SOURCE: NSWDSS2
MATRIX: SOIL

LABORATORY SAMPLE NUMBER: 10573

PERCENT MOISTURE: 3.8%

ANALYSIS	DATE ANALYZED	ANALYST	RESULTS (mg/kg) Dry Weight
ARSENIC	10/11/2006	MB	673.0
LEAD	10/11/2006	MB	2,010.0
MERCURY	10/12/2006	SQ	0.340
ZINC	10/11/2006	MB	8,210.0

Suzanne Myers, Laboratory Manager

Alchem Laboratories, Inc.

104 West 31st Street
Boise, Idaho 83714

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FAX (208) 336-7124

Water, Waste Water and Soil Analysis

LABORATORY REPORT

DEPT. OF ENVIRONMENTAL QUALITY
ATTENTION: BRUCE SCHULD
1410 N. HILTON
BOISE, IDAHO 83706

DATE COLLECTED: 10/03/06
TIME COLLECTED: 9:45
DATE RECEIVED: 10/05/06
DATE REPORTED: 10/12/06

PROJ:
SOURCE: NSWDSS3
MATRIX: SOIL

LABORATORY SAMPLE NUMBER: 10575

PERCENT MOISTURE: 3.1%

ANALYSIS	DATE ANALYZED	ANALYST	RESULTS (mg/kg) Dry Weight
ARSENIC	10/11/2006	MB	626.0
LEAD	10/11/2006	MB	1,700.0
MERCURY	10/12/2006	SQ	0.377
ZINC	10/11/2006	MB	6,860.0

Suzanne Myers, Laboratory Manager

Alchem Laboratories, Inc.

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Boise, Idaho 83714

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Water, Waste Water and Soil Analysis

LABORATORY REPORT

DEPT. OF ENVIRONMENTAL QUALITY
ATTENTION: BRUCE SCHULD
1410 N. HILTON
BOISE, IDAHO 83706

DATE COLLECTED: 10/03/06
TIME COLLECTED: 10:15
DATE RECEIVED: 10/05/06
DATE REPORTED: 10/12/06

PROJ:
SOURCE: TSWDSS1
MATRIX: SOIL

LABORATORY SAMPLE NUMBER: 10577

PERCENT MOISTURE: 5.2%

ANALYSIS	DATE ANALYZED	ANALYST	RESULTS (mg/kg) Dry Weight
ARSENIC	10/11/2006	MB	31.6
LEAD	10/11/2006	MB	210.0
MERCURY	10/12/2006	SQ	0.136
ZINC	10/11/2006	MB	1,040.0

Suzanne Myers, Laboratory Manager

Alchem Laboratories, Inc.

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Boise, Idaho 83714

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FAX (208) 336-7124

Water, Waste Water and Soil Analysis

LABORATORY REPORT

DEPT. OF ENVIRONMENTAL QUALITY
ATTENTION: BRUCE SCHULD
1410 N. HILTON
BOISE, IDAHO 83706

DATE COLLECTED: 10/03/06
TIME COLLECTED: 10:00
DATE RECEIVED: 10/05/06
DATE REPORTED: 10/12/06

PROJ:
SOURCE: TSWDSS2
MATRIX: SOIL

LABORATORY SAMPLE NUMBER: 10576

PERCENT MOISTURE: 5.5%

ANALYSIS	DATE ANALYZED	ANALYST	RESULTS (mg/kg) Dry Weight
ARSENIC	10/11/2006	MB	2,600.0
LEAD	10/11/2006	MB	4,970.0
MERCURY	10/12/2006	SQ	0.701
ZINC	10/11/2006	MB	8,140.0

Suzanne Myers, Laboratory Manager

Alchem Laboratories, Inc.

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Boise, Idaho 83714

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Water, Waste Water and Soil Analysis

LABORATORY REPORT

DEPT. OF ENVIRONMENTAL QUALITY
ATTENTION: BRUCE SCHULD
1410 N. HILTON
BOISE, IDAHO 83706

DATE COLLECTED: 10/03/06
TIME COLLECTED: 8:00
DATE RECEIVED: 10/05/06
DATE REPORTED: 10/12/06

PROJ:
SOURCE: TSWDSS3
MATRIX: SOIL

LABORATORY SAMPLE NUMBER: 10572

PERCENT MOISTURE: 5.4%

ANALYSIS	DATE ANALYZED	ANALYST	RESULTS (mg/kg) Dry Weight
ARSENIC	10/11/2006	MB	3,230.0
LEAD	10/11/2006	MB	4,380.0
MERCURY	10/12/2006	SQ	0.902
ZINC	10/11/2006	MB	12,600.0

Suzanne Myers, Laboratory Manager

Alchem Laboratories, Inc.

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Boise, Idaho 83714

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FAX (208) 336-7124

Water, Waste Water and Soil Analysis

LABORATORY REPORT

DEPT. OF ENVIRONMENTAL QUALITY
ATTENTION: BRUCE SCHULD
1410 N. HILTON
BOISE, IDAHO 83706

DATE COLLECTED: 10/03/06
TIME COLLECTED: 10:00
DATE RECEIVED: 10/05/06
DATE REPORTED: 10/12/06

PROJ:
SOURCE: NSWDSS6
MATRIX: SOIL

LABORATORY SAMPLE NUMBER: 10566

PERCENT MOISTURE: 7.3%

ANALYSIS	DATE ANALYZED	ANALYST	RESULTS (mg/kg) Dry Weight
ARSENIC	10/11/2006	MB	12.4
LEAD	10/11/2006	MB	62.0
MERCURY	10/12/2006	SQ	0.029
ZINC	10/11/2006	MB	166.0

Suzanne Myers, Laboratory Manager

Alchem Laboratories, Inc.

104 West 31st Street
Boise, Idaho 83714

Phone (208) 336-1172
FAX (208) 336-7124

Water, Waste Water and Soil Analysis

LABORATORY REPORT

DEPT. OF ENVIRONMENTAL QUALITY
ATTENTION: BRUCE SCHULD
1410 N. HILTON
BOISE, IDAHO 83706

DATE COLLECTED: 10/03/06
TIME COLLECTED: 7:15
DATE RECEIVED: 10/05/06
DATE REPORTED: 10/12/06

PROJ:
SOURCE: NSWDSS7
MATRIX: SOIL

LABORATORY SAMPLE NUMBER: 10574

PERCENT MOISTURE: 5.0%

ANALYSIS	DATE ANALYZED	ANALYST	RESULTS (mg/kg) Dry Weight
ARSENIC	10/11/2006	MB	195.0
LEAD	10/11/2006	MB	256.0
MERCURY	10/12/2006	SQ	0.049
ZINC	10/11/2006	MB	808.0

Suzanne Myers, Laboratory Manager

Alchem Laboratories, Inc.

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Boise, Idaho 83714

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Water, Waste Water and Soil Analysis

LABORATORY REPORT

DEPT. OF ENVIRONMENTAL QUALITY
ATTENTION: BRUCE SCHULD
1410 N. HILTON
BOISE, IDAHO 83706

DATE COLLECTED: 10/03/06
TIME COLLECTED: 8:45
DATE RECEIVED: 10/05/06
DATE REPORTED: 10/12/06

PROJ:
SOURCE: NSWDSS1
MATRIX: SOIL

LABORATORY SAMPLE NUMBER: 10569

PERCENT MOISTURE: 6.5%

ANALYSIS	DATE ANALYZED	ANALYST	RESULTS (mg/kg) Dry Weight
ARSENIC	10/11/2006	MB	1,470.0
LEAD	10/11/2006	MB	2,260.0
MERCURY	10/12/2006	SQ	0.659
ZINC	10/11/2006	MB	10,300.0

Suzanne Myers, Laboratory Manager

Alchem Laboratories, Inc.

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Boise, Idaho 83714

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Water, Waste Water and Soil Analysis

LABORATORY REPORT

DEPT. OF ENVIRONMENTAL QUALITY
ATTENTION: BRUCE SCHULD
1410 N. HILTON
BOISE, IDAHO 83706

DATE COLLECTED: 10/03/06
TIME COLLECTED: 8:30
DATE RECEIVED: 10/05/06
DATE REPORTED: 10/12/06

PROJ:
SOURCE: NSWDSS4
MATRIX: SOIL

LABORATORY SAMPLE NUMBER: 10570

PERCENT MOISTURE: 3.2%

ANALYSIS	DATE ANALYZED	ANALYST	RESULTS (mg/kg) Dry Weight
ARSENIC	10/11/2006	MB	1,510.0
LEAD	10/11/2006	MB	482.0
MERCURY	10/12/2006	SQ	0.778
ZINC	10/11/2006	MB	2,480.0

Suzanne Myers, Laboratory Manager

Alchem Laboratories, Inc.

104 West 31st Street
Boise, Idaho 83714

Phone (208) 336-1172
FAX (208) 336-7124

Water, Waste Water and Soil Analysis

LABORATORY REPORT

DEPT. OF ENVIRONMENTAL QUALITY
ATTENTION: BRUCE SCHULD
1410 N. HILTON
BOISE, IDAHO 83706

DATE COLLECTED: 10/03/06
TIME COLLECTED: 9:30
DATE RECEIVED: 10/05/06
DATE REPORTED: 10/12/06

PROJ:
SOURCE: NSWDSS5
MATRIX: SOIL

LABORATORY SAMPLE NUMBER: 10567

PERCENT MOISTURE: 3.2%

ANALYSIS	DATE ANALYZED	ANALYST	RESULTS (mg/kg) Dry Weight
ARSENIC	10/11/2006	MB	351.0
LEAD	10/11/2006	MB	902.0
MERCURY	10/12/2006	SQ	0.510
ZINC	10/11/2006	MB	3,680.0

Suzanne Myers, Laboratory Manager

Alchem Laboratories, Inc.

104 West 31st Street
Boise, Idaho 83714

Phone (208) 336-1172
FAX (208) 336-7124

Water, Waste Water and Soil Analysis

LABORATORY REPORT

DEPT. OF ENVIRONMENTAL QUALITY
ATTENTION: BRUCE SCHULD
1410 N. HILTON
BOISE, IDAHO 83706

DATE COLLECTED: 10/03/06
TIME COLLECTED: 9:00
DATE RECEIVED: 10/05/06
DATE REPORTED: 10/12/06

PROJ:
SOURCE: NSBGSS1
MATRIX: SOIL

LABORATORY SAMPLE NUMBER: 10568

PERCENT MOISTURE: 5.5%

ANALYSIS	DATE ANALYZED	ANALYST	RESULTS (mg/kg) Dry Weight
ARSENIC	10/11/2006	MB	29.3
LEAD	10/11/2006	MB	60.8
MERCURY	10/12/2006	SQ	0.047
ZINC	10/11/2006	MB	834.0

Suzanne Myers, Laboratory Manager

III.5 Waterbars

A waterbar is a berm built at a downslope angle, extending across the length of the roadway.

Purpose: Waterbars reduce erosion by diverting runoff away from the road surface. These erosion control structures can be either permanent or temporary for lightly used unimproved roads.

Specifications: (See Figure III-5)

1. Waterbars should extend from the cutbank side of the road across to the fillslope side.

2. Berm height should be twelve (12) to twenty-four (24) inches above the roadbed.

3. Berms should have a downslope angle of between 30% and 40%.

4. Waterbars can be built with a dozer or by hand.

Maintenance: Properly constructed waterbars should require little or no maintenance. They should be kept open at the discharge end so that water can flow away from the roadway. Silt fence, riprap, or a slash filter windrow may need to be installed below the discharge end of the waterbar to control erosion and trap sediment.

SAMPLE RECEIPT CONFIRMATION

SVL ANALYTICAL, INC.
One Government Gulch - Kellogg, ID 83837-0929

CLIENT: BRUCE SCHULD
IDEQ
1410 N. HILTON

BOISE ID 83706
FAX: (208)373-0154 PH: (208)373-0554 Fax:

We will invoice: SAME

SOIL BOISE RCRA METALS
SVL JOB No: 129267
Received: 5/16/07
Expected Due date: 5/30/07
CASE: #
SAS #:
SDG #:

SVL#	M	ClientID	Sampled	Time	By	Received	Sample Comments
574556	S	KMWDSS-1	5/08/07	12:00	BG	5/16/07	Tests:RCRA METALS - SOIL
574557	S	KMBGSS-1	5/08/07	12:30	BG	5/16/07	Tests:RCRA METALS - SOIL
574558	S	OTBGSS-1	5/07/07	15:30	BG	5/16/07	Tests:RCRA METALS - SOIL
574559	S	NSBGSS-2	5/07/07	16:00	BG	5/16/07	Tests:RCRA METALS - SOIL
574560	S	TRBGSS-1	5/07/07	16:30	BG	5/16/07	Tests:RCRA METALS - SOIL
574561	S	TTWDSS-1	5/07/07	10:30	BG	5/16/07	Tests:RCRA METALS - SOIL
574562	S	TRWDSS-9	5/07/07	11:00	BG	5/16/07	Tests:RCRA METALS - SOIL
574563	S	TRWDSS-11	5/07/07	11:30	BG	5/16/07	Tests:RCRA METALS - SOIL
574564	S	BVWD3SS-1	5/09/07	9:45	BG	5/16/07	Tests:RCRA METALS - SOIL
574565	S	IMWD2SS-1	5/08/07	13:15	BG	5/16/07	Tests:RCRA METALS - SOIL
574566	S	IMWD3SS-1	5/08/07	13:30	BG	5/16/07	Tests:RCRA METALS - SOIL
574567	S	IMWD4SS-1	5/08/07	14:15	BG	5/16/07	Tests:RCRA METALS - SOIL
574568	S	IMWD5SS-1	5/08/07	15:00	BG	5/16/07	Tests:RCRA METALS - SOIL
574569	S	IMBGSS-1	5/08/07	13:00	BG	5/16/07	Tests:RCRA METALS - SOIL
574570	S	IMWD6SS-1	5/09/07	12:10	BG	5/16/07	Tests:RCRA METALS - SOIL
574571	S	IM-M-SS-1	5/09/07	13:50	BG	5/16/07	Tests:RCRA METALS - SOIL

ADDITIONAL COMMENTS FOR JOB: Sample Cooler temp: 16.°C.

[ ] These samples will be DISPOSED 45 days after job completion.
[X] These samples will be ARCHIVED 45 days, then you will receive a letter requesting disposal options.

Please contact Crystal Sevy (208-784-1258) if you have questions regarding the receipt of these samples. 7/06/07 8:05

SAMPLE RECEIPT CONFIRMATION

SVL ANALYTICAL, INC.
One Government Gulch - Kellogg, ID 83837-0929

CLIENT: BRUCE SCHULD
IDEQ
1410 N. HILTON

BOISE ID 83706
FAX: (208)373-0154 PH: (208)373-0554 Fax:

We will invoice: SAME

SOIL RCRA METALS
SVL JOB No: 128960
Received: 5/01/07
Expected Due date: 5/15/07
CASE: #
SAS #:
SDG #:

SVL#	M	ClientID	Sampled	Time	By	Received	Sample Comments
571382	S	OTWD2	4/18/07	13:30	BS	5/01/07	Tests:RCRA METALS - SOIL
571383	S	OTWDSSO4	4/18/07	14:15	BS	5/01/07	Tests:RCRA METALS - SOIL
571384	S	OTWDSS05	4/18/07	15:00	BS	5/01/07	Tests:RCRA METALS - SOIL
571385	S	NSWD-3	4/19/07	12:30	BS	5/01/07	Tests:RCRA METALS - SOIL
571386	S	TRWD-3	4/19/07	14:00	BS	5/01/07	Tests:RCRA METALS - SOIL
571387	S	IMSS01	4/17/07	9:30	BS	5/01/07	Tests:RCRA METALS - SOIL
571388	S	IMSS02	4/17/07	10:30	BS	5/01/07	Tests:RCRA METALS - SOIL
571389	S	NS OREBIN CLEANOUT	4/19/07	:	BS	5/01/07	Tests:RCRA METALS - SOIL

ADDITIONAL COMMENTS FOR JOB: Sample Cooler/Container temp not measured upon receipt. SVL DID NOT REC.SAMPLE NS WD-1. SVL DID REC. SAMPLE NS OREBIN CLEANOUT. RCRA METALS WILL BE RUN ON ALL SAMPLES. NO TIME ON SAMPLE LABELS/SAMPLES WILL BE RUN ON AS REC'D BASIS

[ ] These samples will be DISPOSED 45 days after job completion.
[X] These samples will be ARCHIVED 45 days, then you will receive a letter requesting disposal options.

Please contact Crystal Sevy (208-784-1258) if you have questions regarding the receipt of these samples. 7/06/07 8:04

COC 1 OF ____

STATE OF IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

CHAIN OF CUSTODY RECORD

129266

Contact Name	E-mail Address
Bruce Schuld	Bruce.Schuld@DEQ.Idaho.Gov
Address	
1410 N. Hilton St	
City	**State** / **Zip Code**
Boise	ID / 83706
Contact Phone No.	**Fax No.**
208-373-0554	208-373-0154
Project/Site:	**Sampler Signature**
Triumph/Independence	

RECEIVED
JUN 11 2007
DEPT. OF ENVIRONMENTAL QUALITY
WASTE PROGRAM

SAMPLE ID. NO.	DATE	TIME	SAMPLE LOCATION	SAMPLE MATRIX: WATER	SOIL	OTHER	ANALYSIS REQUESTED	SPECIAL INSTRUCTIONS / COMMENTS
KM WD SS-1	5/8	12:00	toe of WD #1		X			
KM BG SS-1	5/8	12:30	background		X			
KM SW-1	5/8	11:30	Pond below 2 adits	X				
OT BG SS-1	5/7	15:30	S. ridge above workings		X			
NS BG SS-2	5/7	16:00	Background - yurt		X			
TR BG SS-1	5/7	16:30	Background		X			
TT WD SS-1	5/7	10:30	Below Tunnel		X			
TR WD SS-9	5/7	11:00	base of WD		X			
TR WD SS-11	5/7	11:30	toe of WD		X			
BV WD3 SS-1	5/9	9:45	base of WD		X			
IM WD2 SS-1	5/8	13:15	toe of WD		X			
IM WD3 SS-1	5/8	13:30	toe of WD		X			

PRESERVATIVE (Ice ≤ 4° C, etc.)

TOTAL # OF CONTAINERS:

RELINQUISHED BY: (Signature)	DATE 5/13	TIME 12:00	RECEIVED BY: (Signature) J. Sieg	DATE 5/16/2007	TIME 1230
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME

SAMPLE RECEIPT:

RECEIVED WITH SEALS INTACT? ☐ YES ☑ NO

LABEL TAG, COC AGREE? ☐ YES ☐ NO

COC 2 OF 2

Contact Name	E-mail Address
Bruce Schuld	
Address	
1410 N Hilton St.	
City	**State** / **Zip Code**
Boise	ID 83706

Contact Phone No.	Fax No.
208-373-0554	208-373-0154
Project/Site:	**Sampler Signature**
Triumph/Independence	Bruce Schuld

STATE OF IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

CHAIN OF CUSTODY RECORD

129266

RECEIVED
JUN 11 2007
DEPT. OF ENVIRONMENTAL QUALITY
WASTE PROGRAM

SAMPLE ID. NO.	DATE	TIME	SAMPLE LOCATION	SAMPLE MATRIX: WATER	SOIL	OTHER	ANALYSIS REQUESTED	SPECIAL INSTRUCTIONS / COMMENTS
IM WD 4 SS-1	5/8	14:15	WD		X			
IM WD5 SS-1	5/8	15:00	WD		X			
IM BG SS-1	5/8	13:00	above adit 1		X			
IM WD6SS-61	5/9	12:10	WD		X			
IM-M-SS-1	5/9	13:50	below mill		X			
IM-WD4-SW-1	5/8	16:00	Pond below Adit 4	X				
IM-WD6-SW1	5/9	12:20	Seep below Adit 6	X				

COPY
ORIGINAL WATER

PRESERVATIVE (Ice ≤ 4° C, etc.)

TOTAL # OF CONTAINERS:

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
Bruce Schuld	5/11	16:00	J. Sieg	5/16/2007	1230
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME

SAMPLE RECEIPT:

RECEIVED WITH SEALS INTACT? ☐ YES ☐ NO

LABEL TAG, COC AGREE? ☐ YES ☐ NO

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83827-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

REPORT OF ANALYTICAL RESULTS

CLIENT : IDEQ
PROJECT:

Sample Receipt: 5/16/07
Report Date: 6/05/07

SVL JOB: 129266

SVL ID	CLIENT SAMPLE ID		Cu 6010B	Pb 6010B	Se 6010B	Zn 6010B	Hg 7470A
W574551	KM SW-1	5/08/07	<0.010mg/L	0.0106mg/L	<0.04mg/L	0.057mg/L	<0.00020mg/L
W574552	IM-WD4-SW-1	5/08/07	<0.010mg/L	<0.0075mg/L	<0.04mg/L	0.381mg/L	<0.00020mg/L
W574553	IM-WD6-SW-1	5/09/07	<0.010mg/L	0.0081mg/L	<0.04mg/L	0.063mg/L	<0.00020mg/L

Certificate: ID ID00019
AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C12

Reviewed By: _____ Date: 6/5/07

IM file

SVL ANALYTICAL, INC.

Quality Control Report
Part I Prep Blank and Laboratory Control Sample

Client :IDEQ

SVL JOB No: 129266

Analyte	Method	Matrix	Units	Prep Blank	True—LCS—Found		LCS %R	Analysis Date
Silver	6010B	WATER	mg/L	<0.0050	0.0500	0.0512	102.4	6/04/07
Arsenic	6010B	WATER	mg/L	<0.025	1.00	0.957	95.7	6/04/07
Barium	6010B	WATER	mg/L	<0.0020	1.00	0.955	95.5	6/04/07
Cadmium	6010B	WATER	mg/L	<0.0020	1.00	0.970	97.0	6/04/07
Chromium	6010B	WATER	mg/L	<0.0060	1.00	0.954	95.4	6/04/07
Copper	6010B	WATER	mg/L	<0.010	1.00	0.986	98.6	6/04/07
Lead	6010B	WATER	mg/L	<0.0075	1.00	0.948	94.8	6/04/07
Selenium	6010B	WATER	mg/L	<0.04	1.00	0.94	94.0	6/04/07
Zinc	6010B	WATER	mg/L	<0.010	1.00	0.940	94.0	6/04/07
Mercury	7470A	WATER	mg/L	<0.00020	0.00500	0.00535	107.0	5/21/07

LEGEND:

LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

SVL ANALYTICAL, INC.

Quality Control Report
Part II Duplicate and Spike Analysis

Client :IDEQ

SVL JOB No: 129266

Test	Method	Mtx	QC SAMPLE ID	Units	Result	Duplicate Found		MSD RPD%	Matrix Spike Result	Matrix Spike SPK ADD	Matrix Spike %R	Analysis Date
Ag	6010B	W	1	mg/L	<0.0050	0.0515	M	0.8	0.0511	0.0500	102.2	6/04/07
As	6010B	W	1	mg/L	<0.025	0.990	M	1.0	1.00	1.00	100.0	6/04/07
Ba	6010B	W	1	mg/L	0.0173	0.954	M	0.2	0.952	1.00	93.5	6/04/07
Cd	6010B	W	1	mg/L	<0.0020	0.948	M	0.6	0.954	1.00	95.4	6/04/07
Cr	6010B	W	1	mg/L	<0.0060	0.953	M	0.4	0.957	1.00	95.7	6/04/07
Cu	6010B	W	1	mg/L	<0.010	1.02	M	1.0	1.03	1.00	103.0	6/04/07
Pb	6010B	W	1	mg/L	0.0081	1.00	M	1.0	1.01	1.00	100.2	6/04/07
Se	6010B	W	1	mg/L	<0.04	1.02	M	1.0	1.03	1.00	103.0	6/04/07
Zn	6010B	W	1	mg/L	0.063	0.962	M	0.9	0.971	1.00	90.8	6/04/07
Hg	7470A	W	2	mg/L	<0.00020	0.00092	M	2.2	0.00094	0.0010	94.0	5/21/07

LEGEND:

RPD% = (|SAM - DUP|/((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.

RPD% = (|SPK - MSD|/((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.

SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

QC limits for MS recoveries apply only if the spike is at least 1/4 the concentration of the analyte in the sample.

Control limits for the RPD apply only if the concentration of the analyte in the sample is at least five times the reporting limit.

QC Sample 1: SVL SAM No.: 574553 Client Sample ID: IM-WD6-SW-1

QC Sample 2: SVL SAM No.: 574551 Client Sample ID: KM SW-1

RECEIVED

JUN 11 2007

DEPT OF ENVIRONMENTAL QUALITY
WASTE PROGRAM

129267 COC 1 OF ____

STATE OF IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

CHAIN OF CUSTODY RECORD

Contact Name	E-mail Address
Bruce Schuld	Bruce.Schuld@DEQ.Idaho.Gov
Address	
1410 N. Hilton St	
City	**State** / **Zip Code**
Boise	ID / 83706

Contact Phone No.	Fax No.
208-373-0554	208-373-0154
Project/Site:	**Sampler Signature**
Triumph/Independence	Bruce Schuld

SAMPLE ID. NO.	DATE	TIME	SAMPLE LOCATION	SAMPLE MATRIX: WATER	SOIL	OTHER	ANALYSIS REQUESTED: 8 RCRA metals (per B. Schuld's DEQ email 5/16/07)	SPECIAL INSTRUCTIONS / COMMENTS
KM WD SS-1	5/8	12:00	Toe of WD #1		X			
KM BG SS-1	5/8	12:30	Background		X			
KM SW-1	5/8	11:30	Pond below 2 adits	X				
OT BG SS-1	5/7	15:30	S. ridge above workings		X			
NS BG SS-2	5/7	16:00	Background - yurt		X			
TR BG SS-1	5/7	16:30	Background		X			
TT WD SS-1	5/7	10:30	Below Tunnel		X			
TR WD SS-9	5/7	11:00	base of WD		X			
TR WD SS-11	5/7	11:30	toe of WD		X			
SV WD 3 SS-1	5/9	9:45	base of WD		X			
IM WD 2 SS-1	5/8	13:15	toe of WD		X			
IM WD 3 SS-1	5/8	13:30	toe of WD		X			

Per Bruce Schuld: Analyze RCRA metals on all samples... 5/16/07 C Smyer

PRESERVATIVE (Ice ≤ 4° C, etc.)

TOTAL # OF CONTAINERS:

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
Bruce Schuld	5/13	12:00	J. Sieg	5/14/2007	1230
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME

SAMPLE RECEIPT:

RECEIVED WITH SEALS INTACT? ☐ YES ☐ NO

LABEL TAG, COC AGREE? ☐ YES ☐ NO

PINK - CLIENT

YELLOW - OFFICE

WHITE - ORIGINAL

RECEIVED

JUN 11 2007

DEPT. OF ENVIRONMENTAL QUALITY
WASTE PROGRAM

129267 COC 2 OF 2

STATE OF IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

CHAIN OF CUSTODY RECORD

Contact Name	E-mail Address
Bruce Schuld	
Address	
1410 N. Hilton St.	
City	State / Zip Code
Boise	ID 83706

Contact Phone No.	Fax No.
208-373-0554	208-373-0154
Project/Site:	Sampler Signature
Triumph/Independence	Bruce Schuld

SAMPLE ID. NO.	DATE	TIME	SAMPLE LOCATION	SAMPLE MATRIX: WATER	SOIL	OTHER	ANALYSIS REQUESTED: 8 RCRA metals (per B. Schuld)	IDEQ	5/16/07 Comp	SPECIAL INSTRUCTIONS / COMMENTS
IM WD 4 SS-1	5/8	14:15	WD		X					
IM WD5 SS-1	5/8	15:00	WD		X					
IM BG SS-1	5/8	13:00	above adit 1		X					
IM WD6 SS-1	5/9	12:40	WD		X					
IM-M-SS-1	5/9	13:50	below mill		X					
IM-WD4-SW-1	5/8	16:00	Pond below Adit 4	X						
IM-WD6-SW1	5/9	12:20	Seep below Adit 6	X						

PRESERVATIVE (Ice ≤ 4° C, etc.)

TOTAL # OF CONTAINERS:

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
Bruce Schuld	5/13	12:00	J. Sieg	5/16/2007	1230
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME

SAMPLE RECEIPT:

RECEIVED WITH SEALS INTACT? ☐ YES ☐ NO

LABEL TAG, COC AGREE? ☐ YES ☐ NO

WHITE - ORIGINAL YELLOW - OFFICE PINK - CLIENT

SVL ANALYTICAL, INC.
SAMPLE RECEIPT CONFIRMATION One Government Gulch - Kellogg, ID 83837-0929

CLIENT: BRUCE SCHULD
IDEQ
1410 N. HILTON

BOISE ID 83706
FAX: (208)373-0154 PH: (208)373-0554 Fax:

We will invoice: SAME

RECEIVED
JUN 11 2007
DEPT. OF ENVIRONMENTAL QUALITY
WASTE PROGRAM

SOIL RCRA METALS
SVL JOB No: 129267
Received: 5/16/07
Expected Due date: 5/31/07

SVL#	M	ClientID	Sampled	Time	By	Received	Sample Comments
574556	S	KMWDSS-1	5/08/07	12:00	BG	5/16/07	Tests:RCRA METALS - SOIL
574557	S	KMBGSS-1	5/08/07	12:30	BG	5/16/07	Tests:RCRA METALS - SOIL
574558	S	OTBGSS-1	5/07/07	15:30	BG	5/16/07	Tests:RCRA METALS - SOIL
574559	S	NSBGSS-2	5/07/07	16:00	BG	5/16/07	Tests:RCRA METALS - SOIL
574560	S	TRBGSS-1	5/07/07	16:30	BG	5/16/07	Tests:RCRA METALS - SOIL
574561	S	TTWDSS-1	5/07/07	10:30	BG	5/16/07	Tests:RCRA METALS - SOIL
574562	S	TRWDSS-9	5/07/07	11:00	BG	5/16/07	Tests:RCRA METALS - SOIL
574563	S	TRWDSS-11	5/07/07	11:30	BG	5/16/07	Tests:RCRA METALS - SOIL
574564	S	BVWD3SS-1	5/09/07	9:45	BG	5/16/07	Tests:RCRA METALS - SOIL
574565	S	IMWD2SS-1	5/08/07	13:15	BG	5/16/07	Tests:RCRA METALS - SOIL
574566	S	IMWD3SS-1	5/08/07	13:30	BG	5/16/07	Tests:RCRA METALS - SOIL
574567	S	IMWD4SS-1	5/08/07	14:15	BG	5/16/07	Tests:RCRA METALS - SOIL
574568	S	IMWD5SS-1	5/08/07	15:00	BG	5/16/07	Tests:RCRA METALS - SOIL
574569	S	IMBGSS-1	5/08/07	13:00	BG	5/16/07	Tests:RCRA METALS - SOIL
574570	S	IMWD6SS-1	5/09/07	12:10	BG	5/16/07	Tests:RCRA METALS - SOIL
574571	S	IM-M-SS-1	5/09/07	13:50	BG	5/16/07	Tests:RCRA METALS - SOIL

ADDITIONAL COMMENTS FOR JOB: Sample Cooler temp: 16.°C.

[ ] These samples will be DISPOSED 45 days after job completion.
[X] These samples will be ARCHIVED 45 days, then you will receive a letter requesting disposal options.

Please contact Crystal Sevy (208-784-1258) if you have questions regarding the receipt of these samples. 5/16/07 14:38

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

REPORT OF ANALYTICAL RESULTS

CLIENT : IDEQ
PROJECT:

Sample Receipt: 5/16/07
Report Date: 6/06/07

SVL JOB: 129267

SVL ID	CLIENT SAMPLE ID		Ag 6010B	As 6010B	Ba 6010B	Cd 6010B	Cr 6010B	Cu 6010B	Pb 6010B	Se 6010B
S574556	KMWDSS-1	5/08/07	113mg/kg	1470mg/kg	260mg/kg	10.9mg/kg	20.8mg/kg	278mg/kg	9750mg/kg	27mg/kg
S574557	KMBGSS-1	5/08/07	<0.50mg/kg	16.2mg/kg	489mg/kg	5.49mg/kg	29.4mg/kg	30.0mg/kg	120mg/kg	<4mg/kg
S574558	OTBGSS-1	5/07/07	<0.50mg/kg	14.4mg/kg	316mg/kg	9.33mg/kg	30.7mg/kg	36.1mg/kg	17.60mg/kg	<4mg/kg
S574559	NSBGSS-2	5/07/07	<0.50mg/kg	34.0mg/kg	94.4mg/kg	10.1mg/kg	58.8mg/kg	72.2mg/kg	51.0mg/kg	<4mg/kg
S574560	TRBGSS-1	5/07/07	<0.50mg/kg	19.6mg/kg	142mg/kg	4.44mg/kg	39.2mg/kg	37.8mg/kg	49.30mg/kg	<4mg/kg
S574561	TTWDSS-1	5/07/07	31.9mg/kg	10700mg/kg	56.1mg/kg	71.0mg/kg	25.1mg/kg	2040mg/kg	11300mg/kg	22mg/kg
S574562	TRWDSS-9	5/07/07	104mg/kg	2590mg/kg	162mg/kg	23.6mg/kg	40.1mg/kg	557mg/kg	2110mg/kg	<4mg/kg
S574563	TRWDSS-11	5/07/07	<0.50mg/kg	665mg/kg	66.1mg/kg	8.93mg/kg	37.7mg/kg	74.7mg/kg	277mg/kg	<4mg/kg
S574564	BVWD3SS-1	5/09/07	45.5mg/kg	455mg/kg	182mg/kg	123mg/kg	8.68mg/kg	230mg/kg	6910mg/kg	22mg/kg
S574565	IMWD2SS-1	5/08/07	47.1mg/kg	733mg/kg	482mg/kg	1.95mg/kg	13.9mg/kg	49.5mg/kg	5750mg/kg	12mg/kg
S574566	IMWD3SS-1	5/08/07	37.2mg/kg	845mg/kg	478mg/kg	1.33mg/kg	28.1mg/kg	65.9mg/kg	4230mg/kg	7mg/kg
S574567	IMWD4SS-1	5/08/07	3.49mg/kg	698mg/kg	237mg/kg	2.26mg/kg	20.3mg/kg	26.9mg/kg	799mg/kg	12mg/kg
S574568	IMWD5SS-1	5/08/07	38.1mg/kg	577mg/kg	349mg/kg	2.81mg/kg	21.2mg/kg	87.4mg/kg	4710mg/kg	8mg/kg
S574569	IMBGSS-1	5/08/07	<0.50mg/kg	12.6mg/kg	351mg/kg	1.84mg/kg	55.0mg/kg	30.9mg/kg	97.7mg/kg	<4mg/kg
S574570	IMWD6SS-1	5/09/07	<0.50mg/kg	56.9mg/kg	74.4mg/kg	6.86mg/kg	33.1mg/kg	48.4mg/kg	174mg/kg	<4mg/kg
S574571	IM-M-SS-1	5/09/07	94.6mg/kg	635mg/kg	114mg/kg	8.0mg/kg	10.6mg/kg	108mg/kg	11200mg/kg	40mg/kg

Soil Samples: As Received Basis

Certificate: ID ID00019
AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C12

Reviewed By: _____ Date: 6/6/07

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

REPORT OF ANALYTICAL RESULTS

CLIENT : IDEQ
PROJECT:

Sample Receipt: 5/16/07
Report Date: 6/06/07

SVL JOB: 129267

SVL ID	CLIENT SAMPLE ID		Zn 6010B	Hg 7471A	% Sol. 999
S574556	KMWDSS-1	5/08/07	1300mg/kg	1.60mg/kg	96.8%
S574557	KMBGSS-1	5/08/07	520mg/kg	<0.033mg/kg	90.6%
S574558	OTBGSS-1	5/07/07	1970mg/kg	0.067mg/kg	95.0%
S574559	NSBGSS-2	5/07/07	716mg/kg	0.052mg/kg	89.8%
S574560	TRBGSS-1	5/07/07	296mg/kg	<0.033mg/kg	90.0%
S574561	TTWDSS-1	5/07/07	11400mg/kg	0.670mg/kg	98.5%
S574562	TRWDSS-9	5/07/07	3000mg/kg	0.687mg/kg	96.2%
S574563	TRWDSS-11	5/07/07	939mg/kg	0.218mg/kg	93.6%
S574564	BVWD3SS-1	5/09/07	14200mg/kg	3.20mg/kg	96.3%
S574565	IMWD2SS-1	5/08/07	291mg/kg	0.370mg/kg	96.4%
S574566	IMWD3SS-1	5/08/07	187mg/kg	0.403mg/kg	90.6%
S574567	IMWD4SS-1	5/08/07	162mg/kg	0.368mg/kg	96.2%
S574568	IMWD5SS-1	5/08/07	231mg/kg	0.503mg/kg	94.3%
S574569	IMBGSS-1	5/08/07	161mg/kg	0.045mg/kg	90.2%
S574570	IMWD6SS-1	5/09/07	629mg/kg	0.128mg/kg	94.8%
S574571	IM-M-SS-1	5/09/07	858mg/kg	0.300mg/kg	96.7%

Soil Samples: As Received Basis

Certificate: ID ID00019
AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C12

Reviewed By: _____ Date: 6/6/07

SVL ANALYTICAL, INC.

Quality Control Report
Part I Prep Blank and Laboratory Control Sample

Client :IDEQ

SVL JOB No: 129267

Analyte	Method	Matrix	Units	Prep Blank	True	LCS Found	LCS %R	Analysis Date
Silver	6010B	SOIL	mg/kg	<0.50	5.00	5.12	102.4	6/05/07
Arsenic	6010B	SOIL	mg/kg	<2.5	100	94.8	94.8	6/05/07
Barium	6010B	SOIL	mg/kg	<0.20	100	102	102.0	6/05/07
Cadmium	6010B	SOIL	mg/kg	<0.20	100	96.8	96.8	6/05/07
Chromium	6010B	SOIL	mg/kg	<0.60	100	105	105.0	6/05/07
Copper	6010B	SOIL	mg/kg	<1.0	100	106	106.0	6/05/07
Lead	6010B	SOIL	mg/kg	<0.75	100	97.4	97.4	6/05/07
Selenium	6010B	SOIL	mg/kg	<4	100	83	83.0	6/05/07
Zinc	6010B	SOIL	mg/kg	<1.0	100	97.1	97.1	6/05/07
Mercury	7471A	SOIL	mg/kg	<0.033	0.834	0.853	102.3	5/22/07

LEGEND:
LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

6/06/07 15:04

SVL ANALYTICAL, INC.

Quality Control Report
Part II Duplicate and Spike Analysis

Client :IDEQ

SVL JOB No: 129267

Test	Method	Mtx	QC SAMPLE ID	Units	Result	Duplicate Found		MSD RPD%	Matrix Spike Result	SPK ADD		%R	Analysis Date
Ag	6010B	S	1	mg/kg	113	129	M	21.5	104	5.00		R >4S	6/05/07
As	6010B	S	1	mg/kg	1470	1610	M	4.3	1680	100		R >4S	6/05/07
Ba	6010B	S	1	mg/kg	260	479	M	7.1	446	100		186.0	6/05/07
Ba	6010B	S	1	mg/kg	260	N/A		N/A	358	100	A	98.0	6/05/07
Cd	6010B	S	1	mg/kg	10.9	130	M	20.3	106	100		95.1	6/05/07
Cr	6010B	S	1	mg/kg	20.8	127	M	0.0	127	100		106.2	6/05/07
Cu	6010B	S	1	mg/kg	278	409	M	5.3	388	100		110.0	6/05/07
Pb	6010B	S	1	mg/kg	9750	9870	M	6.1	9290	100		R >4S	6/05/07
Se	6010B	S	1	mg/kg	27	112	M	2.7	109	100		82.0	6/05/07
Zn	6010B	S	1	mg/kg	1300	3130	M	83.9	1280	100		R >4S	6/05/07
Hg	7471A	S	1	mg/kg	1.60	1.69	M	4.2	1.62	0.167		R >4S	5/22/07

LEGEND:
RPD% = (|SAM - DUP| /((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.
RPD% = (|SPK - MSD| /((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.
SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added
QC limits for MS recoveries apply only if the spike is at least 1/4 the concentration of the analyte in the sample.
Control limits for the RPD apply only if the concentration of the analyte in the sample is at least five times the reporting limit.
QC Sample 1: SVL SAM No.: 574556 Client Sample ID: KMWDSS-1

SVL ANALYTICAL, INC.

Quality Control Report
Part I Prep Blank and Laboratory Control Sample

Client :IDEQ

SVL JOB No: 129267

Analyte	Method	Matrix	Units	Prep Blank	True	LCS	Found	LCS %R	Analysis Date
Silver	6010B	SOIL	mg/kg	<0.50	5.00		5.12	102.4	6/05/07
Arsenic	6010B	SOIL	mg/kg	<2.5	100		94.8	94.8	6/05/07
Barium	6010B	SOIL	mg/kg	<0.20	100		102	102.0	6/05/07
Cadmium	6010B	SOIL	mg/kg	<0.20	100		96.8	96.8	6/05/07
Chromium	6010B	SOIL	mg/kg	<0.60	100		105	105.0	6/05/07
Copper	6010B	SOIL	mg/kg	<1.0	100		106	106.0	6/05/07
Lead	6010B	SOIL	mg/kg	<0.75	100		97.4	97.4	6/05/07
Selenium	6010B	SOIL	mg/kg	<4	100		83	83.0	6/05/07
Zinc	6010B	SOIL	mg/kg	<1.0	100		97.1	97.1	6/05/07
Mercury	7471A	SOIL	mg/kg	<0.033	0.834		0.853	102.3	5/22/07

LEGEND:

LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

Client :IDEQ SVL JOB No: 129267

Test	Method	Mtx	QC SAMPLE ID	Units	Result	Duplicate or MSD Found		RPD%	Matrix Spike Result	SPK ADD		%R	Analysis Date
Ag	6010B	S	1	mg/kg	113	129	M	21.5	104	5.00		R >4S	6/05/07
As	6010B	S	1	mg/kg	1470	1610	M	4.3	1680	100		R >4S	6/05/07
Ba	6010B	S	1	mg/kg	260	479	M	7.1	446	100		186.0	6/05/07
Ba	6010B	S	1	mg/kg	260	N/A		N/A	358	100	A	98.0	6/05/07
Cd	6010B	S	1	mg/kg	10.9	130	M	20.3	106	100		95.1	6/05/07
Cr	6010B	S	1	mg/kg	20.8	127	M	0.0	127	100		106.2	6/05/07
Cu	6010B	S	1	mg/kg	278	409	M	5.3	388	100		110.0	6/05/07
Pb	6010B	S	1	mg/kg	9750	9870	M	6.1	9290	100		R >4S	6/05/07
Se	6010B	S	1	mg/kg	27	112	M	2.7	109	100		82.0	6/05/07
Zn	6010B	S	1	mg/kg	1300	3130	M	83.9	1280	100		R >4S	6/05/07
Hg	7471A	S	1	mg/kg	1.60	1.69	M	4.2	1.62	0.167		R >4S	5/22/07

LEGEND:
RPD% = (|SAM - DUP| /((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.
RPD% = (|SPK - MSD| /((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.
SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added
QC limits for MS recoveries apply only if the spike is at least 1/4 the concentration of the analyte in the sample.
Control limits for the RPD apply only if the concentration of the analyte in the sample is at least five times the reporting limit.
QC Sample 1: SVL SAM No.: 574556 Client Sample ID: KMWDSS-1

SVL ANALYTICAL, INC.

Quality Control Report
Part I Prep Blank and Laboratory Control Sample

SVL JOB No: 130636

Client :IDEQ

Analyte	Method	Matrix	Units	Prep Blank	True	LCS	Found	LCS %R	Analysis Date
Silver	6010B	ESOIL	mg/L Ext	<0.0500	1.00		1.01	101.0	8/10/07
Arsenic	6010B	ESOIL	mg/L Ext	<0.050	1.00		1.04	104.0	8/10/07
Lead	6010B	ESOIL	mg/L Ext	<0.050	1.00		0.939	93.9	8/10/07
Mercury	7470A	ESOIL	mg/L Ext	<0.00020	0.00500		0.00510	102.0	8/07/07

LEGEND:
LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

SVL ANALYTICAL, INC.

Quality Control Report
Part II Duplicate and Spike Analysis

SVL JOB No: 130636

Client :IDEQ

Test	Method	Mtx	QC SAMPLE ID Units	Result	Duplicate or MSD Found		RPD%	Matrix Spike Result	SPK ADD	%R	Analysis Date
Ag	6010B	E	1 mg/L Ex	<0.0500	1.10	M	1.8	1.12	0.0500	******	8/10/07
As	6010B	E	1 mg/L Ex	0.651	1.71	M	0.6	1.72	1.00	106.9	8/10/07
Pb	6010B	E	1 mg/L Ex	0.070	1.17	M	0.9	1.18	1.00	111.0	8/10/07
Hg	7470A	E	1 mg/L Ex	<0.00020	0.00099	M	1.0	0.00098	0.0010	98.0	8/07/07

LEGEND:
RPD% = (|SAM - DUP|/((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.
RPD% = (|SPK - MSD|/((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.
SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added
QC limits for MS recoveries apply only if the spike is at least 1/4 the concentration of the analyte in the sample.
Control limits for the RPD apply only if the concentration of the analyte in the sample is at least five times the reporting limit.
QC Sample 1: SVL SAM No.: 590349 Client Sample ID: TVNGSS-1

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

IDEQ
1410 N. Hilton
Boise , ID83706

Work Order: W700764
Reported 07-Sep-07 18:13

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Nan Wilson
Laboratory Director
07-Sep-2007

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received
OR-BG SW	W700764-01	Water	08-Aug-07	BRIAN LEABER	14-Aug-07
TT-SW1	W700764-02	Water	08-Aug-07	BRIAN LEABER	14-Aug-07
UNKW AL SW1	W700764-03	Water	09-Aug-07	BRIAN LEABER	14-Aug-07
BS-BG SW1	W700764-04	Water	07-Aug-07	BRIAN LEABER	14-Aug-07
BS AZ SW1	W700764-05	Water	07-Aug-07	BRIAN LEABER	14-Aug-07
BS SW2	W700764-06	Water	07-Aug-07	BRIAN LEABER	14-Aug-07

Certifications: AZ 0538, CA 2080, ID00019, E87993, ID00019, CERT0027, ID000192007A, WA 1268, ID00019

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

IDEQ
1410 N. Hilton
Boise , ID83706

Work Order: W700764
Reported 07-Sep-07 18:13

Client Sample ID: **TT-SW1**
SVL Sample ID: **W700764-02 (Water)**

Sampled: 08-Aug-07
Received: 14-Aug-07
Sampled: BRIAN LEABER

Method	Analyte	Result	Units	RL	MDL	Dilution	Notes	Analyzed	Analyst
Metals by EPA 6000/7000 Series Methods									
EPA 7470A	Mercury	< 0.0002	mg/L	0.0002	0.00009			16-Aug-07	JAA
Total Recoverable Metals by EPA 6000/7000 Series Methods									
EPA 6010B	**Arsenic**	0.059	mg/L	0.025	0.009			05-Sep-07	AS
EPA 6010B	**Barium**	0.0106	mg/L	0.0020	0.00064			05-Sep-07	AS
EPA 6010B	Cadmium	< 0.0020	mg/L	0.0020	0.00045			05-Sep-07	AS
EPA 6010B	Chromium	< 0.0060	mg/L	0.0060	0.00065			05-Sep-07	AS
EPA 6010B	Copper	< 0.010	mg/L	0.010	0.003			05-Sep-07	AS
EPA 6010B	**Lead**	0.044	mg/L	0.008	0.003			05-Sep-07	AS
EPA 6010B	**Selenium**	0.151	mg/L	0.040	0.013			05-Sep-07	AS
EPA 6010B	Silver	< 0.0050	mg/L	0.0050	0.00039			05-Sep-07	AS
EPA 6010B	**Zinc**	1.39	mg/L	0.0100	0.0017			05-Sep-07	AS

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

IDEQ
1410 N. Hilton
Boise, ID 83706

Work Order: **W701632**
Reported 16-Oct-07 11:25

Client Sample ID: **TTSPSS-01**
SVL Sample ID: **W701632-07 (Solid)**

Sampled: 26-Sep-07
Received: 01-Oct-07
Sampled By: BAS

Method	Analyte	Result	Units	RL	MDL	Dilution	Notes	Analyzed	Analyst
Total Recoverable Metals by EPA 6000/7000 Series Methods									
EPA 6010B	**Antimony**	7.9	mg/kg	2.0	0.7			15-Oct-07	DT
EPA 6010B	**Arsenic**	552	mg/kg	2.5	0.7			15-Oct-07	DT
EPA 6010B	**Cadmium**	5.90	mg/kg	0.20	0.05			15-Oct-07	DT
EPA 6010B	**Copper**	58.2	mg/kg	1.00	0.27			15-Oct-07	DT
EPA 6010B	**Iron**	24600	mg/kg	6.0	1.0			15-Oct-07	DT
EPA 6010B	**Lead**	234	mg/kg	0.75	0.50			15-Oct-07	DT
EPA 6010B	Selenium	< 4.0	mg/kg	4.0	1.1			15-Oct-07	DT
EPA 6010B	**Silver**	4.69	mg/kg	0.50	0.06			15-Oct-07	DT
EPA 6010B	**Zinc**	882	mg/kg	1.00	0.13			15-Oct-07	DT
Mercury by SW846 Methods									
EPA 7471A	**Mercury**	0.137	mg/kg	0.033	0.007			09-Oct-07	JAA
Percent Solids									
Percent Solids	**% Solids**	97	%					08-Oct-07	HB

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Larry Drew
Technical Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

IDEQ
1410 N. Hilton
Boise, ID 83706

Work Order: **W701632**
Reported 16-Oct-07 11:25

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
Total Recoverable Metals by EPA 6000/7000 Series Methods								
EPA 6010B	Antimony	mg/kg	<2.0	0.7	2.0	W710052	15-Oct-07	
EPA 6010B	Arsenic	mg/kg	<2.5	0.7	2.5	W710052	15-Oct-07	
EPA 6010B	Cadmium	mg/kg	<0.20	0.05	0.20	W710052	15-Oct-07	
EPA 6010B	Copper	mg/kg	<1.00	0.27	1.00	W710052	15-Oct-07	
EPA 6010B	Iron	mg/kg	<6.0	1.0	6.0	W710052	15-Oct-07	
EPA 6010B	Lead	mg/kg	<0.75	0.50	0.75	W710052	15-Oct-07	
EPA 6010B	Selenium	mg/kg	<4.0	1.1	4.0	W710052	15-Oct-07	
EPA 6010B	Silver	mg/kg	<0.50	0.06	0.50	W710052	15-Oct-07	
EPA 6010B	Zinc	mg/kg	<1.00	0.13	1.00	W710052	15-Oct-07	
Mercury by SW846 Methods								
EPA 7471A	Mercury	mg/kg	<0.033	0.007	0.033	W710170	09-Oct-07	

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Total Recoverable Metals by EPA 6000/7000 Series Methods									
EPA 6010B	Antimony	mg/kg	103	100	103	84 - 110	W710052	15-Oct-07	
EPA 6010B	Arsenic	mg/kg	99.8	100	99.8	84 - 110	W710052	15-Oct-07	
EPA 6010B	Cadmium	mg/kg	103	100	103	86 - 110	W710052	15-Oct-07	
EPA 6010B	Copper	mg/kg	108	100	108	89 - 112	W710052	15-Oct-07	
EPA 6010B	Iron	mg/kg	1050	1000	105	86 - 117	W710052	15-Oct-07	
EPA 6010B	Lead	mg/kg	104	100	104	82 - 117	W710052	15-Oct-07	
EPA 6010B	Selenium	mg/kg	91.3	100	91.3	80 - 108	W710052	15-Oct-07	
EPA 6010B	Silver	mg/kg	5.30	5.00	106	90 - 118	W710052	15-Oct-07	
EPA 6010B	Zinc	mg/kg	100	100	100	85 - 112	W710052	15-Oct-07	
Mercury by SW846 Methods									
EPA 7471A	Mercury	mg/kg	0.927	0.833	111	85 - 115	W710170	09-Oct-07	

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Total Recoverable Metals by EPA 6000/7000 Series Methods										
EPA 6010B	Antimony	mg/kg	62.9	3.7	100	59.2	75 - 125	W710052	15-Oct-07	M2
EPA 6010B	Arsenic	mg/kg	135	30.6	100	104	75 - 125	W710052	15-Oct-07	
EPA 6010B	Cadmium	mg/kg	117	13.5	100	103	75 - 125	W710052	15-Oct-07	
EPA 6010B	Copper	mg/kg	199	77.0	100	122	75 - 125	W710052	15-Oct-07	
EPA 6010B	Iron	mg/kg	21300	19300	1000	R > 4S	75 - 125	W710052	15-Oct-07	M3
EPA 6010B	Lead	mg/kg	252	144	100	108	75 - 125	W710052	15-Oct-07	
EPA 6010B	Selenium	mg/kg	110	13.1	100	97.1	75 - 125	W710052	15-Oct-07	
EPA 6010B	Silver	mg/kg	7.61	1.56	5.00	121	75 - 125	W710052	15-Oct-07	
EPA 6010B	Zinc	mg/kg	1230	1080	100	R > 4S	75 - 125	W710052	15-Oct-07	M3
Mercury by SW846 Methods										
EPA 7471A	Mercury	mg/kg	0.367	0.200	0.167	100	75 - 125	W710170	09-Oct-07	

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

IDEQ
1410 N. Hilton
Boise, ID 83706

Work Order: W701632
Reported 16-Oct-07 11:25

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	Spike Result	Sample Result	Spike Level	% Rec.	Rec. Limits	RPD	RPD Limit	Batch ID	Analyzed	Notes
Total Recoverable Metals by EPA 6000/7000 Series Methods												
EPA 6010B	Antimony	mg/kg	62.0	3.7	100	58.4	75-125	1.43	20	W710052	15-Oct-07	
EPA 6010B	Arsenic	mg/kg	131	30.6	100	101	75-125	2.31	20	W710052	15-Oct-07	
EPA 6010B	Cadmium	mg/kg	112	13.5	100	98.9	75-125	3.61	20	W710052	15-Oct-07	
EPA 6010B	Copper	mg/kg	192	77.0	100	115	75-125	3.51	20	W710052	15-Oct-07	
EPA 6010B	Iron	mg/kg	19900	19300	1000	53.1	75-125	7.20	20	W710052	15-Oct-07	
EPA 6010B	Lead	mg/kg	257	144	100	113	75-125	1.77	20	W710052	15-Oct-07	
EPA 6010B	Selenium	mg/kg	108	13.1	100	95.2	75-125	1.75	20	W710052	15-Oct-07	
EPA 6010B	Silver	mg/kg	7.19	1.56	5.00	113	75-125	5.58	20	W710052	15-Oct-07	
EPA 6010B	Zinc	mg/kg	1160	1080	100	75.4	75-125	6.36	20	W710052	15-Oct-07	
Mercury by SW846 Methods												
EPA 7471A	Mercury	mg/kg	0.348	0.200	0.167	89.0	75-125	5.13	20	W710170	9-Oct-07	

Quality Control - POST DIGESTION SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Total Recoverable Metals by EPA 6000/7000 Series Methods										
EPA 6010B	Antimony	mg/kg	96.1	3.7	100	92.4	75 - 125	W710052	15-Oct-07	D2

Notes and Definitions

M3 The accuracy of the spike recovery value is reduced since the analyte concentration in the sample is disproportionate to spike level. The LCS was acceptable.

M2 Matrix spike was low, but the LCS was acceptable.

D2 Sample required dilution due to high concentration of target analyte.

CHAIN OF CUSTODY RECORD

SVL Analytical, Inc. • One Government Gulch • Kellogg, ID 83837 • (208) 784-1258 • FAX: (208) 783-0891

FOR SVL USE ONLY
SVL JOB #

TEMP on Receipt: 13.8°C 130005

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other_____

Report to Company: IDEQ
Contact: Bruce Schuld
Address: 1410 N. Hilton St.
Boise Idaho 83706
Phone Number: 208-373-0554
FAX Number: 208-373-0154
E-mail: bruce.schuld@deq.idaho.gov

Invoice Sent To: IDEQ
Contact: Bruce Schuld
Address: 1410 N. Hilton St
Boise ID 83706
Phone Number:
FAX Number:
PO#:

Project Name: Blaine County PA
Sampler's Signature: Bruce Schuld

Indicate State of sample origination: ID
USACE? ☐ Yes ☒ No

	Sample ID Please take care to distinguish between: 1 and I 2 and Z 5 and S Ø and O Thanks! *	Collection: Date	Collection: Time	Collected by: (Init.)	Misc.: Matrix Type (From Table 1)	Misc.: No. of Containers	Preservative(s): Unpreserved	Preservative(s): HNO_3 Filtered	Preservative(s): HNO_3 Unfiltered	Preservative(s): HCl	Preservative(s): H_2SO_4	Preservative(s): NaOH	Preservative(s): Other (Specify)	Analyses Required: Total Metals - RCRA 8	Analyses Required: Total Copper	Analyses Required: Total - Zinc	Rush Instructions (Days)
1	M-WD-4 SS-1	6/5/07	15:45	BG	3	1	✓							X	X	X	
2	TR-WD-4 SS-1	6/7/07	12:00	BG	3	1	✓							X	X	X	
3	QC-SS-1	6/7/07	15:00	RL	3	1	✓							X	X	X	
4	~~MG~~ UNG BG-1	6/12/07	10:45	RH	3	1	✓							X	X	X	
5	NG WDG-SS-1	6/12/07	13:00	BS	3	1	✓							X	X	X	
6	NG WDG SS-2	6/12/07	13:46	BS	3	1	✓							X	X	X	
7	LNG WD-1 SS-1	6/13/07 ~~6/12/07~~	15:30	BS	3	1	✓							X	X	X	
8	RC WD 10 JT	6/13/07	13:50	RH	3	1	✓							X	X	X	
9																	
10																	

Comments
Sample #'s 1-2-3-5 & 7 Have No Time on Id.
*
All Samples Arrived Sitting in Water — Ice Melted.
COC Not Signed by Client.

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
			S. Sieg	6/20/07	1500
Relinquished by:	Date:	Time:	Received by:		

* Sample Reject: ☐ Return ☐ Dispose ☐ Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

SVL-COC 9/05

SAMPLE RECEIPT CONFIRMATION

SVL ANALYTICAL, INC.
One Government Gulch - Kellogg, ID 83837-0929

CLIENT: BRUCE SCHULD
IDEQ
1410 N. HILTON

BOISE ID 83706
FAX: (208)373-0154 PH: (208)373-0554 Fax:

We will invoice: SAME

SOIL RCRA/CU/ZN
SVL JOB No: 130005
Received: 6/20/07
Expected Due date: 7/05/07

SVL#	M	ClientID	Sampled	Time	By	Received	Sample Comments
582608	S	M-WD-4 SS-1	6/05/07	15:45	BG	6/20/07	Tests:RCRA METALS - SOIL|Zn ICP SOIL|Cu ICP SOIL|
582609	S	TR-WD-4 SS-1	6/07/07	12:00	BG	6/20/07	Tests:RCRA METALS - SOIL|Zn ICP SOIL|Cu ICP SOIL|
582610	S	QC-SS-1	6/07/07	15:00	RL	6/20/07	Tests:RCRA METALS - SOIL|Zn ICP SOIL|Cu ICP SOIL|
582611	S	UNG BG-1	6/12/07	10:45	RH	6/20/07	Tests:RCRA METALS - SOIL|Zn ICP SOIL|Cu ICP SOIL|
582612	S	NG WDG-SS-1	6/12/07	13:00	BS	6/20/07	Tests:RCRA METALS - SOIL|Zn ICP SOIL|Cu ICP SOIL|
582613	S	NG WDG SS-2	6/12/07	13:46	BS	6/20/07	Tests:RCRA METALS - SOIL|Zn ICP SOIL|Cu ICP SOIL|
582614	S	LNG WD-1 SS-1	6/13/07	15:30	BS	6/20/07	Tests:RCRA METALS - SOIL|Zn ICP SOIL|Cu ICP SOIL|
582615	S	RC WD-10 JT	6/13/07	13:50	RH	6/20/07	Tests:RCRA METALS - SOIL|Zn ICP SOIL|Cu ICP SOIL|

ADDITIONAL COMMENTS FOR JOB: Sample Cooler temp: 13.°C.
TIME NOT LISTED ON SOME SAMPLES/SAMPLES ARRIVES SITTING IN
WATER THE ICE HAD MELTED, COC NOT SIGNED BY CLIENT

[ ] These samples will be DISPOSED 45 days after job completion.
[X] These samples will be ARCHIVED 45 days, then you will receive a letter requesting disposal options.

Please contact Crystal Sevy (208-784-1258) if you have questions regarding the receipt of these samples. 6/20/07 16:44

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

REPORT OF ANALYTICAL RESULTS

CLIENT : IDEQ
PROJECT:

Sample Receipt: 6/20/07
Report Date: 7/19/07

SVL JOB: 130005

SVL ID	CLIENT SAMPLE ID		Ag 6010B	As 6010B	Ba 6010B	Cd 6010B	Cr 6010B	Cu 6010B	Pb 6010B	Se 6010B
S582608	M-WD-4 SS-1	6/05/07	58.2mg/kg	708mg/kg	50.0mg/kg	195mg/kg	40.9mg/kg	190mg/kg	13100mg/kg	<4mg/kg
S582609	TR-WD-4 SS-1	6/07/07	253mg/kg	594mg/kg	11.4mg/kg	55.3mg/kg	4.49mg/kg	509mg/kg	56300mg/kg	26mg/kg
S582610	QC-SS-1	6/07/07	40.8mg/kg	177mg/kg	77.3mg/kg	16.1mg/kg	7.62mg/kg	137mg/kg	2050mg/kg	21mg/kg
S582611	UNG BG-1	6/12/07	4.04mg/kg	54mg/kg	191mg/kg	9.79mg/kg	31.9mg/kg	38.6mg/kg	357.0mg/kg	<4mg/kg
S582612	NG WDG-SS-1	6/12/07	<0.50mg/kg	649mg/kg	55.0mg/kg	265mg/kg	20.5mg/kg	188mg/kg	279.0mg/kg	<4mg/kg
S582613	NG WDG SS-2	6/12/07	0.68mg/kg	817mg/kg	96.7mg/kg	13.4mg/kg	21.8mg/kg	36.4mg/kg	115.0mg/kg	5mg/kg
S582614	LNG WD-1 SS-1	6/13/07	4.96mg/kg	79mg/kg	14.2mg/kg	13.6mg/kg	21.2mg/kg	10.3mg/kg	1830mg/kg	<4mg/kg
S582615	RC WD-10 JT	6/13/07	161mg/kg	11500mg/kg	22.9mg/kg	46.1mg/kg	12.5mg/kg	1360mg/kg	41300mg/kg	9mg/kg

Certificate: ID ID00019
AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C12

Reviewed By: _____ Date: 7/19/07

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

REPORT OF ANALYTICAL RESULTS

CLIENT : IDEQ
PROJECT:

Sample Receipt: 6/20/07
Report Date: 7/19/07

SVL JOB: 130005

SVL ID	CLIENT SAMPLE ID		Zn 6010B	Hg 7471A	% Sol. 999
S582608	M-WD-4 SS-1	6/05/07	22100mg/kg	0.720mg/kg	97.6%
S582609	TR-WD-4 SS-1	6/07/07	10100mg/kg	6.48mg/kg	98.7%
S582610	QC-SS-1	6/07/07	573mg/kg	0.297mg/kg	98.2%
S582611	UNG BG-1	6/12/07	1010mg/kg	0.090mg/kg	95.0%
S582612	NG WDG-SS-1	6/12/07	28300mg/kg	0.262mg/kg	76.5%
S582613	NG WDG SS-2	6/12/07	1230mg/kg	6.90mg/kg	94.1%
S582614	LNG WD-1 SS-1	6/13/07	1000mg/kg	0.310mg/kg	91.8%
S582615	RC WD-10 JT	6/13/07	4970mg/kg	16.3mg/kg	98.8%

Certificate: ID ID00019
AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C12

Reviewed By: _____ Date: 7/19/07

Client :IDEQ

SVL JOB No: 13000

Analyte	Method	Matrix	Units	Prep Blank	True	LCS	Found	LCS %R	Analysis Date
Silver	6010B	SOIL	mg/kg	<0.50	5.00		4.78	95.6	7/08/0
Arsenic	6010B	SOIL	mg/kg	<2.5	100		92.9	92.9	7/11/0
Barium	6010B	SOIL	mg/kg	<0.20	100		98.6	98.6	7/08/0
Cadmium	6010B	SOIL	mg/kg	<0.20	100		93.8	93.8	7/08/0
Chromium	6010B	SOIL	mg/kg	<0.60	100		97.4	97.4	7/08/0
Copper	6010B	SOIL	mg/kg	<1.0	100		92.3	92.3	7/08/0
Lead	6010B	SOIL	mg/kg	<0.75	100		104	104.0	7/11/0
Selenium	6010B	SOIL	mg/kg	<4	100		93	93.0	7/08/0
Zinc	6010B	SOIL	mg/kg	<1.0	100		86.6	86.6	7/11/0
Mercury	7471A	SOIL	mg/kg	<0.033	0.834		0.877	105.2	7/03/0

LEGEND:
LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

SVL ANALYTICAL, INC.

Quality Control Repor
Part II Duplicate and Spike Analysi

Client :IDEQ

SVL JOB No: 130005

Test	Method	Mtx	QC SAMPLE ID	Units	Result	Duplicate Found	or	MSD RPD%	Matrix Spike Result	SPK ADD		%R	Analysis Date
Ag	6010B	S	1	mg/kg	58.2	61.3	M	46.9	98.9	5.00		R >4S	7/08/07
As	6010B	S	1	mg/kg	708	875	M	5.4	829	100		121.0	7/11/07
Ba	6010B	S	1	mg/kg	50.0	144	M	2.8	140	100		90.0	7/08/07
Cd	6010B	S	1	mg/kg	195	294	M	0.0	294	100		99.0	7/08/07
Cr	6010B	S	1	mg/kg	40.9	126	M	4.7	132	100		91.1	7/08/07
Cu	6010B	S	1	mg/kg	190	237	M	3.4	229	100		39.0	7/08/07
Cu	6010B	S	1	mg/kg	190	N/A		N/A	259	100	A	69.0	7/08/07
Pb	6010B	S	1	mg/kg	13100	12300	M	58.2	22400	100		R >4S	7/11/07
Se	6010B	S	1	mg/kg	<4	91	M	1.1	92	100		92.0	7/08/07
Zn	6010B	S	1	mg/kg	22100	23700	M	13.5	20700	100		R >4S	7/11/07
Hg	7471A	S	1	mg/kg	0.720	0.800	M	3.8	0.770	0.167		R >4S	7/03/07

LEGEND:

RPD% = (|SAM - DUP| /((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.

RPD% = (|SPK - MSD| /((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.

SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

QC limits for MS recoveries apply only if the spike is at least 1/4 the concentration of the analyte in the sample.

Control limits for the RPD apply only if the concentration of the analyte in the sample is at least five times the reporting limit.

QC Sample 1: SVL SAM No.: 582608 Client Sample ID: M-WD-4 SS-1

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : IDEQ
PROJECT:
CLIENT SAMPLE ID: TVNGSS-1
Sample Collected: 6/27/07 14:00
Sample Receipt : 7/03/07
Date of Report : 7/11/07

SVL JOB: 130269
SAMPLE: 585609
% Solids: 98.7%
Matrix: SOIL

As Received Basis

Determination	Result	Units	Dilution	Method	Analyzed
Silver	5.82	mg/kg		6010B	7/06/07
Arsenic	1190	mg/kg	5	6010B	7/08/07
Barium	112	mg/kg		6010B	7/06/07
Cadmium	12.9	mg/kg		6010B	7/06/07
Chromium	36.4	mg/kg		6010B	7/06/07
Copper	57	mg/kg	5	6010B	7/08/07
Iron	23800	mg/kg		6010B	7/06/07
Mercury	0.128	mg/kg		7471A	7/09/07
Lead	741	mg/kg		6010B	7/06/07
Selenium	<4	mg/kg		6010B	7/06/07

Tests:RCRA METALS - SOIL

Reviewed By: _____ Date 7/12/07
7/11/07 17:12

AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C1268

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : IDEQ
PROJECT:
CLIENT SAMPLE ID: TVNGSS-2
Sample Collected: 6/27/07 14:15
Sample Receipt : 7/03/07
Date of Report : 7/11/07 As Received Basis

SVL JOB: 130269
SAMPLE: 585610
% Solids: 96.7%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
Silver	5.14	mg/kg		6010B	7/06/07
Arsenic	1040	mg/kg	5	6010B	7/08/07
Barium	108	mg/kg		6010B	7/06/07
Cadmium	10.8	mg/kg		6010B	7/06/07
Chromium	40.8	mg/kg		6010B	7/06/07
Copper	62	mg/kg	5	6010B	7/08/07
Iron	24500	mg/kg		6010B	7/06/07
Mercury	0.145	mg/kg		7471A	7/09/07
Lead	748	mg/kg		6010B	7/06/07
Selenium	<4	mg/kg		6010B	7/06/07

Tests:RCRA METALS - SOIL

Reviewed By: _____ Date 7/12/07
7/11/07 17:12

AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C1268

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : IDEQ
PROJECT:
CLIENT SAMPLE ID: TVNGSS-3
Sample Collected: 6/27/07 14:30
Sample Receipt : 7/03/07
Date of Report : 7/11/07 As Received Basis

SVL JOB: 130269
SAMPLE: 585611
% Solids: 98.8%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
Silver	4.02	mg/kg		6010B	7/06/07
Arsenic	396	mg/kg	5	6010B	7/08/07
Barium	137	mg/kg		6010B	7/06/07
Cadmium	6.35	mg/kg		6010B	7/06/07
Chromium	38.2	mg/kg		6010B	7/06/07
Copper	50	mg/kg	5	6010B	7/08/07
Iron	24000	mg/kg		6010B	7/06/07
Mercury	0.095	mg/kg		7471A	7/09/07
Lead	391	mg/kg		6010B	7/06/07
Selenium	<4	mg/kg		6010B	7/06/07

Tests:RCRA METALS - SOIL

Reviewed By: _____ Date 7/12/07
7/11/07 17:12

AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C1268

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : IDEQ
PROJECT:
CLIENT SAMPLE ID: TVNGSS-4
Sample Collected: 6/27/07 14:45
Sample Receipt : 7/03/07
Date of Report : 7/11/07 As Received Basis

SVL JOB: 130269
SAMPLE: 585612
% Solids: 98.5%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
Silver	4.08	mg/kg		6010B	7/06/07
Arsenic	651	mg/kg	5	6010B	7/08/07
Barium	122	mg/kg		6010B	7/06/07
Cadmium	10.3	mg/kg		6010B	7/06/07
Chromium	41.4	mg/kg		6010B	7/06/07
Copper	58	mg/kg	5	6010B	7/08/07
Iron	21600	mg/kg		6010B	7/06/07
Mercury	0.125	mg/kg		7471A	7/09/07
Lead	552	mg/kg		6010B	7/06/07
Selenium	<4	mg/kg		6010B	7/06/07

Tests:RCRA METALS - SOIL

Reviewed By: _____ Date 7/12/07
7/11/07 17:12

AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C1268

SVL ANALYTICAL, INC.

Quality Control Report
Part I Prep Blank and Laboratory Control Sample

Client :IDEQ

SVL JOB No: 130269

Analyte	Method	Matrix	Units	Prep Blank	True	LCS	Found	LCS %R	Analysis Date
Silver	6010B	SOIL	mg/kg	<0.50	5.00		5.00	100.0	7/06/07
Arsenic	6010B	SOIL	mg/kg	<2.5	100		98.2	98.2	7/08/07
Barium	6010B	SOIL	mg/kg	<0.20	100		98.3	98.3	7/06/07
Cadmium	6010B	SOIL	mg/kg	<0.20	100		92.3	92.3	7/06/07
Chromium	6010B	SOIL	mg/kg	<0.60	100		104	104.0	7/06/07
Copper	6010B	SOIL	mg/kg	<1.0	100		94.5	94.5	7/08/07
Iron	6010B	SOIL	mg/kg	<6.0	1000		1030	103.0	7/06/07
Lead	6010B	SOIL	mg/kg	<0.75	100		98.3	98.3	7/06/07
Selenium	6010B	SOIL	mg/kg	<4	100		92	92.0	7/06/07
Mercury	7471A	SOIL	mg/kg	<0.033	0.834		0.807	96.8	7/09/07

LEGEND:
LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

SVL ANALYTICAL, INC.

Quality Control Report
Part II Duplicate and Spike Analysis

Client :IDEQ — SVL JOB No: 130269

Test	Method	Mtx	QC SAMPLE ID	Units	Result	Duplicate or MSD Found		MSD RPD%	Matrix Spike Result	Matrix Spike SPK ADD	%R	Analysis Date
Ag	6010B	S	1	mg/kg	5.82	17.4	M	52.2	10.2	5.00	87.6	7/06/07
As	6010B	S	1	mg/kg	1190	1270	M	9.7	1400	100	R >4S	7/08/07
Ba	6010B	S	1	mg/kg	112	241	M	15.2	207	100	95.0	7/06/07
Cd	6010B	S	1	mg/kg	12.9	105	M	3.9	101	100	88.1	7/06/07
Cr	6010B	S	1	mg/kg	36.4	141	M	2.2	138	100	101.6	7/06/07
Cu	6010B	S	1	mg/kg	57	169	M	6.1	159	100	102.0	7/08/07
Fe	6010B	S	1	mg/kg	23800	24900	M	11.7	28000	1000	R >4S	7/06/07
Pb	6010B	S	1	mg/kg	741	1030	M	29.5	765	100	R >4S	7/06/07
Se	6010B	S	1	mg/kg	<4	100	M	1.0	99	100	99.0	7/06/07
Hg	7471A	S	1	mg/kg	0.128	0.272	M	15.6	0.318	0.167	113.8	7/09/07

LEGEND:
RPD% = (|SAM - DUP|/((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.
RPD% = (|SPK - MSD|/((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.
SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added
QC limits for MS recoveries apply only if the spike is at least 1/4 the concentration of the analyte in the sample.
Control limits for the RPD apply only if the concentration of the analyte in the sample is at least five times the reporting limit.
QC Sample 1: SVL SAM No.: 585609 Client Sample ID: TVNGSS-1

7/12/07 7:04

CHAIN OF CUSTODY RECORD

SVL ANALYTICAL

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Page ____ of ____

FOR SVL USE ONLY
SVL JOB #

15.1°C TEMP on Receipt: 130269

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other_____

Report to Company: DEQ
Contact: Bruce Schuld
Address: 1410 N Hilton
BOISE IDAHO 83706
Phone Number: 208 841 8179
FAX Number: 208 373 0154
E-mail: bruce.schuld@deq.idaho.gov

Invoice Sent To: SAME
Contact:
Address:
Phone Number:
FAX Number:
PO#:

Project Name: BLAINE Cty SA
Sampler's Signature: Bruce A Schuld

added per discussion 7/3/07 C Meyer (SVL) w/ B. Shuld

Indicate State of sample origination: _____ **USACE?** ☐ Yes ☐ No

Please take care to distinguish between:
1 and I
2 and Z
5 and S
ø and O
Thanks!

	Sample ID	Collection Date	Collection Time	Collected by: (Init.)	Misc. Matrix Type (From Table 1)	Misc. No. of Containers	Preservative(s) Unpreserved	HNO_3 Filtered	HNO_3 Unfiltered	HCl	H_2SO_4	NaOH	Other (Specify)	Analyses Required: As (Total)	Ba (Total)	Cd (Total)	Cu (Total)	Fe (Total)	Hg (Total)	Se (Total)	Ag (Total)	Zn (Total)	Cr (Total)	Rush Instructions (Days)
1	LJWDSS-3	6/20/07	1400	BS	3	1	X							X	X	X	X	X	X	X	X	X		
2	LLJJTPPE-1	6/26/07	0900	BS	3	1	X							X	X	X	X	X	X	X	X	X		
3	LLJJTSS-1	6/26/07	1000	BS	3	1	X							X	X	X	X	X	X	X	X	X		
4	LLJJTSS-2	6/26/07	1100	BS	3	1	X							X	X	X	X	X	X	X	X	X		
5	LLJJTBG-1	6/26/07	1200	BS	3	1	X							X	X	X	X	X	X	X	X	X		
6	LLJJTBGSS-2	6/26/07	1300	BS	3	1	X							X	X	X	X	X	X	X	X	X		
7	TVNGSS-1	6/27/07	1400	BS	3	1	X							X	X	X	X	X	X	X	X	X		
8	TVNGSS-2	6/27/07	1415	BS	3	1	X							X	X	X	X	X	X	X	X	X		
9	TVNGSS-3	6/27/07	1430	BS	3	1	X							X	X	X	X	X	X	X	X	X		
10	TVNGSS-4	6/27/07	1445	BS	3	1	X							X	X	X	X	X	X	X	X	X		

Comments
8 RCRA Metals + Hg & Zn
• ignore this note per B. Shields....
7/3/07 C Meyer

Libby Jane Mine
Lower Libby Jane Dig Tails
" " " " "
" " " " "
" " " " "
" " " " "
Triumph Village @ No. Star Gulch
" " " " "
" " " " "
" " " " "

RUSH **
RUSH **
RUSH **

Relinquished by: Bruce A Schuld	Date: 6/28	Time: 2000hr	Received by: J Steg
Relinquished by:	Date:	Time:	Received by:

Date: 07/03/07 Time: 1145

* Sample Reject: ☐ Return ☐ Dispose ☐ Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

SVL-COC 9/05

please email results bruce.schuld@deq.idaho.gov

Cooler Rec 7/3/07 Temp NA No Ice #130322
7/5/07 CRS

SVL ANALYTICAL

CHAIN OF CUSTODY RECORD

Page ___ of ___

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FOR SVL USE ONLY
SVL JOB #

15.1°C
TEMP on Receipt:

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other_____

Report to Company:	DEQ
Contact:	Bruce Schuld
Address:	1410 N Hilton Boise ID 83706
Phone Number:	208 841 8179
FAX Number:	208 373 0154
E-mail:	bruce.schuld@deq.idaho.gov
Invoice Sent To:	Same
Contact:	
Address:	
Phone Number:	
FAX Number:	
PO#:	

Project Name: Blaine Ctg SA
Sampler's Signature: Bruce A Schuld

Indicate State of sample origination: _____ **USACE?** ☐ Yes ☐ No

Rec'd Cooler 7/3/07 15.1°C (water + Rush Samples)

	Sample ID	Collection Date	Collection Time	Collected by: (Init.)	Misc. Matrix Type (From Table 1)	Misc. No. of Containers	Preservative(s) Unpreserved	HNO_3 Filtered	HNO_3 Unfiltered	HCl	H_2SO_4	NaOH	Other (Specify)	Analyses Required: As (Total), Ba (Total), Cd (Total), Cu (Total), Fe (Total), Hg (Total), Se (Total), Ag (Total), Zn (Total)	Rush Instructions (Days)	Comments
	Please take care to distinguish between: 1 and I, 2 and Z, 5 and S, ø and o. Thanks!															
1	CarSW1	6/27	1400	BS	1	1			X					X X X X X X X X X		Carbonaceous Stockton/k
2	LJPPESW1	6/20	1600	BS	1	1			X					X X X X X X X X X		
3	LJADSW-1	6/20	1200	BS	1	1			X					X X X X X X X X X		
4	LLJJTPPESW1	6/25	1400	BS	1	1			X					X X X X X X X X X		
5	LLJJTSWBG-2	6/25	1500	BS	1	1			X					X X X X X X X X X		
6	VKMSPPESS1	6/28	1300	BS	3	1	X							X X X X X X X X X		
7	VKMSSS-1	6/28	12:30	BS	3	1	X							X X X X X X X X X		
8	VKMSBGSS-1	6/28	1245	BS	3	1	X							X X X X X X X X X		
9	VKMSPPESW-1	6/28	12:15	BS	1	1			X					X X X X X X X X X		
10	TTADSW-4	6/28/07			1	2										

7-3-07

per Brian Gaber/Bruce Schuld
TTAD SW-4 not on COC
Sample is preserved
one bottle filtered
" " unfiltered
for T + D metals
RCRA 8 + Zn + Cu

Relinquished by:	Bruce A Schuld	Date: 6/28/07	Time: 2000	Received by:	CRSevy	Date: 7/5/07	Time: 6:40
Relinquished by:		Date:	Time:	Received by:		Date:	Time:

* Sample Reject: ☐ Return ☐ Dispose ☐ Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

SVL-COC 9/05

please email results bruce.schuld@deq.idaho.gov

CHAIN OF CUSTODY RECORD

SVL ANALYTICAL

Page ___ of ___

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\# 130322

FOR SVL USE ONLY
SVL JOB #

15.1°C
TEMP on Receipt:

Report to Company: DEQ
Contact: Bruce Schuld
Address: 1410 N Hilton
BOISE ID 83706
Phone Number: 208 841 8179
FAX Number: 208 373 0159
E-mail: bruce.schuld@deq.idaho.gov

Invoice Sent To: Same
Contact:
Address:
Phone Number:
FAX Number:
PO#:

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other

Project Name: Blaine Cty SA
Sampler's Signature: Bruce A S[illegible]

Cooler rec 7/5/07 N/A temp- NO ICE 07/05/CRS

Rec 1 Cooler 7/03/07 15.1°C / WATERY RUSH Samples

Indicate State of sample origination: ______ USACE? ☐ Yes ☐ No

Please take care to distinguish between:
1 and I
2 and Z
5 and S
Ø and O

Thanks!

#	Sample ID	Date	Time	Collected by: (Init.)	Matrix Type (From Table 1)	No. of Containers	Unpreserved	HNO₃ Filtered	HNO₃ Unfiltered	HCl	H_2SO_4	NaOH	Other (Specify)	As (Total)	Ba (Total)	Cd (Total)	Cr (Total)	Pb (Total)	Hg (Total)	Se (Total)	Ag (Total)	Zn (Total)	~~Cr (total) added~~	Rush Instructions (Days)	Comments
1	TRBGSS-1	6/20/07	0900	BG	3	1	X							X	X	X	X	X	X	X	X	X			Tom Rogers Mine
2	BVBGSS-1	6/19/07	0930	BS	3	1	X							X	X	X	X	X	X	X	X	X			Baltimore Victoria
3	BBBGSS-1	6/27/07	1215	BG	3	1	X							X	X	X	X	X	X	X	X	X			Black Barb Mine
4	CWD4SS-1	6/27/07	1300	BS	3	1	X							X	X	X	X	X	X	X	X	X			Carboniferous Mine
5	CWD5SS-1	6/27/07	1400	BS	3	1	X							X	X	X	X	X	X	X	X	X			" " "
6	CBGSS-1	6/27/07	1330	BS	3	1	X							X	X	X	X	X	X	X	X	X			" " "
7	LJWDSS-1	6/20/07	1330	BS	3	1	X							X	X	X	X	X	X	X	X	X			Libby Jane Mine
8	LJBGSS-1	6/20/07	1400	BS	3	1	X							X	X	X	X	X	X	X	X	X			" " "
9	LJWDSS-2	6/20/07	1430	BS	3	1	X							X	X	X	X	X	X	X	X	X			" " "
10	LJPPESS-1	6/20/07	1500	BS	3	1	X							X	X	X	X	X	X	X	X	X			" " "

Comments: 8 RCRA Metals + Hg & Zn

Ignore this note per BJ[illegible] reference SVL JOB # 130264 CRS 7/6/[illegible]

CR (total) added per [illegible] with R[illegible]

Relinquished by: [signature] Date: 6/28 Time: 2000 Received by: CRSeery Date: 7/5/07 Time: 6:40

Relinquished by: Date: Time: Received by: Date: Time:

* Sample Reject: ☐ Return ☐ Dispose ☐ Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

SVL-COC 9/05

please email results to bruce.schuld@deq.idaho.gov

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : IDAHO DEQ
PROJECT:
CLIENT SAMPLE ID: TRBGSS-1
Sample Collected: 6/20/07 9:00
Sample Receipt : 7/05/07
Date of Report : 8/09/07 As Received Basis

SVL JOB: 130322
SAMPLE: 586308
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
Silver	0.80	mg/kg		6010B	8/07/07
Arsenic	17.2	mg/kg		6010B	8/07/07
Barium	141	mg/kg		6010B	8/07/07
Cadmium	3.91	mg/kg		6010B	8/07/07
Chromium	8.55	mg/kg		6010B	8/07/07
Copper	17.9	mg/kg		6010B	8/07/07
Iron	12700	mg/kg		6010B	8/07/07
Mercury	0.153	mg/kg		7471A	7/16/07
Lead	245	mg/kg		6010B	8/07/07
Selenium	<4	mg/kg		6010B	8/07/07
Zinc	355	mg/kg		6010B	8/07/07

Tests:RCRA METALS - SOIL

Reviewed By: _____ Date 8/9/07
8/09/07 15:42

AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C1268

JOB#: 130636
SVL ANALYTICAL, INC.

CLP Extraction Log

ART II

Toxicity Characteristic Leaching Procedure
Method: SW846 1311
SOP: SVL4114

CASE #: SAS #: SDG #:

SVL#	M	ClientID	Ext. Fluid pH	Multi-phasic Y/N	% Solids Wet	% Solids Dry	% Solids %	Part Size Reduction Y/N	Sample Filtration	Air Temp.	RPM
590347	ES	EXTRACTION FLUID 1	4.93								
~~590348~~	~~ES~~	~~EXTRACTION FLUID 2~~									
590349	ES	TVNGSS-1	4.93	N			100%	N	Y	22°C/24°C	30
590350	ES	TVNGSS-2	4.93	N			100%	N	Y	22°C/24°C	30
590351	ES	TVNGSS-3	4.93	N			100%	N	Y	22°C/24°C	30
590352	ES	TVNGSS-4	4.93	N			100%	N	Y		

Extraction Started By: [signature] Date/Time: 08/02/07 1210

Extraction Completed By: [signature] Date/Time: 08/03/07 0610

Client: IDEQ
Received: 7/20/07

v3.

JOB#: 130636

CLP Extraction Log

SVL ANALYTICAL, INC.

ART I

Toxicity Characteristic Leaching Procedure
Method: SW846 1311 SOP: SVL4114

CASE #: SAS #: SDG #:

SVL#	M	ClientID	Init. Wt.	mls H2O	Init. pH	mls 1N HCl	pH	mls ext. fluid/type	Sample Wt.	Final pH
										3.99
pH 4 Buffer					3.99		3.99			7.01
pH 7 Buffer					7.00		7.00			4.93
590347	ES	EXTRACTION FLUID 1								
~~590348~~	~~ES~~	~~EXTRACTION FLUID 2~~								
590349	ES	TVNGSS-1	5g	96.5mls	8.42	3.5 mls	2.44	2000 mls #1	100g	6.24
590350	ES	TVNGSS-2	5g	96.5mls	8.88	3.5 mls	2.57	2000 mls #1	100g	6.32
590351	ES	TVNGSS-3	5g	96.5mls	8.73	3.5 mls	2.01	2000 mls #1	100g	6.31
590352	ES	TVNGSS-4	5g	96.5mls	8.89	3.5 mls	2.60	2000 mls #1	100g	6.50

Extraction Started By: DA Date/Time: 08/02/07 1210

Extraction Completed By: DA Date/Time: 08/03/07 0610

v3.0

Client: IDEQ
Received: 7/20/07

TCLP Extraction Log

JOB#: 130636

PART II — Toxicity Characteristic Leaching Procedure — SVL ANALYTICAL, INC.

Method: SW846 1311 — SOP: SVL4114

CASE #: SAS #: SDG #:

SVL#	M	ClientID	Ext. Fluid pH	Multi-phasic Y/N	% Solids			Part Size Reduction Y/N	Sample Filtration	Air Temp.	RPM
					Wet	Dry	%				
590347	ES	EXTRACTION FLUID 1	4.93	—							
~~590348~~	~~ES~~	~~EXTRACTION FLUID 2~~									
590349	ES	TVNGSS-1	4.93	N	—	—	100%	N	Y	22°C/24°C	30
590350	ES	TVNGSS-2	4.93	N	—	—	100%	N	Y	22°C/24°C	30
590351	ES	TVNGSS-3	4.93	N	—	—	100%	N	Y	22°C/24°C	30
590352	ES	TVNGSS-4	4.93	N	—	—	100%	N	Y	22°C/24°C	30

Extraction Started By: [signature] Date/Time: 08/02/07 1210

Extraction Completed By: [signature] Date/Time: 08/03/07 0610

Client: IDEQ

Received: 7/20/07

v3.0

SVL ANALYTICAL, INC.

Quality Control Report
Part II Duplicate and Spike Analysis

Client :IDEQ

SVL JOB No: 130270

Test	Method	Mtx	QC SAMPLE ID	Units	Result	Duplicate Found		or MSD RPD%	Matrix Spike Result	Matrix Spike SPK ADD	%R	Analysis Date
Ag	6010B	W	1	mg/L	<0.0050	0.0497	M	12.6	0.0438	0.0500	87.6	7/25/07
Ag	6010B	W	2	mg/L	<0.0050	0.0506	M	1.6	0.0514	0.0500	102.8	7/25/07
As	6010B	W	1	mg/L	0.037	0.968	M	10.8	0.869	1.00	83.2	7/25/07
As	6010B	W	2	mg/L	<0.025	1.03	M	0.0	1.03	1.00	103.0	7/25/07
Ba	6010B	W	1	mg/L	0.0128	1.01	M	2.6	0.984	1.00	97.1	7/25/07
Ba	6010B	W	2	mg/L	0.0109	0.970	M	1.8	0.988	1.00	97.7	7/25/07
Cd	6010B	W	1	mg/L	<0.0020	0.947	M	2.5	0.924	1.00	92.4	7/25/07
Cd	6010B	W	2	mg/L	<0.0020	0.919	M	1.8	0.936	1.00	93.6	7/25/07
Cr	6010B	W	1	mg/L	<0.0060	1.01	M	2.2	0.988	1.00	98.8	7/25/07
Cr	6010B	W	2	mg/L	<0.0060	0.971	M	2.3	0.994	1.00	99.4	7/25/07
Cu	6010B	W	1	mg/L	<0.010	1.09	M	2.8	1.06	1.00	106.0	7/25/07
Cu	6010B	W	2	mg/L	<0.010	1.08	M	0.0	1.08	1.00	108.0	7/25/07
Fe	6010B	W	1	mg/L	5.91	15.3	M	8.2	16.6	10.0	106.9	7/25/07
Fe	6010B	W	2	mg/L	4.32	14.8	M	7.0	13.8	10.0	94.8	7/25/07
Pb	6010B	W	1	mg/L	<0.0075	0.935	M	10.6	0.841	1.00	84.1	7/25/07
Pb	6010B	W	2	mg/L	0.0146	0.991	M	0.1	0.992	1.00	97.7	7/25/07
Se	6010B	W	1	mg/L	<0.04	0.85	M	12.5	0.75	1.00	75.0	7/25/07
Se	6010B	W	2	mg/L	<0.04	0.97	M	4.2	0.93	1.00	93.0	7/25/07
Zn	6010B	W	1	mg/L	1.53	2.41	M	2.1	2.36	1.00	83.0	7/25/07
Zn	6010B	W	2	mg/L	1.32	2.07	M	3.8	2.15	1.00	83.0	7/25/07
Hg	7470A	W	1	mg/L	<0.00020	0.00096	M	1.0	0.00097	0.0010	97.0	7/09/07
Hg	7470A	W	2	mg/L	<0.00020	0.00098	M	6.3	0.00092	0.0010	92.0	7/09/07

LEGEND:

RPD% = (|SAM - DUP|/((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.

RPD% = (|SPK - MSD|/((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.

SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

QC limits for MS recoveries apply only if the spike is at least 1/4 the concentration of the analyte in the sample.

Control limits for the RPD apply only if the concentration of the analyte in the sample is at least five times the reporting limit.

QC Sample 1: SVL SAM No.: 585621 Client Sample ID: TTAD SW-4 ^T

QC Sample 2: SVL SAM No.: 585622 Client Sample ID: TTAD SW-4 ^D

7/26/07 10:53

SVL ANALYTICAL, INC.

Quality Control Report
Part I Prep Blank and Laboratory Control Sample

Client :IDEQ

SVL JOB No: 130270

Analyte	Method	Matrix	Units	Prep Blank	True	LCS	Found	LCS %R	Analysis Date
Silver	6010B	WATER	mg/L	<0.0050	0.0500		0.0504	100.8	7/25/07
Arsenic	6010B	WATER	mg/L	<0.025	1.00		0.982	98.2	7/25/07
Barium	6010B	WATER	mg/L	<0.0020	1.00		1.02	102.0	7/25/07
Cadmium	6010B	WATER	mg/L	<0.0020	1.00		1.01	101.0	7/25/07
Chromium	6010B	WATER	mg/L	<0.0060	1.00		1.06	106.0	7/25/07
Copper	6010B	WATER	mg/L	<0.010	1.00		1.02	102.0	7/25/07
Iron	6010B	WATER	mg/L	<0.060	10.0		10.9	109.0	7/25/07
Lead	6010B	WATER	mg/L	<0.0075	1.00		0.974	97.4	7/25/07
Selenium	6010B	WATER	mg/L	<0.04	1.00		0.91	91.0	7/25/07
Zinc	6010B	WATER	mg/L	<0.010	1.00		0.975	97.5	7/25/07
Mercury	7470A	WATER	mg/L	<0.00020	0.00500		0.00499	99.8	7/09/07

LEGEND:

LCS = Laboratory Control Sample

LCS %R = LCS Percent Recovery

N/A = Not Applicable

7/26/07 10:53

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

REPORT OF ANALYTICAL RESULTS

CLIENT : IDEQ
PROJECT:

Sample Receipt: 7/03/07
Report Date: 7/26/07

SVL JOB: 130270

SVL ID	CLIENT SAMPLE ID		Se 6010B	Zn 6010B	Hg 7470A
W585615	CAR SW1	6/27/07	<0.04mg/L	0.302mg/L	<0.00020mg/L
W585616	LJ PPE SW1	6/20/07	<0.04mg/L	0.085mg/L	<0.00020mg/L
W585617	LJ AD SW1	6/20/07	<0.04mg/L	0.084mg/L	<0.00020mg/L
W585618	LLJJT PPE SW1	6/25/07	<0.04mg/L	0.127mg/L	<0.00020mg/L
W585619	LLJJTSWBG-1	6/25/07	<0.04mg/L	<0.010mg/L	<0.00020mg/L
W585620	UKMSPPE SW1	6/28/07	<0.04mg/L	<0.010mg/L	<0.00020mg/L
W585621	TTAD SW-4	^T 6/28/07	<0.04mg/L	1.53mg/L	<0.00020mg/L
W585622	TTAD SW-4	^D 6/28/07	<0.04mg/L	1.32mg/L	<0.00020mg/L

Certificate: ID ID00019
AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C12

Reviewed By: _____ Date: 7/26/07

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

REPORT OF ANALYTICAL RESULTS

CLIENT : IDEQ
PROJECT:

Sample Receipt: 7/03/07
Report Date: 7/26/07

SVL JOB: 130270

SVL ID	CLIENT SAMPLE ID		Ag 6010B	As 6010B	Ba 6010B	Cd 6010B	Cr 6010B	Cu 6010B	Fe 6010B	Pb 6010B
W585615	CAR SW1	6/27/07	<0.0050mg/L	<0.025mg/L	0.0042mg/L	<0.0020mg/L	<0.0060mg/L	<0.010mg/L	0.104mg/L	<0.0075mg/L
W585616	LJ PPE SW1	6/20/07	<0.0050mg/L	<0.025mg/L	0.0036mg/L	<0.0020mg/L	<0.0060mg/L	<0.010mg/L	<0.060mg/L	<0.0075mg/L
W585617	LJ AD SW1	6/20/07	<0.0050mg/L	0.032mg/L	0.0103mg/L	<0.0020mg/L	<0.0060mg/L	0.011mg/L	0.174mg/L	0.0254mg/L
W585618	LLJJT PPE SW1	6/25/07	<0.0050mg/L	0.030mg/L	0.0092mg/L	<0.0020mg/L	<0.0060mg/L	0.024mg/L	0.079mg/L	0.0160mg/L
W585619	LLJJTSWBG-1	6/25/07	<0.0050mg/L	<0.025mg/L	0.0050mg/L	<0.0020mg/L	<0.0060mg/L	<0.010mg/L	<0.060mg/L	<0.0075mg/L
W585620	UKMSPPE SW1	6/28/07	<0.0050mg/L	<0.025mg/L	0.0171mg/L	<0.0020mg/L	<0.0060mg/L	<0.010mg/L	<0.060mg/L	<0.0075mg/L
W585621	TTAD SW-4	^T 6/28/07	<0.0050mg/L	0.037mg/L	0.0128mg/L	<0.0020mg/L	<0.0060mg/L	<0.010mg/L	5.91mg/L	<0.0075mg/L
W585622	TTAD SW-4	^D 6/28/07	<0.0050mg/L	<0.025mg/L	0.0109mg/L	<0.0020mg/L	<0.0060mg/L	<0.010mg/L	4.32mg/L	0.0146mg/L

Certificate: ID ID00019
AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C12

Reviewed By: _____ Date: 7/26/07

CHAIN OF CUSTODY RECORD

SVL Analytical, Inc. • One Government Gulch • Kellogg, ID 83837 • (208) 784-1258 • FAX: (208) 783-0891

Page ___ of ___

FOR SVL USE ONLY
SVL JOB #: 130270
TEMP on Receipt: 15.1°C

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other_____

Report to Company: DEQ
Contact: Bruce Schuld
Address: 1410 N Hilton
Boise ID 83706
Phone Number: 208 841 8179
FAX Number: 208 373 0154
E-mail: bruce.schuld@deq.idaho.gov

Invoice Sent To: Same
Contact:
Address:
Phone Number:
FAX Number:
PO#:

Project Name: Blaine Cty SA
Sampler's Signature: Bruce A Schuld

Indicate State of sample origination: _____ USACE? ☐ Yes ☐ No

	Sample ID (Please take care to distinguish between: 1 and I, 2 and Z, 5 and S, ø and O. Thanks!)	Collection Date	Collection Time	Collected by: (Init.)	Misc. Matrix Type (From Table 1)	Misc. No. of Containers	Preservative(s) Unpreserved	HNO_3 Filtered	HNO_3 Unfiltered	HCl	H_2SO_4	NaOH	Other (Specify)	Analyses Required: As (Total)	Ba (Total)	Cd (Total)	Cu (Total)	Fe (Total)	Hg (Total)	Se (Total)	Ag (Total)	Zn (Total)	Rush Instructions (Days)
1	Car SW 1	6/27	1400	BS	1	1			X					X	X	X	X	X	X	X	X	X	
2	LJ PPE SW1	6/20	1600	BS	1	1			X					X	X	X	X	X	X	X	X	X	
3	LJ AD SW-1	6/20	1260	BS	1	1			X					X	X	X	X	X	X	X	X	X	
4	LLJJT PPE SW1	6/25	1400	BS	1	1			X					X	X	X	X	X	X	X	X	X	
5	LLJJT SW BG-2	6/25	1500	BS	1	1			X					X	X	X	X	X	X	X	X	X	
6	UK MS PPE SS1	6/28	1300	BS	3	1	X							X	X	X	X	X	X	X	X	X	
7	UK MS SS-1	6/28	12:30	BS	3	1	X							X	X	X	X	X	X	X	X	X	
8	UK MS BG SS-1	6/28	1245	BS	3	1	X							X	X	X	X	X	X	X	X	X	
9	UK MS PPE SW-1	6/28	12:15	BS	1	1			X					X	X	X	X	X	X	X	X	X	
10	TTAD SW-4	6/28/07			5	2																	

2-3-07

Comments: per Brian Gabor/Bruce Schuld
TTAD SW-4 not on COC:
Sample is preserved
one bottle filtered
" " unfiltered
for T & D metals
RCRA 8 + Zn & Cu

Carbonaceous Stockton/k

Relinquished by: Bruce A Schuld Date: 6/28/07 Time: 2000
Relinquished by: Date: Time:
Received by: S. Sieg Date: 07/03/07 Time:
Received by: Date: Time:

* Sample Reject: ☐ Return ☐ Dispose ☐ Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

SVL-COC 9/05

please email results bruce.schuld@deq.idaho.gov
ctn ship cooler

SVL ANALYTICAL, INC.
ent Gulch - Kellogg, ID 83837-0929

l invoice: SAME

WATER RCRA METALS/CU/FE/ZN
SVL JOB No: 130270
Received: 7/03/07
Expected Due date: 7/18/07

Fax:

By	Received	Sample Comments
BS	7/03/07	Tests:RCRA METALS
BS	7/03/07	Tests:RCRA METALS
BS	7/03/07	Tests:RCRA METALS
BS	7/03/07	Tests:RCRA METALS
BS	7/03/07	Tests:RCRA METALS
BS	7/03/07	Tests:RCRA METALS
BS	7/03/07	Tests:RCRA METALS
BS	7/03/07	Tests:RCRA METALS

:s. (^P) and Dissolved (^D) fractions separately. Field samples may appear twice.

mp: 15.°C.

after job completion.
then you will receive a letter requesting disposal options.

you have questions regarding the receipt of these samples. 7/06/07 14:51

TRANSMISSION VERIFICATION REPORT

TIME : 07/06/2007 16:46
NAME : SVL ANALYTICAL
FAX : 2087830891
TEL : 2087841258
SER.# : BROJ6J530158

DATE,TIME 07/06 16:46
FAX NO./NAME 912083730154
DURATION 00:00:17
PAGE(S) 01
RESULT OK
MODE FINE ECM

SAMPLE RECEIPT CONFIRMATION

SVL ANALYTICAL, INC.
One Government Gulch - Kellogg, ID 83837-0929

CLIENT: BRUCE SCHULD
IDEQ
1410 N. HILTON

BOISE ID 83706
FAX: (208)373-0154 PH: (208)373-0554 Fax:

We will invoice: SAME

RUSH! SOIL RCRA/CU/ZN/FE
SVL JOB No: 130269
Received: 7/03/07
Expected Due date: 7/11/07

SVL#	M	ClientID	Sampled	Time	By	Received	Sample Comments
585609	S	TVNGSS-1	6/27/07	14:00	BS	7/03/07	Tests:RCRA METALS - SOIL
585610	S	TVNGSS-2	6/27/07	14:15	BS	7/03/07	Tests:RCRA METALS - SOIL
585611	S	TVNGSS-3	6/27/07	14:30	BS	7/03/07	Tests:RCRA METALS - SOIL
585612	S	TVNGSS-4	6/27/07	14:45	BS	7/03/07	Tests:RCRA METALS - SOIL

ADDITIONAL COMMENTS FOR JOB: Sample Cooler temp: 15.°C.

[ ] These samples will be DISPOSED 45 days after job completion.
[X] These samples will be ARCHIVED 45 days, then you will receive a letter requesting disposal options.

Please contact Crystal Sevy (208-784-1258) if you have questions regarding the receipt of these samples. 7/03/07 13:56

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

REPORT OF ANALYTICAL RESULTS (TCLP)

CLIENT : IDEQ

SVL JOB # : 130636
SVL SAMPLE # : 590349

CLIENT SAMPLE ID: TVNGSS-1
Sample Collected: 6/27/07 14:00
Sample Receipt : 7/20/07
Date of Report : 8/13/07

Sample Matrix: Solid Waste
Extraction : TCLP **
Extracted: 8/02/07

Determination	Result	Units	Dil'n	TCLP Reg. Limit	Method	Analysis Date
Silver	<0.0500	mg/L Ext		5.0	6010B	8/10/07
Arsenic	0.651	mg/L Ext		5.0	6010B	8/10/07
Mercury	<0.00020	mg/L Ext		0.2	7470A	8/07/07
Lead	0.070	mg/L Ext		5.0	6010B	8/10/07

** Sample extracted according to EPA method 1311 (TCLP).
Tests:TCLP - AS/PB/HG/AG
Certificate: ID ID00019

Reviewed By: _____ Date 8/14/07
8/13/07 18:12

AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C1268

SVL ANALYTICAL, INC.
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REPORT OF ANALYTICAL RESULTS (TCLP)

CLIENT : IDEQ

SVL JOB # : 130636
SVL SAMPLE # : 590350

CLIENT SAMPLE ID: TVNGSS-2
Sample Collected: 6/27/07 14:15
Sample Receipt : 7/20/07
Date of Report : 8/13/07

Sample Matrix: Solid Waste
Extraction : TCLP **
Extracted: 8/02/07

Determination	Result	Units	Dil'n	TCLP Reg. Limit	Method	Analysis Date
Silver	<0.0500	mg/L Ext		5.0	6010B	8/10/07
Arsenic	0.283	mg/L Ext		5.0	6010B	8/10/07
Mercury	<0.00020	mg/L Ext		0.2	7470A	8/07/07
Lead	0.071	mg/L Ext		5.0	6010B	8/10/07

** Sample extracted according to EPA method 1311 (TCLP).
Tests:TCLP - AS/PB/HG/AG
Certificate: ID ID00019

Reviewed By: _____ Date 8/14/07
8/13/07 18:12

AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C1268

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REPORT OF ANALYTICAL RESULTS (TCLP)

CLIENT : IDEQ
SVL JOB # : 130636
SVL SAMPLE # : 590351

CLIENT SAMPLE ID: TVNGSS-3
Sample Collected: 6/27/07 14:30
Sample Receipt : 7/20/07
Date of Report : 8/13/07

Sample Matrix: Solid Waste
Extraction : TCLP **
Extracted: 8/02/07

Determination	Result	Units	Dil'n	TCLP Reg. Limit	Method	Analysis Date
Silver	<0.0500	mg/L Ext		5.0	6010B	8/10/07
Arsenic	0.273	mg/L Ext		5.0	6010B	8/10/07
Mercury	<0.00020	mg/L Ext		0.2	7470A	8/07/07
Lead	0.067	mg/L Ext		5.0	6010B	8/10/07

** Sample extracted according to EPA method 1311 (TCLP).
Tests:TCLP - AS/PB/HG/AG
Certificate: ID ID00019

Reviewed By: _____ Date 8/14/07
8/13/07 18:12

AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C1268

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REPORT OF ANALYTICAL RESULTS (TCLP)

CLIENT : IDEQ

SVL JOB # : 130636
SVL SAMPLE # : 590352

CLIENT SAMPLE ID: TVNGSS-4
Sample Collected: 6/27/07 14:45
Sample Receipt : 7/20/07
Date of Report : 8/13/07

Sample Matrix: Solid Waste
Extraction : TCLP **
Extracted: 8/02/07

Determination	Result	Units	Dil'n	TCLP Reg. Limit	Method	Analysis Date
Silver	<0.0500	mg/L Ext		5.0	6010B	8/10/07
Arsenic	0.248	mg/L Ext		5.0	6010B	8/10/07
Mercury	<0.00020	mg/L Ext		0.2	7470A	8/07/07
Lead	0.107	mg/L Ext		5.0	6010B	8/10/07

** Sample extracted according to EPA method 1311 (TCLP).
Tests:TCLP - AS/PB/HG/AG
Certificate: ID ID00019

Reviewed By: _____ Date 8/14/07
8/13/07 18:12

AZ: AZ0538 CA: CERT NO. 2080 CO: CERT NO. ID00019 ID: ID00019 MT: CERT. 0027 NV: CERT. ID19 WA: C1268

Milligan	Arsenic	D_Arsenic	Arsenic2O	D_Arsenic2O	Cadmium	D_Cadmium	Cadmium3O
	13.7	1	13.7	1	2.67	1	2.67
	10.2	1	10.2	1	0.2	0	0.2
	2.5	0	2.5	0	2.13	1	2.13
	3.8	1	3.8	1	2.7	1	2.7
	11.8	1	11.8	1	3.28	1	3.28
	2.7	1	2.7	1	0.2	0	0.2
	5.8	1	5.8	1	0.61	1	0.61
	5.8	1	5.8	1	1.99	1	1.99
	9.9	1	9.9	1	3.33	1	3.33
	11.4	1	11.4	1	2.42	1	2.42
	20.6	1	20.6	1	5.4	1	5.4
	13.8	1	13.8	1	5.61	1	5.61
	11.1	1	11.1	1	2.09	1	2.09
	9.2	1	9.2	1	2.73	1	2.73
	45.4	1	45.4	1	14.7	1	4.75
	9.8	1	9.8	1	4.75	1	5.06
	34.7	1	34.7	1	5.06	1	4.15
	19.2	1	19.2	1	4.15	1	3.18
	22.5	1	22.5	1	3.18	1	2.35
	14.1	1	14.1	1	2.35	1	1.44
	16	1	16	1	1.44	1	0.2
	72.7	1	17.1	1	0.2	0	2.59
	17.1	1	10.9	1	2.59	1	2.24
	10.9	1	18.1	1	2.24	1	0.99
	18.1	1	12.8	1	0.99	1	1.5
	12.8	1	2.5	0	1.5	1	1.3
	2.5	0	11.9	1	1.3	1	5.21
	11.9	1	11.4	1	5.21	1	4.48
	11.4	1	49.7	1	4.48	1	6.1
	49.7	1	28.5	1	6.1	1	1.19
	28.5	1	52.4	1	16.6	1	4.22
	52.4	1	2.5	0	12.5	1	2.4
	2.5	0	10.3	1	1.19	1	5.47
	10.3	1	14.1	1	4.22	1	4.63
	14.1	1	10.2	1	2.4	1	3.54
	10.2	1	16.9	1	5.47	1	6.11
	16.9	1	13.3	1	4.63	1	0.86
	13.3	1	12.7	1	3.54	1	1.29
	115	1	16.1	1	6.11	1	2.09
	12.7	1	15.3	1	0.86	1	4.47
	16.1	1	7.6	1	1.29	1	
	15.3	1			2.09	1	
	7.6	1			4.47	1	

D_Cadmium3O	Lead	D_Lead	Lead2O	D_Lead2O	Zinc	D_Zinc
1	39.3	1	39.3	1	315	1
0	26.8	1	26.8	1	119	1
1	25.9	1	25.9	1	182	1
1	27	1	27	1	401	1
1	37.1	1	37.1	1	370	1
0	16.4	1	16.4	1	64	1
1	26.9	1	26.9	1	171	1
1	63.7	1	63.7	1	350	1
1	111	1	111	1	412	1
1	62	1	62	1	393	1
1	47.6	1	47.6	1	884	1
1	66.5	1	66.5	1	762	1
1	61.1	1	61.1	1	427	1
1	65.4	1	65.4	1	358	1
1	91.8	1	91.8	1	1860	1
1	83.7	1	83.7	1	545	1
1	145	1	145	1	777	1
1	40.4	1	40.4	1	353	1
1	30.3	1	30.3	1	477	1
1	25.3	1	25.3	1	396	1
0	32.2	1	32.2	1	340	1
1	72.3	1	72.3	1	167	1
1	42.7	1	42.7	1	306	1
1	47.1	1	47.1	1	280	1
1	26.4	1	26.4	1	159	1
1	32.8	1	32.8	1	224	1
1	14.7	1	14.7	1	100	1
1	22.2	1	22.2	1	449	1
1	1820	1	104	1	2430	1
1	104	1	109	1	796	1
1	444	1	23.3	1	1150	1
1	109	1	21	1	1290	1
1	23.3	1	79.1	1	121	1
1	21	1	69.2	1	604	1
1	79.1	1	45.7	1	268	1
1	69.2	1	33.2	1	616	1
1	45.7	1	72.8	1	334	1
1	33.2	1	14.3	1	210	1
1	72.8	1	19.1	1	499	1
1	14.3	1	34.7	1	77	1
	19.1	1	132	1	131	1
	34.7	1			194	1
	132	1			801	1

Triumph Road Base Samples

Description		SSS5 Soil Sample - 80 Mesh XRF Analysis ppm	SSS5 Soil Sample - 80 Mesh Lab Analysis mg/kg
Aluminum			
Antimony			
Arsenic		23.64	39.5
Barium			66.3
Beryllium			
Cadmium		ND	1.04
Calcium		23,524.96	
Chromium		52.39	18.4
Cobalt		ND	
Copper		ND	26.9
Iron		7,458.76	
Lead		41.14	58.8
Magnesium			
Manganese		189.57	174
Mercury		ND	<0.033
Nickel		ND	
Potassium		8,644.76	
Selenium		ND	<4.0
Silver		ND	<0.50
Vanadium		ND	
Zinc		103.62	103

Triumph Road Base Samples

Description	IDTLs	EPA Region 9 PRGs	Waste Rock Soil Sample - 80 Mesh XRF Analysis		SSS5 Soil Sample - 80 Mesh XRF Analysis ppm	SSS5 Soil Sample + 80 Mesh XRF Analysis ppm	SSS5 Soil Sample - 80 Mesh Lab Analysis mg/kg
Aluminum							
Antimony	4.77	76000	<LOD 26.10		<LOD 24.68	<LOD 27.48	
Arsenic	0.391	31	30.8		23.64	27.31	39.5
Barium	896	0.39	915.2		<LOD 80.92	677.05	66.3
Beryllium	1.63	5400					
Cadmium	1.35	1500	<LOD 14.93		<LOD 14.23	<LOD 16.19	1.04
Calcium		37	15,711.48		23,524.96	23,911.13	
Chromium	7.9	NA	67.27		52.39	60.23	18.4
Cobalt		210	<LOD 190.66		<LOD 135.11	<LOD 145.68	
Copper	921	900	<LOD 39.32		<LOD 37.99	<LOD 34.15	26.9
Iron		3100	15,515.68		7,458.76	11,399.08	
Lead	49.6	23000	43.04		41.14	81.93	58.8
Magnesium		400					
Manganese	223	NA	135.38		189.57	225.62	174
Mercury	0.00509	1800	<LOD 16.21		<LOD 13.65	<LOD 12.88	<0.033
Nickel	59.1	23	111.83		<LOD 78.85	<LOD 70.04	
Potassium		NA	8,351.21		8,644.76	636.76	
Selenium	2.03	NA	<LOD 7.13		<LOD 6.61	<LOD 6.44	<4.0
Silver	0.189	390	<LOD 11.39		<LOD 10.26	<LOD 12.20	<0.50
Vanadium		390	346.48		<LOD 87.00	<LOD 84.13	
Zinc	886	550	377.69		103.62	127.19	103

APPENDIX C

Human Health and Ecological Risk Assessments

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DRAFT

REPORT ON

HUMAN HEALTH RISK EVALUATION

Submitted to:

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1.0 INTRODUCTION

Golder Associates Inc. on behalf of DeNovo Independence, LLC has prepared this Human Health Risk Evaluation (HHRE) for submittal to the Idaho Department of Environmental Quality (IDEQ) for the DeNovo Independence Site (Site) located in Blaine County, Idaho. This document is Appendix D of the Draft Remediation Work Plan and identifies potential risks to human health at the Site. The HHRE focuses on the human receptors that may become exposed to mine impacted media at the Site.

1.1 Human Health Risk Evaluation Approach

The HHRE evaluates potentially complete exposure pathways for impacted media at the Site to reach human receptors, and then characterizes cancer and non-cancer risks associated with the potentially complete exposure pathways. A conceptual site model (CSM) for evaluating exposures at the Site is developed for the HHRE and is shown on Figure D-1. The CSM identifies the potential human receptors and operative exposure pathways.

The HHREs initially screens contaminant concentrations by comparing to Idaho's Initial Default Threshold Limits (IDTLs) and Site–specific background concentrations to eliminate specific constituents of potential concern (COPCs) (metals for this Site) or specific Site media from further consideration in more detailed and quantified evaluations. This HHRE does not eliminate any metal COPCs from further consideration; it evaluates cumulative human risks resulting from all analyzed metal COPCs through all operative pathways for media having any metal concentration above screening values.

This HHRE is streamlined to initially determine risks for the media having the highest concentration of metals at each mine site. Human health risks will only be determined for other Site media (having lower metal concentrations) if unacceptable risks are quantified for the materials having the highest metal concentrations. In this manner, the HHRE focuses on determining human health risks for all pathways and receptors without conducting exhaustive calculations for each possible exposure.

2.0 HUMAN RISK SCREENING LEVELS

This section discusses the screening levels that were used to screen the metal COPCs at the Site based on Federal and State applicable, relevant, and appropriate requirements. Media having metal COPCs that are above the screening levels were considered further in this HHRE.

2.1 Human Risk Screening Levels

Potentially applicable risk-based concentrations for human receptors were identified for soil and water in Table D-1 from Federal and Idaho State criteria. Because screening levels or cleanup levels cannot be below background or laboratory practical quantification limits (PQLs) for standard EPA and Idaho accepted analytical methods, Site-specific background concentrations and PQLs are included in Table D-1 and were also used in selecting risk-based screening levels that are appropriate for the Site. The selected human risk-based screening levels for each metal represent the highest value among the Federal or State risk-based criteria, Site-specific background levels, and laboratory PQLs.

2.2 Extent of Potential Contamination

The extent of metal COPCs above human screening levels in source materials and media is summarized by media in Table D-2. The screening process compares screening level concentrations to metal COPCs concentrations. Metal COPC concentrations represent the lesser value of either the maximum detected metal concentration or the upper confidence level (UCL) of the arithmetic mean (at a confidence interval of 95 percent) for each media at each mine site or residential neighborhood. Site investigations have adequately defined the extent of metal COPCs that are present in source materials or media to proceed with this HHRE. The Site materials and affected media that have been found to have metal COPC concentrations above human screening levels (Table D-2) are shown by shading and are considered further in this HHRE. As shown in Table D-2, surface water at the site and the North Independence neighborhood soils are not above screening levels for all metal COPCs and will not be considered further in this HHRE.

3.0 HUMAN RECEPTOR AND EXPOSURE EVALUATION

Information concerning potential receptors and exposure pathways, including chemical sources and chemical constituent release mechanisms, are integrated into a CSM. The CSM provides a framework for problem definition, defines the framework for the risk assessment, and assists in identifying response actions for the Site, if necessary. A CSM is typically based on the most current information available, but is dynamic and can change as new information becomes available for a site.

The human health CSM for the Site (Figure D-1) reflects current and reasonable future land uses of the Site. The potential sources presented in the CSM represent the suspected sources of metal releases at the Site and are identified on the basis of historical information that is provided in Appendix A (IDEQ Sampling Results) and the Site investigation activities presented in Appendix C (Sampling and Analysis Report) of the Draft Remediation Work Plan (Golder, 2008).

3.1 Potential Human Health Receptors

The Site is currently an inactive and abandoned mine. The area surrounding the Site is mainly undisturbed and is composed of native soil cover, rock outcrops, and vegetation. There are no residences or schools on the Site; however, there is the town of Triumph with single-family homes adjacent to the south side of the Site. However, the redevelopment plan for the Site includes the construction of 30 single-family residences. The Site is currently used for recreation by the public from nearby towns.

The following current and future receptors may be exposed to Site metals and were included as potential receptors in the human health CSM:

- Future on-Site residents
- Current and future on-Site recreational visitors
- Future on-Site remediation construction workers

3.2 Potential Human Health Exposure Pathways

A complete exposure pathway is defined by the following four elements (USEPA, 1989):

- A source of chemical release into the environment
- An environmental medium for transport of the chemical (e.g., air, ground water, or soil)
- A point of potential exposure for a receptor
- A route of exposure for the receptor (e.g., ingestion, inhalation, or dermal contact)

An exposure pathway is considered complete or potentially complete when all four of these elements are present. All potential human health exposure pathways for the media of concern depict primary and secondary release mechanisms, retention-exposure mechanisms, and potential exposure routes.

Complete and potentially complete exposure pathways were identified by comparing media concentrations to conservative risk-based screening values. The screening values for Site media are the lowest human risk-based screening criteria that are above Site-specific background levels and are

summarized in Table D-1. A summary of the Site media containing metals that are above human screening levels are presented in Table D-2, which provides the basis for the various human exposure pathways that are illustrated in the site conceptual model (Figure D-1). A discussion of the main exposure pathways is presented in the following paragraphs.

3.2.1 Groundwater Pathway

The regional groundwater table at the Site exists in the bedrock. Localized perched groundwater may occur along the interface between the colluvium soils and weathered surface of the bedrock as interflow, which may be close to land surface. This is evidenced by stands of small shrub vegetation and treed areas on the mountain sides. The Site has numerous mine adits, drifts and tunnels. Mine workings collect groundwater locally within the bedrock. Where the mine workings are connected to the Triumph Tunnel, groundwater likely drains to the Triumph Tunnel because it is at the lowest elevation on-Site and is inclined toward the Triumph Tunnel portal at the south end of the mine near the town of Triumph. Because the mine workings were in areas that exposed ore veins and deposits to atmospheric air, the groundwater may have become impacted with metals from sulfide mineral oxidation and dissolution processes. Historically, the groundwater discharge from the Triumph Tunnel portal has been around 100 gallons per minute (gpm), but in 2003 a plug was installed in the tunnel and the mine water discharge was reduced to between 3 -5 gpm. The metal concentrations were high in groundwater discharges prior to installation of the plug, but are much lower in metal concentrations since the plug was placed. IDEQ monitors nearby mine adit portals and the general area for groundwater discharges and springs that could represent mine water discharges as a result of the Triumph Tunnel plug installation. To date, no new groundwater discharges have been observed. As described above, these measures were taken pursuant to the 1998 ROD and are not addressed, supplanted, or affected by this Work Plan. ASARCO is responsible for the management of the groundwater associated with and impacted by the mine workings as outlined in the 1998 ROD.

Currently, there are no groundwater wells or groundwater users on the Site. Several groundwater supply wells exit for residents in the town of Triumph and nearby along the East Fork Road. These private supply wells are monitored on a regular basis by IDEQ and currently meet drinking water quality criteria.

In the future, groundwater may be used as the drinking water supply for the proposed residential development at the Site. A future groundwater supply system was investigated with a test well in the lower Independence Creek area of the Site (Strata, 2008). The test well produced adequate quantity (~50 gpm) of groundwater for domestic use. The groundwater quality was below drinking water maximum contaminant levels (MCLs), except for arsenic. Arsenic is a primary MCL with a Federal MCL of 10 µg/L and an Idaho MCL of 50 µg/L. Arsenic concentrations in the test well were 24 µg/L. These levels may be indicative of the natural background levels within bedrock at the Site because of the ore mineralization or from mine impacts. Any groundwater supply system installed on-Site for future residential developments will be analyzed for water quality and assessed for potential impact by mine workings and waste materials. If analytical results of groundwater supply systems indicate concentrations of arsenic are elevated above MCLs, treatment of the drinking water will be required.

3.2.2 Surface Water Pathway

Surface water is limited at the Site. Two groundwater springs surface in the Independence Mine area. One spring discharges from an adit and passes through a mine waste pile. The other spring surfaces down-stream of the Independence Mine area within Independence Gulch. The analytical results of

surface water seep samples that were collected at the Site are summarized in Table D-2. As can be seen from the table, these springs meet drinking water quality and do not pose a human health risk.

Since the springs at the Independence Mine discharge from a mine adit, pass through or under mine waste materials, and do not indicate any mine related impacts, the mine operations and wastes materials at the surface (at least at the Independence Mine) do not indicate metals leaching is occurring and impacting local groundwater and springs. Therefore, surface water exposure pathways do not represent a risk to human receptors and will not be evaluated further in this HHRE.

The groundwater discharge from the Triumph Tunnel portal does not meet drinking water standards, but this discharge is sent to the holding pond on BLM property and not used for as a drinking water source.

3.2.3 Air Pathway

Mine waste materials at the Site represent impacted media that may release metals through fugitive dust emissions. There is limited to no vegetative cover on mine waste piles, which make these materials more amenable to fugitive dust emissions. However the tailings and mine waste materials are relatively course grained and are not expected to be amenable to fugitive dust emissions. Soils analysis of the potential dispersal by wind generated fugitive dust indicated that wind dispersal was not widespread, except for possibly in the North Star Mine area. Recreational use and remedial construction on the mine waste materials at the Site could generate fugitive dust emissions by mechanical disturbance. Therefore, fugitive dust inhalation was considered for current and future recreational visitors and for future on-Site remediation construction workers in the HHRE because these receptors could be exposed to localized dust emissions from activities on the Site.

3.2.4 Soil and Sediment Pathway

Site soils and sediments are impacted with metals above background levels. Current and future recreational visitors could be exposed to Site soils and sediments during biking, hiking, and other recreational activities. Exposure pathways include incidental ingestion and dermal contact of Site soils and sediments. Future on-Site remediation construction workers could become exposed to Site metals in soils and sediments during construction activities. Future Site residents could be exposed on a more or less continual basis to Site metals at the proposed neighborhood sites that have soil metal concentrations above background levels. Consequently, these three receptor groups are addressed in the HHRE for potential exposures to Site soils and sediments.

4.0 RISK EVALUATION

The streamlined HHRE is completed in two steps. Step 1 involves screening constituent concentrations in each of the potential exposure media against conservative screening values. The first step was completed as part of the evaluation of the data collected during the Site investigations are presented and summarized in Table D-2.

Step 2 of the risk assessment process further evaluates constituents and media for which concentrations at the Site were detected in excess of the screening values. The approach for further evaluation of metal COPCs is through a risk characterization performed in accordance with USEPA CERCLA Risk Assessment Guidance (RAGS–EPA, 1989) and the State of Idaho Risk Assessment Manual (IDEQ, 2004). The cumulative health risk is calculated to determine the individual excess lifetime cancer risks (IELCR) and non-cancer hazard index (HI) for toxic metal COPCs. Risks are assessed for receptors that may contact Site source materials or affected media identified in Step 1 of the risk evaluation, and are summed by multiple metal COPCs to obtain cumulative IELCR and non-cancer HI.

Cumulative carcinogenic potential (i.e., cancer risk) was calculated for arsenic for all exposure pathways; and for cadmium and chromium (assuming chromium in the hexavalent state) through the inhalation pathway because cadmium and hexavalent chromium are suspected carcinogens though inhalation. Cancer risks, calculated as the IELCR that occurs due to exposures to the Site carcinogenic metal COPCs through multiple exposure pathways, represent the cumulative IELCR for the Site and are the number of individuals that potentially would develop additional cancers for a given population over normally developed cancers. Acceptable calculated cancer risks less than 1 additional cancer out of 100,000 people (10^{-5}), are considered acceptable in Idaho when conducting a Risk Evaluation-1 or 2 Level with cumulative contaminant effects considered (IDEQ, 2004).

The non-cancer hazards for each constituent are included in the risk evaluation, except for lead, are summed by medium to obtain a cumulative Hazard Index (HI) value. Again the cumulative HI values for all toxic metal COPCs are calculated, are summed, and are compared to a threshold Hazard Index value of 1.0, which is considered to be an acceptable risk level from toxic metal COPC exposure at the Site (IDEQ, 2004). Lead does not have an accepted reference dose (RfD) intake that can be applied to risk evaluation methods. Therefore, the potential risk associated from lead exposures was conducted using the USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) model (USEPA, 1994). This model determines the probability of a receptor having an unacceptable concentration of lead in blood.

This process entails the following components:

- Selection of Site Media and metals
- Reasonable Maximum Exposure Assessment
- Risk Characterization

The basic approach used to develop each step of the HHRE and the results of each step are outlined in the following subsections.

4.1 Selection of Metals and Media

The Site metals of potential concern were identified in the SAP (Appendix B of the Remediation Work Plan) from the Site history of mining operations, ore mineralogy, previous Site investigations, and remediation at the adjacent Triumph Tailings Pile in the town of Triumph. Based on the screening conducted in Section 2 and summarized in Table D-2, the metals to be addressed in the HHRE are inorganic metals detected at elevated levels in the source materials and affected media. To ensure that potential risks are not underestimated, all inorganic metals have been conservatively carried through the streamlined HHRE. Therefore, the risk evaluation quantifies cumulative risks associated with potential exposures to the other inorganic constituents that were not detected at concentrations above the screening level values. It should be emphasized that some of these constituents occur naturally in background soils at concentrations that are generally similar to those reported for Site mine media.

Based on the evaluation Step 1and the media that have metal COPCs above screening levels that were presented in Table D-2 the following source media are retained as media for conducting Step 2 HHRE:

- North Star Mine area soils, sediments and road surfaces
- Independence Mine area soils sediments and road surfaces
- Old Triumph Shaft area soils, sediments and road surfaces
- Triumph Tunnel Area soils
- North Star Neighborhood soils
- South Independence Neighborhood soils

Although the groundwater discharge from the Triumph Tunnel portal is above screening levels this discharge is collected, is sent to the treatment holding pond on BLM property, is not used for as a drinking water source and will not be further evaluated in this HHRE.

4.2 Reasonable Maximum Exposure Assessment

Consistent with Idaho guidance for calculating exposure point concentrations (IDEQ, 2004), the exposure point concentration (EPC) for metals is the lesser of the maximum detected concentration or 95% UCL on the mean. The UCL was based on a normal distribution for a specific Site source material or affected media depending how the data for a Site source material or affected medium was distributed. For some media, the maximum detected concentration was used as the EPC when the maximum detected value was above the 95% UCL of the mean and sample data sets were comprised of fewer than 10 samples. Table D-2 presents the EPCs for each material type at each mine area.

For evaluating IELCR, the cancer risk existing due to natural background metal concentrations were not subtracted from potential exposures at the Site. By definition, the IELCR represents the cancer risk solely due to exposures to Site impacted media. Site impacted media are metal COPCs that are above background levels. Typically, risk assessments remove cancer risk from natural conditions by either subtracting background levels from site impacted media or by subtracting the calculated cancer risk from only background from the total site cancer risks. This HHRE only calculates the total cancer risks from Site metal COPCs to be conservative using EPCs in Table D-2 without subtracting background cancer risks.

Current and Future Recreational Visitor Receptor:

Current and future recreational visitors at the Site may be engaged in several outdoor activities such as hiking, mountain or motor-biking, ATV riding, wildlife viewing, hunting or other activities. Recreational visitors include any visitor including: residents from the town of Triumph, Sun Valley, and nearby cities, future residents on the Site or people from other regions of Idaho or from out of state.

Exposures would be expected to occur equally throughout the Site and, consequently, the exposure area for a recreational visitor would be the entire available Site open area. The open area encompasses approximately 848 acres and includes the former Old Triumph Shaft Area, North Star Mine, Independence Mine areas and Triumph Tunnel area. The combined areas of waste piles and affected surrounding surface soils represents only about 3 percent of the entire Site. This risk assessment evaluates human risk from exposures to the mine waste piles (some containing tailings). The mine waste piles have the highest metal concentrations of affected media at each mine area and would represent the highest human health risks. However, to provide a more conservative assessment of potential risks, and to account for the disparity in constituent concentrations among the various Site source materials and affected media evaluated in this HHRE, the mine waste piles were evaluated independently for each mine area with the recreational visitor spending 10 percent of recreating time on mine waste piles at each mine area. Therefore, potential exposures to the recreational visitors include the following media:

- North Star Mine waste piles
- Independence Mine waste piles
- Old Triumph Shaft area waste piles
- Triumph Tunnel area surface soils

Exposures were assumed to occur from incidental ingestion and dermal contact with mine waste media. Inhalation of fugitive dust was also included in the HHRE for exposures to Site mine waste media. The standard recreational visitor scenario used in the Human Health Risk Assessment for the Triumph Tailings Pile Project (Tetra Tech, Inc., 1997) was used for the HHRE along with standard default exposure inputs from the Idaho Risk Evaluation Manual, (IDEQ, 2004). This scenario assumes both an adolescent and adult recreates at the Site seven (7) days per year for an exposure frequency (EF). The assumption that recreational visitors will access the Site seven (7) days per year was based on a HHRE prepared for the IDEQ for the Triumph Mine Tailings Pile Project (Tetra Tech, Inc., 1997). Each Site visit by a recreational visitor was assumed to last 6.6 hours (IDEQ, 2004). The exposure duration (ED) assumed 9 and 15 years for an adolescent and adult, respectively, residing near the Site. Averaging times (AT) were 9 and 15 years, respectively for an adolescent and adult, respectively for non-carcinogenic metals COPCs and 70 years for carcinogenic metal COPCs. The open area at the Site is too remote with high relief topography for small children (six years old or less) to access the Site; therefore, the most sensitive human receptors expected for the Site are an adolescence and an adult).

Exposure parameters used in this assessment are conservative. For example, to assess potential exposures, it is assumed that soil contact occurs at each mine area waste pile 10 percent of the recreating time on the days that visits occur at the Site. The mine waste piles total only 26 acres (three percent) of the entire Site 848 acres. This provides a conservative assessment of potential exposures because cumulative contact with all mine waste piles would total 40 percent (four mine

areas at 10 percent time at each area), because travel between mine areas is considered to occupy much of the recreating time. For a recreational visitor you have contact frequencies greater than the three (3) percent of the time at the mine waste piles, a recreational visitor must target and stay at the mine waste piles. Although a mine area would be expected to be initially visited from curiosity and mineral specimen collecting, recreational visitors may actually avoid visiting the mine waste piles during subsequent visits over the longer term.

Other exposure inputs are consistent with the Idaho Risk Evaluation Manual exposure inputs, if default values were provided, or based on the Baseline Human Risk Assessment for the Triumph Mine Tailings Pile Project (Tetra Tech, 1997) in cases where default values are not provided in the Idaho Risk Evaluation Manual. An exception was for the exposure input for incidental soil ingestion rate (IRs). The Idaho Risk Evaluation Manual does not specify a default IRs for recreational visitors. Although the Baseline Human Risk Assessment for the Triumph Tailings Pile used 100 mg/day for the recreational visitor, an IRs of 200 mg/day was used in this HHRE to be conservative. Inhalation exposures assumed an average daily adolescent and adult-breathing rates of 1.3 and 1.6 m^3/day, respectively (IDEQ, 2004). For estimating concentrations of metals in air, a particulate (dust) emission factor (PEF) of 4.0 E+08 m^3/kg was used (IDEQ, 2004; and Tetra Tech, 1997) assuming no vegetative cover on the waste piles. Other exposure parameters such as body weight (55 and 70 kg) and averaging times were based on the Idaho Risk Assessment Manual (IDEQ, 2004) for adolescents and adults, respectively. The input parameters and calculated Site risks to the recreational visitor scenario are presented in Table D-3 and D-4 for an adolescent and adult, respectively at each mine area. The total risk for the recreational visitor would be the sum of the HI and IELCR for the entire Site.

The HHRE evaluated exposures to lead separately than for the other metals at the Site. Lead does not have an accepted reference dose (RfD) intake that can be applied to risk evaluation methods used for the other Site metals. Therefore, the manner for evaluating risk from lead exposure was to estimate blood lead levels in human receptors from exposures to Site media.

Risks associated with potential exposures to lead for the recreational visitor scenario were evaluated by methods recommended in the USEPA document titled *Recommendations of the Technical Review Workgroup for Lead for an Adult Exposures to Lead in Soil* (USEPA, 2003). The recommended approach uses a biokinetic model and identifies the greatest worker risk population to be women of child-bearing age. Since adolescences are not considered to be child-bearing age, lead risks are based on the potential for a fetus (at the upper 95th percentile of the population) to have a lead concentration of 10 µg/dL or more in blood from the recreational visiting woman to the Site. The fetus could receive lead from the woman's intake of lead from exposures while recreating or visiting at the Site. The guidance document to the IEUBK model (USEPA, 1994) suggests that the arithmetic mean value for lead soil concentrations be used in the biokinetic model, but to be conservative, the UCL of the mean lead concentrations were used as input to the model for this Site. Using the suggested input parameters for the type of population in the area and research of populations around lead mines (USEPA, 2003), the Geometric Standard Deviation (GSD_i) for individual blood lead and the Baseline Blood Lead Concentration ($PbB_{adult,0}$) used for the Independence Mine Site are 1.9 individual blood lead geometric standard deviation (GSDi) and 1.9 antecedent blood lead levels in woman of child bearing age ($PbB_{adult,0}$), respectively USEPA, 2003).

The IEUBK equations, input values and resulting fetal blood lead levels are presented in Attachment A to this HHRE and summarized in Table D-5. The lead concentrations for Site media were used to predict the fetal blood lead concentration for the 95th percentile population from females exposed to lead while recreating at the Site. The IEUBK modeling results predict potential fetus blood lead

levels are below 10 µg/dL for at least 95 percent of the exposed population for fetuses of women of child-bearing age that result from recreational activities at the Site.

Future Remediation Construction Worker Receptor

A future remediation construction worker may be exposed to metal COPCs in Site media by incidental ingestion and dermal contact during outdoor activities such as excavating, transporting, placing, trenching and general earthwork during remedial actions. A Site worker could also be exposed to Site metals from the inhalations of fugitive dust generated from Site work.

Exposures would be expected to occur primarily at the mine waste piles (some containing tailings), because remedial actions are focused on the mine waste piles. This risk assessment evaluates human risk from exposures to the mine waste piles. The mine waste piles have the highest metal concentrations of affected media at each mine area and would represent the highest human health risks. In this HHRE, the mine waste piles were evaluated independently for each mine area with the remediation construction worker spending all their time on individual mine waste piles. Therefore, potential exposures to the remediation construction worker include the following media:

- North Star Mine waste piles
- Independence Mine waste piles
- Old Triumph Shaft area waste piles
- Triumph Tunnel area surface soils

Exposures were assumed to occur from incidental ingestion and dermal contact with mine waste media. Inhalation of fugitive dust was also included in the HHRE for exposures to Site mine waste media. The same approach for the recreational visitor was used for the construction worker in this HHRE, except standard default exposure inputs from the Idaho Risk Evaluation Manual, (IDEQ, 2004) for an adult construction worker were used when applicable. This scenario assumes an adult construction worker at the Site with an exposure frequency (EF) of 30 days/year and assumed to be working the entire time on the mine waste piles. The averaging time used for this evaluation was one year (ATnc) for toxic metal COPCs and 70 years (ATc) for carcinogenic metal COPCs. Each work day was assumed to be 10 hours/day (IDEQ, 2004). The soil incidental soil ingestion rate and air inhalation rates used for worker exposures were 480 mg/day and 2.4 m^3/hour, respectively (IDEQ, 2004). For estimating concentrations of metals in air, a particulate (dust) emission factor (PEF) of 4.0 E+08 m^3/kg was used (IDEQ, 2004; and Tetra Tech, 1997) assuming no vegetative cover on the waste piles. Other exposure parameters such as body weight (70 kg) were based on the Idaho Risk Assessment Manual (IDEQ, 2004). The input parameters and calculated Site risks to the future remediation construction worker scenario are presented in Table D-6 for mine waste piles at each mine area.

The HHRE evaluated exposures to lead separately than for the other metals at the Site. Lead does not have an accepted reference dose (RfD) intake that can be applied to risk evaluation methods used for the other Site metals. Therefore, the manner for evaluating risk from lead exposure was to estimate blood lead levels in human receptors from exposures to Site media.

Risks associated with potential exposures to lead for the Remediation Construction worker scenario were evaluated by methods recommended in the USEPA document titled *Recommendations of the Technical Review Workgroup for Lead for an Adult Exposures to Lead in Soil* (USEPA, 2003). The

approach used for this receptor scenario is the same as used for the recreational visitor scenario. The most sensitive construction worker to lead exposures is an adult woman of child bearing age. Using the suggested input parameters to the EPA biokinetic model for the type of population in the area and research of populations around lead mines (USEPA, 2003), the Geometric Standard Deviation (GSD_i) for individual blood lead and the Baseline Blood Lead Concentration ($PbB_{adult,0}$) used for the Site is 2.0 individual blood lead geometric standard deviation (GSDi) and 2.0 antecedent blood lead levels in woman of child bearing age ($PbB_{adult,0}$), respectively (USEPA, 2003). The lead EPC used for Site media was the UCL of the mean lead concentration of the mine waste piles.

The IEUBK equations, input values and resulting fetal blood lead levels from women workers at the Site are presented in Attachment A to this HHRE and summarized in Table D-5. The lead concentrations for Site mine waste media were used to predict the fetal blood lead concentration for the 95th percentile population from females exposed to lead while working at the Site. The IEUBK modeling results predict child blood lead levels are above 10 µg/dL for at least 5 percent of the exposed population for fetuses of women conducting remediation activities at the mine waste piles of the Site

Future On-Site Resident Receptor

A future resident at the Site may be exposed on a continuous basis to Site soils in the neighborhoods where homes will be developed. Three neighborhoods are identified for potential future residential development and are :

1. North Independence Neighborhood
2. South Independence Neighborhood
3. North Star Neighborhood

Based on the screening conducted and shown in Table D-2, soils in the North Independence Neighborhood are below screening levels and will not be further evaluated in this HHRE. Soils in the other two neighborhoods have concentrations of some metals above screening levels and will be further evaluated in this HHRE.

Exposures were assumed to occur from incidental ingestion and dermal contact with soils in each neighborhood. Inhalation of fugitive dust was also included in the HHRE for exposures to Site soils the neighborhoods. The standard residential scenario (IDEQ, 2004) assumes residents live on the Site 350 days per year. A child and an adult were evaluated as receptors in a future resident scenario. For the HHRE, it was assumed that all exposures occur in the neighborhood. The soil ingestion rate used to evaluate incidental ingestion exposures was 200 mg/day for a child and 100 mg/day for the adult (IDEQ, 2004). Inhalation exposures assumed an average daily child-and adult outside breathing rate of 1.1 m^3/hour and 1.3 m^3/hour, respectively. For estimating concentrations of metals in air, a particulate fugitive dust emission factor of 8 E+08 m^3/kg was used from the USEPA *Soil Screening Guidance* (IDEQ, 2004) assuming 50 percent vegetative cover on yard soils. Other exposure parameters such as body weight (15 kg child and 70 kg adult) and averaging times were based on Idaho Risk Evaluation Manual (IDEQ, 2004), if default values are provided. The input parameters and calculated Site risks to the future residential scenario are presented in Table D-7 for the residential child and Table D-8 for the residential adult receptors.

The HHRE evaluated exposures to lead separately than for the other metals at the Site using the IEUBK model (USEPA, 1994) for children exposures. The IEUBK model was run assuming a child

resided on each of the source materials and affected media at the Site. The standard default input parameters suggested for the model were used for a child residing on-Site. The lead UCL of the mean concentrations for Site media was used as the lead EPCs in the residential yard. Using yard soil concentrations, the IEUBK model estimates the expected indoor dust (internal IEUBK algorithm). The default value for lead in drinking water was used for the future residential scenario, which is 4 µg/L. The input values and resulting child lead blood levels are presented in Attachment B to this HHRE. The IEUBK model results are summarized in Table D-5. Although the calculated average blood lead levels in children residing at both neighborhoods are below10 µg/dL, the model results indicate children blood lead levels would be below 10 µg/dL for more than 95 percent of the population from residing on the South Independence Neighborhood, but may be over 10 µg/dL for less than 95 percent of children residing at the North Star Neighborhood.

5.0 HUMAN RISK CHARACTERIZATION SUMMARY

The cumulative risk calculations for the recreational visitor, the future remediation construction worker and future resident scenarios are provided in Tables D-3, D-4, D-5, D-6, D-7, and D-8. Chronic non-cancer risk was evaluated by calculating the hazard quotient (HQ) for exposure to each constituent, and the total cumulative Hazard Index (HI) for concomitant exposure to all metal constituents. Idaho considers a cumulate HI of 1.0 to be acceptable for sites conducting a Risk Evaluation-2 Level (IDEQ, 2004). Cancer risks were evaluated by calculating the probability for cancer to develop from specific metals (arsenic, cadmium and hexavalent chromium) that are suspected carcinogens for concomitant types of exposures at the Site. Cancer risks represent the individual excess lifetime cancer risks (IELCR) that occur due to exposures to the Site contaminants and are presented as the number of individuals that potentially would develop cancer for a given population. Idaho considers cancer risk less than 1 additional cancer out of 100,000 people (10^{-5}) to be acceptable when conducting a Risk Evaluation-1 or 2 Level (IDEQ, 2004) with cumulative contaminant effects considered. Chronic exposures to Site lead was evaluated separately using the IEUBK model and the results are shown in Table D-4 for the recreational visitor, future remediation construction workers and future residents. Blood lead levels below 10 µg/dL for more than 95 percent of children or fetuses resulting from exposures to Site material are considered acceptable (USEPA, 1994).

5.1 Human Recreational Visitor Scenario

This HHRE determined that unacceptable risks (including HI, IELCR, and blood lead) to recreational visitors at the Site do not exist. Although all impacted media was not carried though the detailed risk evaluation, mine waste at each mine area were evaluated because these materials have the highest metal concentration and they also represent the highest risk to recreational visitors. The highest HI risk to recreational visitors at an individual mine waste pile was calculated to be 0.05 for the Triumph Tunnel soils (Tables D-3 and D4). This HI was highly influenced by one sample obtained by IDEQ that was collected below the ore bins. If the recreational visitor frequented all mine waste piles (assuming 40 percent of their entire recreating time), the accumulative HI could total 0.1 for an adolescent (sum of all HI for each mine area waste piles). The highest IELCR risk to recreational visitors from all Site areas evaluated in the HHRE was calculated at $4x10^{-6}$or assuming the recreational visitor frequents all mine area wastes piles the total IELCR could be $8x10^{-6}$(Tables D-3 and D-4). The highest potential blood lead levels for the 95th percentile of potentially affected fetuses was calculated at 5.6 µg/dL, well below the threshold of 10 µg/dL (Table D-5) (USEPA 1994).

Although the mine impacted materials at the Site do not represent an unacceptable risk to recreational visitors, remedial alternatives for the Site evaluated in the Section 6 of this Draft Remediation Work Plan include measures to reduce or eliminate risk for these human receptors.

5.2 Remediation Construction Worker Scenario

This HHRE determined that unacceptable risks (including HI, IELCR, and blood lead) to future remediation construction workers exist at the Site. Although all impacted media was not carried though the detailed risk evaluation, mine waste piles at each mine area were evaluated, because future remedial actions will be focused on the mine waste piles. The only mine waste pile that had the calculated HI less than 1.0 was at the Independence Mine. Therefore, any other mine impacted soils that were not explicitly evaluated and has metal EPCs comparable to or less than the metal EPCs at the mine waste piles of the Independence Mine area should not represent an unacceptable risk to the future construction worker. HI risk to remediation construction workers for all other mine waste piles

at the other mines were above 1.0. The highest potential IELCR risks to remediation construction workers from all Site areas evaluated in the HHRE was calculated at $3.3x10^{-5}$ at the Triumph Tunnel area, while all other cancer risks are approximately 10^{-5} or below (Table D-6). Again, the IELCR was highly influenced by one sample obtained by IDEQ that was collected below the ore bins. The potential blood lead levels for the 95th percentile of affected fetuses are above 10 µg/dL at all mine waste piles (Table D-5).

The mine impacted materials at the Site do represent an unacceptable risk to remediation construction workers. Remedial actions at the Site will need to address human risks during active remediation in order to protect workers. Protective measures will need to be identified and included in the Site Specific Remediation Health and Safety Plan.

5.3 Future Site Resident Scenario

For the future residential scenario, two neighborhood areas were evaluated in this HHRE because they had metal concentrations in soils above screening levels. These neighborhoods are:

- The North Star Neighborhood
- The South Independence Neighborhood

Both the North Star and South Independence Neighborhoods have potential HI for cumulative metal non-cancer risks above 1 for a child resident, which indicates an unacceptable risk may be associated with future residential use unless some remedial action is conducted. Also, both residential neighborhoods have a calculated IELCR risk of between $2x10^{-4}$ and $3x10^{-4}$ for children. Future residential use of the Site could result in average blood lead levels to children of 5.8 and 4.7 µg/dL at the North Star and South Independence Neighborhoods, respectively, but only the North Star Neighborhood represents a potential to affect more than 5 percent of children to have greater than 10 µg/dL.

Remediation of surface soils at the North Star and South Independence Neighborhoods are warranted. Inspection of the analytical results for the South Independence Neighborhood revealed that one soil sample had high levels of metals and influenced the average for the rest of the neighborhood soils. The surface soils at the South Independence Neighborhood appear to have isolated occurrences of elevated metals that either represent an anomalous background level or small areas of mine materials, both conditions can be effectively removed and remediated. The North Star Neighborhood soils have multiple samples that had elevated metal content. The area appeared to have been disturbed by mining activities in the past and includes sediments that eroded down the drainage from the North Star mine. Remedial actions for mine material removal are recommended for future residential development in the North Star Neighborhood.

5.4 Uncertainty Assessment

Risk evaluations have great uncertainty. The human physiologic responses to contaminants are extrapolated from animal studies with great uncertainty. The exposure and contaminant uptake by human receptors is highly variable and therefore uncertain. Human risk evaluations are by nature conservative to account for the uncertainty associated with exposures, intake and physiological responses. Although the actual calculated risk is uncertain, human risk evaluation are conducted using standard approaches and procedures for relative comparability in evaluating potential risks and making remedial decisions.

In reviewing the results of this risk characterization, it should be emphasized that the risks estimated in this analysis are based on a series of conservative assumptions regarding exposure and toxicity. For example, although the true exposure area at the Site is the entire Site area, risks were evaluated for discrete exposure points within the Site area, assuming that exposures occurred at each of the areas on a frequent basis, rather than across the entire Site. Recreational visitors would be expected to use the entire Site rather than spend all their time in one specific area. For example, the mine waste piles and impacted surrounding soils occupy about 3 percent of the entire 848 acres at the Site. Assuming a human receptor would not spend a disproportionate amount of time at any of the mine waste media areas, the true risk to humans from the mine media would likely be less than calculated for the recreational visitor scenario.

For evaluating IELCR, the cancer risk existing due to natural background metal concentrations were not subtracted from potential exposures at the Site. By definition, the IELCR represents the cancer risk solely due to exposures to Site impacted media. Site impacted media are metal COPCs that are above background levels. Typically, risk assessments remove cancer risk from natural conditions by either subtracting background levels from site impacted media or by subtracting the calculated cancer risk from only background from the total site cancer risks. This HHRE only calculates the total cancer risks from metals at the Site rather than the IECLR to be conservative using EPCs in Table D-2 without subtracting background cancer risks.

Risks to humans from inhalation and dermal contact may be overestimated. Inhalation reference concentrations (RfCs) were not available for the inorganic metal analytes evaluated in the HHRE. Therefore, dust inhalation non-cancer risks were conservatively estimated using oral RfDs. However, dust inhalation exposures are negligible compared to ingestion exposures.

6.0 REFERENCES

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USEPA. 1994. Technical Support Document: Parameters and Equations Used in the Integrated Exposure Uptake Biokinetic Model for Lead in Children (v 0.99d). USEPA publication: EPA 540/R-94/040. Washington, DC.

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TABLES

Screening Levels

Metal	Soil (mg/kg)				Surface Water (µg/L)			
	IDTL[1]	PQL[2]	Background Levels[3]	Soil Screening Level[4]	Federal Primary Drinking Water MCL	Idaho State Drinking Water Standards	PQL[2]	Surface Water Screening Level
Arsenic	0.391	2.5	46.1	**46.1**	10	50	1	**50**
Cadmium	1.35	0.2	7.13	**7.1**	5	5	0.5	**5**
Chromium	7.9	0.6	85.4	**85.4**	100	100	6	**100**
Copper	921	1	48.9	**921**	1,300	1,300	10	**1,300**
Iron	NA	6	26,900	**26,900**	300*	300*	100	**300**
Lead	49.6	0.75	94.8	**94.8**	15	15	0.5	**15**
Manganese	223	0.4	770	**770**	50	50	4	**50**
Mercury	0.005	0.033	0.07	**0.1**	2	2	0.2	**2**
Selenium	2.03	0.5	3.42	**3.4**	50	50	3	**50**
Silver	0.189	0.5	1.19	**1.2**	100*	100*	0.5	**100**
Zinc	886	1	872	**886**	5,000*	5,000*	10	**5,000**

[1] Idaho Initial Default Target Levels

[2] Laboratory Practical Quantification Limit

[3] Site Specific Milligan Formation Background UP-90% Levels

[4] Derived from the highest value between IDTL, PQL, and Site Specific Background Level.

* Federal Water Quality Criteria Secondary Drinking Water Standards

NA - Not Available

Comparison of Screening Levels to Media Exposure Point Concentrations (EPC)

Soil Samples	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)
North Star Mine - Exposure Point Concentrations											
Waste Dumps	2,920	148	54.4	288	68,700	14,300	1,600	2.23	7.49	118	7,050
Wind, Water, Vehicle Dispersal	367	24.6	70.6	93	23,200	2,990	1,540	0.27	5.46	22.9	2,820
Repository Area	693	29.8	72.6	95.8	20,100	1,780	1,350	0.54	5.51	11.8	3,870
Secondary Borrow Area	148	14	95.4	57.3	21,100	700	1,260	0.15	7.68	3.92	1,560
Independence Mine - Exposure Point Concentrations											
Waste Dumps	640	10	59	129	40300	10400	465	0.77	19.50	101	1,100
Wind, Water, Vehicle Dispersal	33.7	6.6	75.3	36.8	17,500	968	361	0.06	2.34	12.9	471
Repository Area	145	5.38	48.6	39.3	17,900	2,520	243	0.13	6.17	35.2	569
Secondary Borrow Area	18.2	4.93	71.0	33.5	20,600	315	373	0.07	1.02	3.8	617
Old Triumph (Shaft) - Exposure Point Concentrations											
Waste Dumps	3,130	291	23.3	---	---	9200.00	---	1.84	9.00	70	12,600
Wind, Water, Vehicle Dispersal	592	15.4	67.6	69.3	27,300	907	920	0.19	2.56	7.18	2,070.00
Repository Area	32.5	8.74	63.3	48.2	24,300	326	1,131	0.17	2.79	1.88	913
Triumph Tunnel - Exposure Point Concentrations											
Waste Dumps	6,863	52	72.6	1,300	17,900	7,620	656	13.9	3.40	25.0	8,050
Independence Neighborhood - Exposure Point Concentrations											
Northern Home Neighborhood	3.71	0.28	39.4	22.7	14,300	19.0	459	0.02	0.25	0.25	98
Southern Home Neighborhood	239	7.34	50.5	73.6	24,410	368	548	0.05	2.44	3.37	682
North Star Neighborhood - Exposure Point Concentrations											
Neighborhood	304	15.2	72.0	57.0	22,800	687	1,130	0.20	3.21	6.34	1,880.00
Screening Levels	**46.1**	**7.13**	**85.4**	**921**	**26,900**	**94.8**	**770**	**0.07**	**3.42**	**1.19**	**886**
Surface Water Samples (mg/L)											
G-TRSW2	0.375	0.000389	<0.006	<0.01	17.7	<0.003	9.87	<0.0002	<0.003	0.000708	0.915
G-IMSW1	<0.003	0.000888	<0.006	<0.01	<0.06	0.00571	0.0116	<0.0002	0.0146	<0.000125	0.0274
G-IMSW2	0.00476	0.000273	<0.006	<0.01	<0.06	<0.003	<0.004	<0.0002	0.0134	<0.000125	<0.01
G-IMSW4	<0.003	0.000626	<0.006	<0.01	0.641	<0.003	0.191	<0.0002	<0.003	0.000143	0.186
Screening Levels	**0.01**	**0.005**	**0.1**	**1.3**	**0.3**	**0.015**	**0.05**	**0.002**	**0.05**	**0.1**	**5**

Exposure Point Concentrations - Lesser of the maximum value detected and the 95% UCL of the mean.

Shading indicates value in excess of the Screening Level

Screening Levels derived from Table D-1

TABLE D-3

Calculation of Potential Risks for Recreational Adolescent Visitor Scenario

North Star Waste Rock Piles	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor	Inhalation	Oral	Respiratory	Oral	Dermal	Inhalation														Potential Oral	Potential Dermal	Potential Inhalation	Potential Total	Potential Oral	Potential Dermal	Potential Respiratory	Potential Total
		PEF	Rate	SF_o	SF_i	RfD_o	RfD_d	Unit Risk**	Atc	Atnc	BWa	ED	UCF	IRa	RAFo	RAFd	M	EFd	ET	SA	Percentage of Time on Medium	Hazard	Hazard	Hazard	Hazard	Cancer	Cancer	Cancer	Cancer
		(m^3/kg)	(m^3/hr)	(kg-day/mg)	(kg-day/mg)	(mg/kg-day)	(mg/kg-day)	[1/(mg/m3)]	(years)	(years)	(kg)	(years)	(mg/kg)	(mg/day)	(unitless)	(unitless)	(mg/cm^2-day)	(days/year)	(hours/day)	(cm^2)	(unitless)	Quotient	Quotient	Quotient	Quotient	Risk	Risk	Risk	Risk
Arsenic	2920	4.00E+08	1.3	1.5	15.1	0.0003		4.3	70	9	55	9	0.000001	200	0.28	0.032	0.1	7	6	2434	0.1	1.90E-02	2.64E-03	6.62E-06	2.17E-02	1.10E-06	1.53E-07	3.85E-09	1.26E-06
Cadmium	148	4.00E+08	1.3		6.3	0.001		1.8	70	9	55	9	0.000001	200	1	0.001	0.1	7	6	2434	0.1	1.03E-03	1.26E-06	1.01E-07	1.03E-03	0.00E+00	0.00E+00	8.15E-11	8.15E-11
Chromium	54.4	4.00E+08	1.3		42	0.003		84	70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	1.26E-04	1.54E-06	1.23E-08	1.28E-04	0.00E+00	0.00E+00	2.00E-10	2.00E-10
Copper	288	4.00E+08	1.3			0.042			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	4.78E-05	5.82E-07	4.66E-09	4.84E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	68700	4.00E+08	1.3						70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	14300	4.00E+08	1.3						70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1					0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	1600	4.00E+08	1.3			0.14			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	7.97E-05	9.70E-07	7.77E-09	8.07E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	2.23	4.00E+08	1.3			0.0003			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	5.18E-05	6.31E-07	5.05E-09	5.25E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	7.49	4.00E+08	1.3			0.005			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	1.04E-05	1.27E-07	1.02E-09	1.06E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	118	4.00E+08	1.3			0.005			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	1.65E-04	2.00E-06	1.60E-08	1.67E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	7050	4.00E+08	1.3			0.3			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	1.64E-04	1.99E-06	1.60E-08	1.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																						2.07E-02	**2.65E-03**	**6.78E-06**	**2.33E-02**	**1.10E-06**	**1.53E-07**	**4.14E-09**	**1.26E-06**

Independence Waste Rock Piles	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor	Inhalation	Oral	Respiratory	Oral	Dermal	Inhalation														Potential Oral	Potential Dermal	Potential Inhalation	Potential Total	Potential Oral	Potential Dermal	Potential Respiratory	Potential Total
		PEF	Rate	SF_o	SF_i	RfD_o	RfD_d	Unit Risk**	Atc	Atnc	BWa	ED	UCF	IRa	RAFo	RAFd	M	EFd	ET	SA	Percentage of Time on Medium	Hazard	Hazard	Hazard	Hazard	Cancer	Cancer	Cancer	Cancer
		(m^3/kg)	(m^3/hr)	(kg-day/mg)	(kg-day/mg)	(mg/kg-day)	(mg/kg-day)	[1/(mg/m3)]	(years)	(years)	(kg)	(years)	(mg/kg)	(mg/day)	(unitless)	(unitless)	(mg/cm^2-day)	(days/year)	(hours/day)	(cm^2)	(unitless)	Quotient	Quotient	Quotient	Quotient	Risk	Risk	Risk	Risk
Arsenic	640	4.00E+08	1.3	1.5	15.1	0.0003		4.3	70	9	55	9	0.000001	200	0.28	0.032	0.1	7	6	2434	0.1	4.17E-03	5.79E-04	1.45E-06	4.75E-03	2.41E-07	3.35E-08	8.45E-10	2.75E-07
Cadmium	10	4.00E+08	1.3		6.3	0.001		1.8	70	9	55	9	0.000001	200	1	0.001	0.1	7	6	2434	0.1	6.82E-05	8.30E-08	6.65E-09	6.83E-05	0.00E+00	0.00E+00	5.39E-12	5.39E-12
Chromium	59	4.00E+08	1.3		42	0.003		84	70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	1.36E-04	1.66E-06	1.33E-08	1.38E-04	0.00E+00	0.00E+00	2.15E-10	2.15E-10
Copper	129	4.00E+08	1.3			0.042			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	2.14E-05	2.61E-07	2.09E-09	2.17E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	40300	4.00E+08	1.3						70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	10400	4.00E+08	1.3						70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1					0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	465	4.00E+08	1.3			0.14			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	2.32E-05	2.82E-07	2.26E-09	2.34E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	0.77	4.00E+08	1.3			0.0003			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	1.79E-05	2.18E-07	1.75E-09	1.81E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	19.50	4.00E+08	1.3			0.005			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	2.72E-05	3.31E-07	2.65E-09	2.75E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	101	4.00E+08	1.3			0.005			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	1.41E-04	1.71E-06	1.37E-08	1.43E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	1100	4.00E+08	1.3			0.3			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	2.56E-05	3.11E-07	2.49E-09	2.59E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																						4.63E-03	**5.84E-04**	**1.50E-06**	**5.21E-03**	**2.41E-07**	**3.35E-08**	**1.07E-09**	**2.76E-07**

Old Triumph Shaft Area	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor	Inhalation	Oral	Respiratory	Oral	Dermal	Inhalation														Potential Oral	Potential Dermal	Potential Inhalation	Potential Total	Potential Oral	Potential Dermal	Potential Respiratory	Potential Total
		PEF	Rate	SF_o	SF_i	RfD_o	RfD_d	Unit Risk**	Atc	Atnc	BWa	ED	UCF	IRa	RAFo	RAFd	M	EFd	ET	SA	Percentage of Time on Medium	Hazard	Hazard	Hazard	Hazard	Cancer	Cancer	Cancer	Cancer
		(m^3/kg)	(m^3/hr)	(kg-day/mg)	(kg-day/mg)	(mg/kg-day)	(mg/kg-day)	[1/(mg/m3)]	(years)	(years)	(kg)	(years)	(mg/kg)	(mg/day)	(unitless)	(unitless)	(mg/cm^2-day)	(days/year)	(hours/day)	(cm^2)	(unitless)	Quotient	Quotient	Quotient	Quotient	Risk	Risk	Risk	Risk
Arsenic	3130	4.00E+08	1.3	1.5	15.1	0.0003		4.3	70	9	55	9	0.000001	200	0.28	0.032	0.1	7	6	2434	0.1	2.04E-02	2.83E-03	7.09E-06	2.32E-02	1.18E-06	1.64E-07	4.13E-09	1.35E-06
Cadmium	291	4.00E+08	1.3		6.3	0.001		1.8	70	9	55	9	0.000001	200	1	0.001	0.1	7	6	2434	0.1	2.03E-03	2.47E-06	1.98E-07	2.03E-03	0.00E+00	0.00E+00	1.60E-10	1.60E-10
Chromium	23	4.00E+08	1.3		42	0.003		84	70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	5.42E-05	6.59E-07	5.28E-09	5.48E-05	0.00E+00	0.00E+00	8.56E-11	8.56E-11
Copper		4.00E+08	1.3			0.042			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron		4.00E+08	1.3						70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	9200	4.00E+08	1.3						70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1					0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese		4.00E+08	1.3			0.14			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	2	4.00E+08	1.3			0.0003			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	4.28E-05	5.21E-07	4.17E-09	4.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	9	4.00E+08	1.3			0.005			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	1.26E-05	1.53E-07	1.22E-09	1.27E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	70	4.00E+08	1.3			0.005			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	9.76E-05	1.19E-06	9.52E-09	9.88E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	12600	4.00E+08	1.3			0.3			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	2.93E-04	3.56E-06	2.86E-08	2.96E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																						2.29E-02	**2.84E-03**	**7.34E-06**	**2.58E-02**	**1.18E-06**	**1.64E-07**	**4.38E-09**	**1.35E-06**

Triumph Tunnel Surface Soils	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor	Inhalation	Oral	Respiratory	Oral	Dermal	Inhalation														Potential Oral	Potential Dermal	Potential Inhalation	Potential Total	Potential Oral	Potential Dermal	Potential Respiratory	Potential Total
		PEF	Rate	SF_o	SF_i	RfD_o	RfD_d	Unit Risk**	Atc	Atnc	BWa	ED	UCF	IRa	RAFo	RAFd	M	EFd	ET	SA	Percentage of Time on Medium	Hazard	Hazard	Hazard	Hazard	Cancer	Cancer	Cancer	Cancer
		(m^3/kg)	(m^3/hr)	(kg-day/mg)	(kg-day/mg)	(mg/kg-day)	(mg/kg-day)	[1/(mg/m3)]	(years)	(years)	(kg)	(years)	(mg/kg)	(mg/day)	(unitless)	(unitless)	(mg/cm^2-day)	(days/year)	(hours/day)	(cm^2)	(unitless)	Quotient	Quotient	Quotient	Quotient	Risk	Risk	Risk	Risk
Arsenic	6860	4.00E+08	1.3	1.5	15.1	0.0003		4.3	70	9	55	9	0.000001	200	0.28	0.032	0.1	7	6	2434	0.1	4.47E-02	6.21E-03	1.55E-05	5.09E-02	2.58E-06	3.59E-07	9.06E-09	2.95E-06
Cadmium	52	4.00E+08	1.3		6.3	0.001		1.8	70	9	55	9	0.000001	200	1	0.001	0.1	7	6	2434	0.1	3.63E-04	4.41E-07	3.54E-08	3.63E-04	0.00E+00	0.00E+00	2.86E-11	2.86E-11
Chromium	73	4.00E+08	1.3		42	0.003		84	70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	1.69E-04	2.05E-06	1.65E-08	1.71E-04	0.00E+00	0.00E+00	2.67E-10	2.67E-10
Copper	1300	4.00E+08	1.3			0.042			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	2.16E-04	2.63E-06	2.10E-08	2.19E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	18000	4.00E+08	1.3						70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	7620	4.00E+08	1.3						70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1					0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	656	4.00E+08	1.3			0.14			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	3.27E-05	3.98E-07	3.19E-09	3.31E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	13.80	4.00E+08	1.3			0.0003			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	3.21E-04	3.90E-06	3.13E-08	3.25E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	3.4	4.00E+08	1.3			0.005			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	4.74E-06	5.77E-08	4.62E-10	4.80E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	25.0	4.00E+08	1.3			0.005			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	3.49E-05	4.24E-07	3.40E-09	3.53E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	8050	4.00E+08	1.3			0.3			70	9	55	9	0.000001	200	1	0.01	0.1	7	6	2434	0.1	1.87E-04	2.28E-06	1.82E-08	1.89E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																						4.60E-02	**6.22E-03**	**1.57E-05**	**5.22E-02**	**2.58E-06**	**3.59E-07**	**9.35E-09**	**2.95E-06**

TABLE D-4

Calculation of Potential Risks for Recreational Adult Visitor Scenario

North Star Waste Rock Piles	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor	Inhalation	Oral	Respiratory	Oral	Dermal	Inhalation														Potential Oral	Potential Dermal	Potential Inhalation	Potential Total	Potential Oral	Potential Dermal	Potential Respiratory	Potential Total
		PEF	Rate	SF_o	SF_i	RfD_o	RfD_d	Unit Risk**	Atc	Atnc	BWa	ED	UCF	IRs	RAFo	RAFd	M	EFd	ET	SA	Percentage of Time on Medium	Hazard	Hazard	Hazard	Hazard	Cancer	Cancer	Cancer	Cancer
		(m^3/kg)	(m^3/hr)	(kg-day/mg)	(kg-day/mg)	(mg/kg-day)	(mg/kg-day)	[1/(mg/m3)]	(years)	(years)	(kg)	(years)	(mg/kg)	(mg/day)	(unitless)	(unitless)	(mg/cm^2-day)	(days/year)	(hours/day)	(cm^2)	(unitless)	Quotient	Quotient	Quotient	Quotient	Risk	Risk	Risk	Risk
Arsenic	2920	4.00E+08	1.6	1.5	15.1	0.0003		4.3	70	15	70	15	0.000001	200	0.28	0.032	0.1	7	6	3477	0.1	1.49E-02	2.97E-03	6.40E-06	1.79E-02	1.44E-06	2.86E-07	6.21E-09	1.73E-06
Cadmium	148	4.00E+08	1.6		6.3	0.001		1.8	70	15	70	15	0.000001	200	1	0.001	0.1	7	6	3477	0.1	8.11E-04	1.41E-06	9.73E-08	8.12E-04	0.00E+00	0.00E+00	1.31E-10	1.31E-10
Chromium	54.4	4.00E+08	1.6		42	0.003		84	70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	9.94E-05	1.73E-06	1.19E-08	1.01E-04	0.00E+00	0.00E+00	3.22E-10	3.22E-10
Copper	288	4.00E+08	1.6			0.042			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	3.76E-05	6.53E-07	4.51E-09	3.82E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	68700	4.00E+08	1.6						70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	14300	4.00E+08	1.6						70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1					0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	1600	4.00E+08	1.6			0.14			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	6.26E-05	1.09E-06	7.51E-09	6.37E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	2.23	4.00E+08	1.6			0.0003			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	4.07E-05	7.08E-07	4.89E-09	4.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	7.49	4.00E+08	1.6			0.005			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	8.21E-06	1.43E-07	9.85E-10	8.35E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	118	4.00E+08	1.6			0.005			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	1.29E-04	2.25E-06	1.55E-08	1.32E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	7050	4.00E+08	1.6			0.3			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	1.29E-04	2.24E-06	1.55E-08	1.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																						1.63E-02	2.98E-03	6.56E-06	1.92E-02	1.44E-06	2.86E-07	6.87E-09	1.73E-06

Independence Waste Rock Piles	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor	Inhalation	Oral	Respiratory	Oral	Dermal	Inhalation														Potential Oral	Potential Dermal	Potential Inhalation	Potential Total	Potential Oral	Potential Dermal	Potential Respiratory	Potential Total
		PEF	Rate	SF_o	SF_i	RfD_o	RfD_d	Unit Risk**	Atc	Atnc	BWa	ED	UCF	IRs	RAFo	RAFd	M	EFd	ET	SA	Percentage of Time on Medium	Hazard	Hazard	Hazard	Hazard	Cancer	Cancer	Cancer	Cancer
		(m^3/kg)	(m^3/hr)	(kg-day/mg)	(kg-day/mg)	(mg/kg-day)	(mg/kg-day)	[1/(mg/m3)]	(years)	(years)	(kg)	(years)	(mg/kg)	(mg/day)	(unitless)	(unitless)	(mg/cm^2-day)	(days/year)	(hours/day)	(cm^2)	(unitless)	Quotient	Quotient	Quotient	Quotient	Risk	Risk	Risk	Risk
Arsenic	640	4.00E+08	1.6	1.5	15.1	0.0003		4.3	70	15	70	15	0.000001	200	0.28	0.032	0.1	7	6	3477	0.1	3.27E-03	6.50E-04	1.40E-06	3.92E-03	3.16E-07	6.27E-08	1.36E-09	3.80E-07
Cadmium	10	4.00E+08	1.6		6.3	0.001		1.8	70	15	70	15	0.000001	200	1	0.001	0.1	7	6	3477	0.1	5.36E-05	9.32E-08	6.43E-09	5.37E-05	0.00E+00	0.00E+00	8.68E-12	8.68E-12
Chromium	59	4.00E+08	1.6		42	0.003		84	70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	1.07E-04	1.86E-06	1.28E-08	1.09E-04	0.00E+00	0.00E+00	3.47E-10	3.47E-10
Copper	129	4.00E+08	1.6			0.042			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	1.68E-05	2.93E-07	2.02E-09	1.71E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	40300	4.00E+08	1.6						70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	10400	4.00E+08	1.6						70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1					0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	465	4.00E+08	1.6			0.14			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	1.82E-05	3.16E-07	2.18E-09	1.85E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	0.77	4.00E+08	1.6			0.0003			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	1.41E-05	2.45E-07	1.69E-09	1.43E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	19.50	4.00E+08	1.6			0.005			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	2.14E-05	3.72E-07	2.56E-09	2.17E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	101	4.00E+08	1.6			0.005			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	1.11E-04	1.92E-06	1.33E-08	1.13E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	1100	4.00E+08	1.6			0.3			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	2.01E-05	3.49E-07	2.41E-09	2.04E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																						3.63E-03	6.56E-04	1.45E-06	4.29E-03	3.16E-07	6.27E-08	1.72E-09	3.80E-07

Old Triumph Shaft Area	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor	Inhalation	Oral	Respiratory	Oral	Dermal	Inhalation														Potential Oral	Potential Dermal	Potential Inhalation	Potential Total	Potential Oral	Potential Dermal	Potential Respiratory	Potential Total
		PEF	Rate	SF_o	SF_i	RfD_o	RfD_d	Unit Risk**	Atc	Atnc	BWa	ED	UCF	IRs	RAFo	RAFd	M	EFd	ET	SA	Percentage of Time on Medium	Hazard	Hazard	Hazard	Hazard	Cancer	Cancer	Cancer	Cancer
		(m^3/kg)	(m^3/hr)	(kg-day/mg)	(kg-day/mg)	(mg/kg-day)	(mg/kg-day)	[1/(mg/m3)]	(years)	(years)	(kg)	(years)	(mg/kg)	(mg/day)	(unitless)	(unitless)	(mg/cm^2-day)	(days/year)	(hours/day)	(cm^2)	(unitless)	Quotient	Quotient	Quotient	Quotient	Risk	Risk	Risk	Risk
Arsenic	3130	4.00E+08	1.6	1.5	15.1	0.0003		4.3	70	15	70	15	0.000001	200	0.28	0.032	0.1	7	6	3477	0.1	1.60E-02	3.18E-03	6.86E-06	1.92E-02	1.54E-06	3.07E-07	6.86E-09	1.86E-06
Cadmium	291	4.00E+08	1.6		6.3	0.001		1.8	70	15	70	15	0.000001	200	1	0.001	0.1	7	6	3477	0.1	1.59E-03	2.77E-06	1.91E-07	1.60E-03	0.00E+00	0.00E+00	2.58E-10	2.58E-10
Chromium	23	4.00E+08	1.6		42	0.003		84	70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	4.26E-05	7.40E-07	5.11E-09	4.33E-05	0.00E+00	0.00E+00	1.38E-10	1.38E-10
Copper		4.00E+08	1.6			0.042			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron		4.00E+08	1.6						70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	9200	4.00E+08	1.6						70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1					0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese		4.00E+08	1.6			0.14			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	2	4.00E+08	1.6			0.0003			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	3.36E-05	5.84E-07	4.03E-09	3.42E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	9	4.00E+08	1.6			0.005			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	9.86E-06	1.71E-07	1.18E-09	1.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	70	4.00E+08	1.6			0.005			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	7.67E-05	1.33E-06	9.21E-09	7.81E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	12600	4.00E+08	1.6			0.3			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	2.30E-04	4.00E-06	2.76E-08	2.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																						1.80E-02	3.19E-03	7.10E-06	2.12E-02	1.54E-06	3.07E-07	7.06E-09	1.86E-06

Triumph Tunnel Surface Soils	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor	Inhalation	Oral	Respiratory	Oral	Dermal	Inhalation														Potential Oral	Potential Dermal	Potential Inhalation	Potential Total	Potential Oral	Potential Dermal	Potential Respiratory	Potential Total
		PEF	Rate	SF_o	SF_i	RfD_o	RfD_d	Unit Risk**	Atc	Atnc	BWa	ED	UCF	IRs	RAFo	RAFd	M	EFd	ET	SA	Percentage of Time on Medium	Hazard	Hazard	Hazard	Hazard	Cancer	Cancer	Cancer	Cancer
		(m^3/kg)	(m^3/hr)	(kg-day/mg)	(kg-day/mg)	(mg/kg-day)	(mg/kg-day)	[1/(mg/m3)]	(years)	(years)	(kg)	(years)	(mg/kg)	(mg/day)	(unitless)	(unitless)	(mg/cm^2-day)	(days/year)	(hours/day)	(cm^2)	(unitless)	Quotient	Quotient	Quotient	Quotient	Risk	Risk	Risk	Risk
Arsenic	6860	4.00E+08	1.6	1.5	15.1	0.0003		4.3	70	15	70	15	0.000001	200	0.28	0.032	0.1	7	6	3477	0.1	3.51E-02	6.97E-03	1.50E-05	4.21E-02	3.38E-06	6.72E-07	1.46E-08	4.07E-06
Cadmium	52	4.00E+08	1.6		6.3	0.001		1.8	70	15	70	15	0.000001	200	1	0.001	0.1	7	6	3477	0.1	2.85E-04	4.95E-07	3.42E-08	2.85E-04	0.00E+00	0.00E+00	4.62E-11	4.62E-11
Chromium	73	4.00E+08	1.6		42	0.003		84	70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	1.33E-04	2.31E-06	1.59E-08	1.35E-04	0.00E+00	0.00E+00	4.30E-10	4.30E-10
Copper	1300	4.00E+08	1.6			0.042			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	1.70E-04	2.95E-06	2.04E-08	1.73E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	18000	4.00E+08	1.6						70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	7620	4.00E+08	1.6						70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1					0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	656	4.00E+08	1.6			0.14			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	2.57E-05	4.46E-07	3.08E-09	2.61E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	13.80	4.00E+08	1.6			0.0003			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	2.52E-04	4.38E-06	3.02E-08	2.56E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	3.4	4.00E+08	1.6			0.005			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	3.73E-06	6.48E-08	4.47E-10	3.79E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	25.0	4.00E+08	1.6			0.005			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	2.74E-05	4.76E-07	3.29E-09	2.79E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	8050	4.00E+08	1.6			0.3			70	15	70	15	0.000001	200	1	0.01	0.1	7	6	3477	0.1	1.47E-04	2.56E-06	1.76E-08	1.50E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																						3.61E-02	6.98E-03	1.52E-05	4.31E-02	3.38E-06	6.72E-07	1.51E-08	4.07E-06

Summary of IEUBK Model Results for Human Blood Lead Levels[a]

Human Receptor	95th Percentile Predicted Blood Lead Level Among Fetuses Born to Women From Lead Exposures at Site (µg/dL)	Predicted Blood Lead Level of the Upper 95th Percentile Children Population From Lead Exposures at Site (µg/dL)	Percentile of Children Predicted to have blood lead Levels Greater Than 10 µg/dL From Lead Exposures at Site (µg/dL)
Tresspasser / Recreational Visitor Scenarios			
Recreational Visitor to North Star Mine Waste Rock Piles	5.6		
Recreational Visitor to Independence Mine Waste Rock Piles	5.4		
Recreational Visitor to Old Triumph Shaft Area Waste Rock Piles	5.4		
Recreational Visitor to Triumph Tunnel Area Soils	5.3		
Remediation Construction Worker at North Star Mine Waste Rock Piles	75		
Remediation Construction Worker at Independence Mine Waste Rock Piles	56		
Remediation Construction Worker at Old Triumph Shaft Area Waste Rock Piles	50		
Remediation Construction Worker at Triumph Tunnel Area Soils	42		
On-Site Residential Scenarios			
Child Resident on North Star Neighborhood Soils		13	12.7
Child Resident on South Independence Neighborhood Soils		9	4.3

a = IEUBK Model Inputs, Outputs and Calculations for each case is provided in Attachment A and B to the Human Health Risk Evaluation (HHRE)

TABLE D-6

Calculation of Potential Risks for Remediation Construction Worker Secenario

North Star Waste Rock Piles	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor PEF (kg/m^3)	Inhalation Rate (m^3/hr)	Oral Sf_o (kg-day/mg)	Respiratory SF_i (kg-day/mg)	Oral RfD_o (mg/kg-day)	Dermal RfD_d (mg/kg-day)	Inhalation Unit Risk** [1/(mg/m3)]	Atc (years)	Atnc (years)	BWa (kg)	ED (years)	UCF (mg/kg)	IRs (mg/day)	RAFo (unitless)	RAFd (unitless)	M-AF (mg/cm^2-day)	EFd (days/year)	ET (hours/day)	SA (cm^2)	Potential Oral Hazard Quotient	Potential Dermal Hazard Quotient	Potential Inhalation Hazard Quotient	Potential Total Hazard Quotient	Potential Oral Cancer Risk	Potential Dermal Cancer Risk	Potential Respiratory Cancer Risk	Potential Total Cancer Risk
Arsenic	2920	8.00E+08	2.4	1.5	15.1	0.0003		4.3	70	1	70	1	0.000001	480	0.28	0.032	0.5	30	10	3477	1.54E+00	6.36E-01	3.43E-04	2.17E+00	9.87E-06	4.09E-06	2.22E-08	1.40E-05
Cadmium	148	8.00E+08	2.4		6.3	0.001		1.8	70	1	70	1	0.000001	480	1	0.001	0.5	30	10	3477	8.34E-02	3.02E-04	5.21E-06	8.37E-02	0.00E+00	0.00E+00	4.69E-10	4.69E-10
Chromium	54.4	8.00E+08	2.4		42	0.003		84	70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	1.02E-02	3.70E-04	6.39E-07	1.06E-02	0.00E+00	0.00E+00	1.15E-09	1.15E-09
Copper	288	8.00E+08	2.4			0.042			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	3.86E-03	1.40E-04	2.42E-07	4.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	68700	8.00E+08	2.4						70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	14300	8.00E+08	2.4						70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477				0.00E+00				0.00E+00
Manganese	1600	8.00E+08	2.4			0.14			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	6.44E-03	2.33E-04	4.03E-07	6.67E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	2.23	8.00E+08	2.4			0.0003			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	4.19E-03	1.52E-04	2.62E-07	4.34E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	7.49	8.00E+08	2.4			0.005			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	8.44E-04	3.06E-05	5.28E-08	8.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	118	8.00E+08	2.4			0.005			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	1.33E-02	4.82E-04	8.31E-07	1.38E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	7050	8.00E+08	2.4			0.3			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	1.32E-02	4.80E-04	8.28E-07	1.37E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																					1.67E+00	**6.38E-01**	**3.51E-04**	**2.31E+00**	**9.87E-06**	**4.09E-06**	**2.38E-08**	**1.40E-05**

Independence Waste Rock Piles	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor PEF (kg/m^3)	Inhalation Rate (m^3/hr)	Oral Sf_o (kg-day/mg)	Respiratory SF_i (kg-day/mg)	Oral RfD_o (mg/kg-day)	Dermal RfD_d (mg/kg-day)	Inhalation Unit Risk** [1/(mg/m3)]	Atc (years)	Atnc (years)	BWa (kg)	ED (years)	UCF (mg/kg)	IRs (mg/day)	RAFo (unitless)	RAFd (unitless)	M (mg/cm^2-day)	EFd (days/year)	ET (hours/day)	SA (cm^2)	Potential Oral Hazard Quotient	Potential Dermal Hazard Quotient	Potential Inhalation Hazard Quotient	Potential Total Hazard Quotient	Potential Oral Cancer Risk	Potential Dermal Cancer Risk	Potential Respiratory Cancer Risk	Potential Total Cancer Risk
Arsenic	640	8.00E+08	2.4	1.5	15.1	0.0003		4.3	70	1	70	1	0.000001	480	0.28	0.032	0.5	30	10	3477	3.37E-01	1.39E-01	7.51E-05	4.76E-01	2.16E-06	8.96E-07	4.86E-09	3.06E-06
Cadmium	10	8.00E+08	2.4		6.3	0.001		1.8	70	1	70	1	0.000001	480	1	0.001	0.5	30	10	3477	5.51E-03	2.00E-05	3.45E-07	5.53E-03	0.00E+00	0.00E+00	3.10E-11	3.10E-11
Chromium	59	8.00E+08	2.4		42	0.003		84	70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	1.10E-02	3.99E-04	6.88E-07	1.14E-02	0.00E+00	0.00E+00	1.24E-09	1.24E-09
Copper	129	8.00E+08	2.4			0.042			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	1.73E-03	6.27E-05	1.08E-07	1.79E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	40300	8.00E+08	2.4						70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	10400	8.00E+08	2.4						70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	465	8.00E+08	2.4			0.14			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	1.87E-03	6.78E-05	1.17E-07	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	0.77	8.00E+08	2.4			0.0003			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	1.45E-03	5.24E-05	9.04E-08	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	19.50	8.00E+08	2.4			0.005			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	2.20E-03	7.96E-05	1.37E-07	2.28E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	101	8.00E+08	2.4			0.005			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	1.14E-02	4.12E-04	7.12E-07	1.18E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	1100	8.00E+08	2.4			0.3			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	2.07E-03	7.48E-05	1.29E-07	2.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																					3.74E-01	**1.41E-01**	**7.75E-05**	**5.14E-01**	**2.16E-06**	**8.96E-07**	**6.13E-09**	**3.07E-06**

Old Triumph Shaft Area	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor PEF (kg/m^3)	Inhalation Rate (m^3/hr)	Oral Sf_o (kg-day/mg)	Respiratory SF_i (kg-day/mg)	Oral RfD_o (mg/kg-day)	Dermal RfD_d (mg/kg-day)	Inhalation Unit Risk** [1/(mg/m3)]	Atc (years)	Atnc (years)	BWa (kg)	ED (years)	UCF (mg/kg)	IRs (mg/day)	RAFo (unitless)	RAFd (unitless)	M (mg/cm^2-day)	EFd (days/year)	ET (hours/day)	SA (cm^2)	Potential Oral Hazard Quotient	Potential Dermal Hazard Quotient	Potential Inhalation Hazard Quotient	Potential Total Hazard Quotient	Potential Oral Cancer Risk	Potential Dermal Cancer Risk	Potential Respiratory Cancer Risk	Potential Total Cancer Risk
Arsenic	3130	8.00E+08	2.4	1.5	15.1	0.0003		4.3	70	1	70	1	0.000001	480	0.28	0.032	0.5	30	10	3477	1.65E+00	6.82E-01	3.68E-04	2.33E+00	1.06E-05	4.38E-06	2.38E-08	1.50E-05
Cadmium	291	8.00E+08	2.4		6.3	0.001		1.8	70	1	70	1	0.000001	480	1	0.001	0.5	30	10	3477	1.64E-01	5.94E-04	1.03E-05	1.65E-01	0.00E+00	0.00E+00	9.23E-10	9.23E-10
Chromium	23	8.00E+08	2.4		42	0.003		84	70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	4.38E-03	1.59E-04	2.74E-07	4.54E-03	0.00E+00	0.00E+00	4.92E-10	4.92E-10
Copper		8.00E+08	2.4			0.042			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron		8.00E+08	2.4						70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	9200	8.00E+08	2.4						70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese		8.00E+08	2.4			0.14			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	2	8.00E+08	2.4			0.0003			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	3.46E-03	1.25E-04	2.16E-07	3.58E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	9	8.00E+08	2.4			0.005			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	1.01E-03	3.67E-05	6.34E-08	1.05E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	70	8.00E+08	2.4			0.005			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	7.89E-03	2.86E-04	4.93E-07	8.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	12600	8.00E+08	2.4			0.3			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	2.37E-02	8.57E-04	1.48E-06	2.45E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																					1.85E+00	**6.84E-01**	**3.80E-04**	**2.53E+00**	**1.06E-05**	**4.38E-06**	**2.52E-08**	**1.50E-05**

Triumph Tunnel Surface Soils	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor PEF (kg/m^3)	Inhalation Rate (m^3/hr)	Oral Sf_o (kg-day/mg)	Respiratory SF_i (kg-day/mg)	Oral RfD_o (mg/kg-day)	Dermal RfD_d (mg/kg-day)	Inhalation Unit Risk** [1/(mg/m3)]	Atc (years)	Atnc (years)	BWa (kg)	ED (years)	UCF (mg/kg)	IRs (mg/day)	RAFo (unitless)	RAFd (unitless)	M (mg/cm^2-day)	EFd (days/year)	ET (hours/day)	SA (cm^2)	Potential Oral Hazard Quotient	Potential Dermal Hazard Quotient	Potential Inhalation Hazard Quotient	Potential Total Hazard Quotient	Potential Oral Cancer Risk	Potential Dermal Cancer Risk	Potential Respiratory Cancer Risk	Potential Total Cancer Risk
Arsenic	6860	8.00E+08	2.4	1.5	15.1	0.0003		4.3	70	1	70	1	0.000001	480	0.28	0.032	0.5	30	10	3477	3.81E+00	1.49E+00	8.05E-04	5.10E+00	2.32E-05	9.60E-06	5.21E-08	3.29E-05
Cadmium	52	8.00E+08	2.4		6.3	0.001		1.8	70	1	70	1	0.000001	480	1	0.001	0.5	30	10	3477	2.93E-02	1.06E-04	1.83E-06	2.94E-02	0.00E+00	0.00E+00	1.65E-10	1.65E-10
Chromium	73	8.00E+08	2.4		42	0.003		84	70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	1.36E-02	4.94E-04	8.52E-07	1.41E-02	0.00E+00	0.00E+00	1.53E-09	1.53E-09
Copper	1300	8.00E+08	2.4			0.042			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	1.74E-02	6.32E-04	1.09E-06	1.81E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	18000	8.00E+08	2.4						70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	7620	8.00E+08	2.4						70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	656	8.00E+08	2.4			0.14			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	2.64E-03	9.56E-05	1.65E-07	2.74E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	13.80	8.00E+08	2.4			0.0003			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	2.59E-02	9.39E-04	1.62E-06	2.69E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	3.4	8.00E+08	2.4			0.005			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	3.83E-04	1.39E-05	2.40E-08	3.97E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	25.0	8.00E+08	2.4			0.005			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	2.82E-03	1.02E-04	1.76E-07	2.92E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	8050	8.00E+08	2.4			0.3			70	1	70	1	0.000001	480	1	0.01	0.5	30	10	3477	1.51E-02	5.48E-04	9.45E-07	1.57E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																					3.72E+00	**1.50E+00**	**8.12E-04**	**5.21E+00**	**2.32E-05**	**9.60E-06**	**5.38E-08**	**3.29E-05**

TABLE D-7

Calculation of Potential Risks for Future Residential Child Scenario

South Indepence Neighborhood Soils	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor	Inhalation	Oral	Respiratory	Oral	Dermal	Inhalation												Potential Oral	Potential Dermal	Potential Inhalation	Potential Total	Potential Oral	Potential Dermal	Potential Respiratory	Potential Total
		PEF	Rate	Sf_o	SF_i	RfD_o	RfD_d	Unit Risk**	Atc	Atnc	BWa	ED	UCF	IRs	RAFo	RAFd	M	EFd	ET	SA	Hazard	Hazard	Hazard	Hazard	Cancer	Cancer	Cancer	Cancer
		(m^3/kg)	(m^3/hr)	(kg-day/mg)	(kg-day/mg)	(mg/kg-day)	(mg/kg-day)	[1/(mg/m3)]	(years)	(years)	(kg)	(years)	(mg/kg)	(mg/day)	(unitless)	(unitless)	(mg/cm^2-day)	(days/year)	(hours/day)	(cm^2)	Quotient	Quotient	Quotient	Quotient	Risk	Risk	Risk	Risk
Arsenic	239	8.00E+08	1.1	1.5	15.1	0.0003		4.3	70	6	15	6	0.000001	200	0.28	0.032	1	270	2	2434	2.20E+00	3.06E+00	1.08E-04	5.26E+00	8.49E-05	1.18E-04	4.20E-08	2.03E-04
Cadmium	7.34	8.00E+08	1.1		6.3	0.001		1.8	70	6	15	6	0.000001	200	1	0.001	1	270	2	2434	7.24E-02	8.81E-04	9.95E-07	7.33E-02	0.00E+00	0.00E+00	5.38E-10	5.38E-10
Chromium	50.5	8.00E+08	1.1		42	0.003		84	70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	1.66E-01	2.02E-02	2.28E-06	1.86E-01	0.00E+00	0.00E+00	2.47E-08	2.47E-08
Copper	73.6	8.00E+08	1.1			0.042			70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	1.73E-02	2.10E-03	2.38E-07	1.94E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	24400	8.00E+08	1.1						70	6	15	6	0.000001	200	1	0.01	1	270	2	2434				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	368	8.00E+08	1.1						70	6	15	6	0.000001	200	1	0.01	1	270	2	2434				0.00E+00				0.00E+00
Manganese	548	8.00E+08	1.1			0.14			70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	3.86E-02	4.70E-03	5.31E-07	4.33E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	0.05	8.00E+08	1.1			0.0003			70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	1.64E-03	2.00E-04	2.26E-08	1.84E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	2.44	8.00E+08	1.1			0.005			70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	4.81E-03	5.86E-04	6.62E-08	5.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	3.37	8.00E+08	1.1			0.005			70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	6.65E-03	8.09E-04	9.14E-08	7.46E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	682	8.00E+08	1.1			0.3			70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	2.24E-02	2.73E-03	3.08E-07	2.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																					2.53E+00	**3.09E+00**	**1.13E-04**	**5.62E+00**	**8.49E-05**	**1.18E-04**	**6.71E-08**	**2.03E-04**

North Star Neighborhood Soils	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor	Inhalation	Oral	Respirstory	Oral	Dermal	Inhalation												Potential Oral	Potential Dermal	Potential Inhalation	Potential Total	Potential Oral	Potential Dermal	Potential Respiratory	Potential Total
		PEF	Rate	Sf_o	SF_i	RfD_o	RfD_d	Unit Risk**	Atc	Atnc	BWa	ED	UCF	IRs	RAFo	RAFd	M	EFd	ET	SA	Hazard	Hazard	Hazard	Hazard	Cancer	Cancer	Cancer	Cancer
		(m^3/kg)	(m^3/hr)	(kg-day/mg)	(kg-day/mg)	(mg/kg-day)	(mg/kg-day)	[1/(mg/m3)]	(years)	(years)	(kg)	(years)	(mg/kg)	(mg/day)	(unitless)	(unitless)	(mg/cm^2-day)	(days/year)	(hours/day)	(cm^2)	Quotient	Quotient	Quotient	Quotient	Risk	Risk	Risk	Risk
Arsenic	304	8.00E+08	1.1	1.5	15.1	0.0003		4.3	70	6	15	6	0.000001	200	0.28	0.032	1	270	2	2434	2.80E+00	3.89E+00	1.37E-04	6.69E+00	1.08E-04	1.50E-04	5.34E-08	2.58E-04
Cadmium	15.2	8.00E+08	1.1		6.3	0.001		1.8	70	6	15	6	0.000001	200	1	0.001	1	270	2	2434	1.50E-01	1.82E-03	2.06E-06	1.52E-01	0.00E+00	0.00E+00	1.11E-08	1.11E-09
Chromium	72.0	8.00E+08	1.1		42	0.003		84	70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	2.37E-01	2.88E-02	3.25E-06	2.66E-01	0.00E+00	0.00E+00	3.52E-08	3.52E-08
Copper	57.0	8.00E+08	1.1			0.042			70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	1.34E-02	1.63E-03	1.84E-07	1.50E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	22800	8.00E+08	1.1						70	6	15	6	0.000001	200	1	0.01	1	270	2	2434				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	687	8.00E+08	1.1						70	6	15	6	0.000001	200	1	0.01	1	270	2	2434				0.00E+00				0.00E+00
Manganese	1130	8.00E+08	1.1			0.14			70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	7.96E-02	9.69E-03	1.09E-06	8.93E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	0.20	8.00E+08	1.1			0.0003			70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	6.58E-03	8.00E-04	9.04E-08	7.38E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	3.21	8.00E+08	1.1			0.005			70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	6.33E-03	7.71E-04	8.71E-08	7.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	6.34	8.00E+08	1.1			0.005			70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	1.25E-02	1.52E-03	1.72E-07	1.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	1880	8.00E+08	1.1			0.3			70	6	15	6	0.000001	200	1	0.01	1	270	2	2434	6.18E-02	7.52E-03	8.50E-07	6.93E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																					3.37E+00	**3.94E+00**	**1.45E-04**	**7.31E+00**	**1.08E-04**	**1.50E-04**	**8.96E-08**	**2.58E-04**

TABLE D-8

Calculation of Potential Risks Future Residential
Adult Scenario

South Indepence Neighborhood Soils	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor	Inhalation	Oral	Respiratory	Oral	Dermal	Inhalation													Potential Oral	Potential Dermal	Potential Inhalation	Potential Total	Potential Oral	Potential Dermal	Potential Respiratory	Potential Total
		PEF	Rate	Sf_o	SF_i	RfD_o	RfD_d	Unit Risk**	Atc	Atnc	BWa	ED	UCF	IRs	RAFo	RAFd	M	EFd	ET	SA	Hazard	Hazard	Hazard	Hazard	Cancer	Cancer	Cancer	Cancer
		(m^3/kg)	(m^3/hr)	(kg-day/mg)	(kg-day/mg)	(mg/kg-day)	(mg/kg-day)	[1/(mg/m3)]	(years)	(years)	(kg)	(years)	(mg/kg)	(mg/day)	(unitless)	(unitless)	(mg/cm^2-day)	(days/year)	(hours/day)	(cm^2)	Quotient	Quotient	Quotient	Quotient	Risk	Risk	Risk	Risk
Arsenic	239	8.00E+08	1.3	1.5	15.1	0.0003		4.3	70	15	70	15	0.000001	100	0.28	0.032	0.3	270	2	5657	2.36E-01	4.57E-01	2.74E-05	6.93E-01	2.27E-05	4.41E-05	2.66E-08	6.68E-05
Cadmium	7.34	8.00E+08	1.3		6.3	0.001		1.8	70	15	70	15	0.000001	100	1	0.001	0.3	270	2	5657	7.76E-03	1.32E-04	2.52E-07	7.89E-03	0.00E+00	0.00E+00	3.40E-10	3.40E-10
Chromium	50.5	8.00E+08	1.3		42	0.003		84	70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	1.78E-02	3.02E-03	5.78E-07	2.08E-02	0.00E+00	0.00E+00	1.56E-08	1.56E-08
Copper	73.6	8.00E+08	1.3			0.042			70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	1.85E-03	3.14E-04	6.02E-08	2.17E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	24400	8.00E+08	1.3						70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	368	8.00E+08	1.3						70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657				0.00E+00				0.00E+00
Manganese	548	8.00E+08	1.3			0.14			70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	4.14E-03	7.02E-04	1.34E-07	4.84E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	0.05	8.00E+08	1.3			0.0003			70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	1.76E-04	2.99E-05	5.72E-09	2.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	2.44	8.00E+08	1.3			0.005			70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	5.16E-04	8.75E-05	1.68E-08	6.03E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	3.37	8.00E+08	1.3			0.005			70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	7.12E-04	1.21E-04	2.31E-08	8.33E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	682	8.00E+08	1.3			0.3			70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	2.40E-03	4.08E-04	7.81E-08	2.81E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																					2.71E-01	4.62E-01	2.85E-05	7.33E-01	2.27E-05	4.41E-05	4.25E-08	6.69E-05

North Star Neighborhood Soils	Lesser of Maximum and 95% UCL (mg/kg)	Particulate Emission Factor	Inhalation	Oral	Respiratory	Oral	Dermal	Inhalation													Potential Oral	Potential Dermal	Potential Inhalation	Potential Total	Potential Oral	Potential Dermal	Potential Respiratory	Potential Total
		PEF	Rate	Sf_o	SF_i	RfD_o	RfD_d	Unit Risk**	Atc	Atnc	BWa	ED	UCF	IRs	RAFo	RAFd	M	EFd	ET	SA	Hazard	Hazard	Hazard	Hazard	Cancer	Cancer	Cancer	Cancer
		(m^3/kg)	(m^3/hr)	(kg-day/mg)	(kg-day/mg)	(mg/kg-day)	(mg/kg-day)	[1/(mg/m3)]	(years)	(years)	(kg)	(years)	(mg/kg)	(mg/day)	(unitless)	(unitless)	(mg/cm^2-day)	(days/year)	(hours/day)	(cm^2)	Quotient	Quotient	Quotient	Quotient	Risk	Risk	Risk	Risk
Arsenic	304	8.00E+08	1.3	1.5	15.1	0.0003		4.3	70	15	70	15	0.000001	100	0.28	0.032	0.3	270	2	5657	3.00E-01	5.82E-01	3.48E-05	8.81E-01	2.89E-05	5.61E-05	3.38E-08	8.50E-05
Cadmium	15.2	8.00E+08	1.3		6.3	0.001		1.8	70	15	70	15	0.000001	100	1	0.001	0.3	270	2	5657	1.61E-02	2.73E-04	5.22E-07	1.63E-02	0.00E+00	0.00E+00	7.05E-10	7.05E-10
Chromium	72.0	8.00E+08	1.3		42	0.003		84	70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	2.54E-02	4.30E-03	8.24E-07	2.97E-02	0.00E+00	0.00E+00	2.23E-08	2.23E-08
Copper	57.0	8.00E+08	1.3			0.042			70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	1.43E-03	2.43E-04	4.66E-08	1.68E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	22800	8.00E+08	1.3						70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	687	8.00E+08	1.3						70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657				0.00E+00				0.00E+00
Manganese	1130	8.00E+08	1.3			0.14			70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	8.53E-03	1.45E-03	2.77E-07	9.98E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	0.20	8.00E+08	1.3			0.0003			70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	7.05E-04	1.20E-04	2.29E-08	8.24E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	3.21	8.00E+08	1.3			0.005			70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	6.78E-04	1.15E-04	2.20E-08	7.94E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	6.34	8.00E+08	1.3			0.005			70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	1.34E-03	2.27E-04	4.35E-08	1.57E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	1880	8.00E+08	1.3			0.3			70	15	70	15	0.000001	100	1	0.01	0.3	270	2	5657	6.62E-03	1.12E-03	2.15E-07	7.75E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
																					3.61E-01	5.89E-01	3.68E-05	9.50E-01	2.89E-05	5.61E-05	5.67E-08	8.50E-05

FIGURE

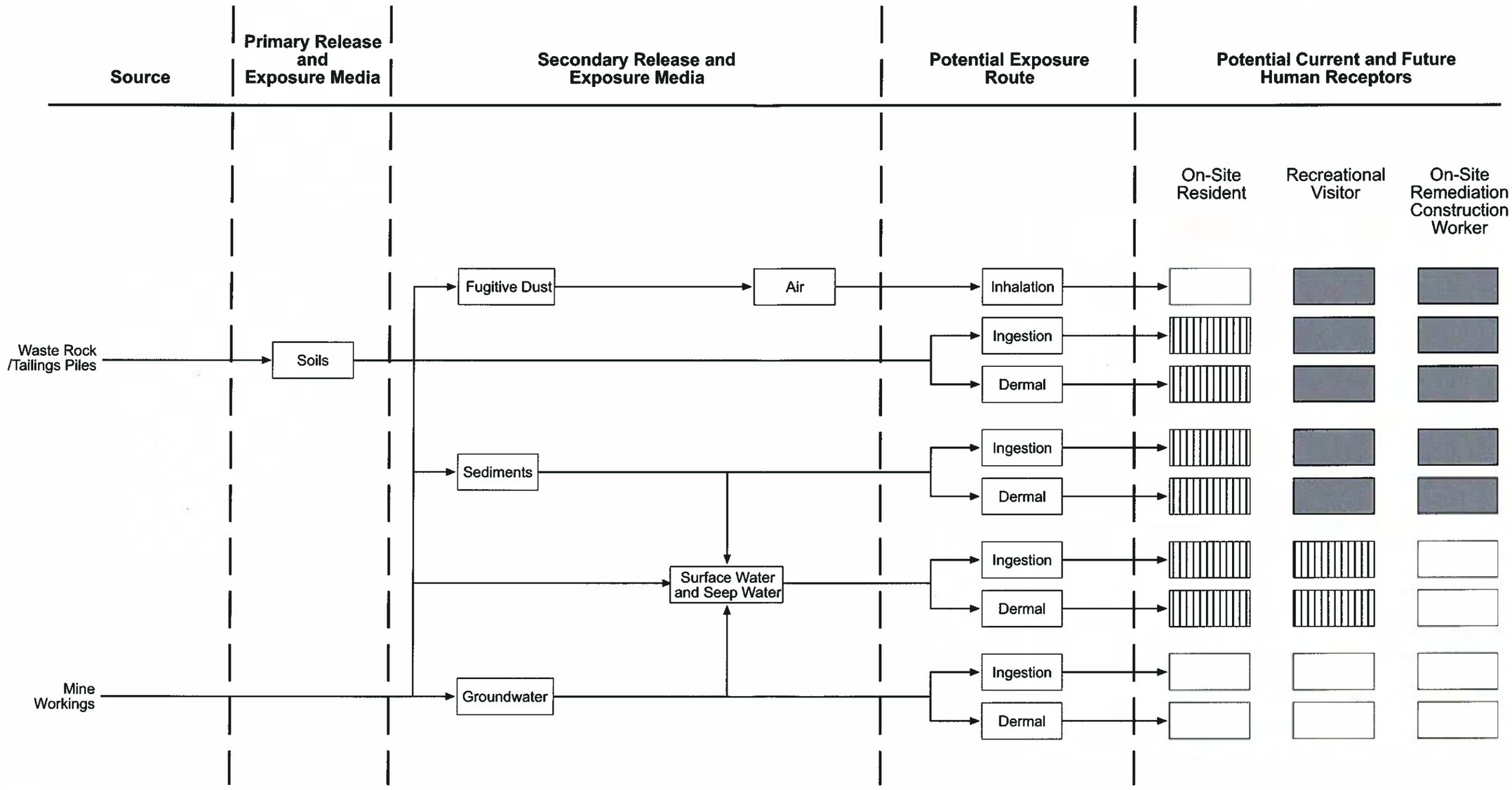


FIGURE **D-1**
CONCEPTUAL SITE MODEL FOR HUMAN HEALTH RISK ASSESSMENT
INDEPENDENCE MINE REMEDI. PLAN/ID

08393359026figD-1_R1.ai | Mod: 01/05/09 | AMP

Golder Associates

ATTACHMENT A

Attachment A
Fetal Blood Lead Prediction Model for Recreational Visitor

$$PbB_{adult,central} = PbB_{adult,O} + \left[\left(\frac{(PbS)(BKSF)(AF_s)(EF_s)(PT)}{AT}\right)\left(IR_s + (1000)(IR_i)(ET)\frac{I}{PEF}\right)\right]$$

Where:

$PbB_{adult,central}$ =	Central estimate of blood lead concentrations (µg/dL) in adults (i.e., women of child-bearing age) that have site exposures to soil lead at concentration, PbS.
$PbB_{adult,O}$ =	Typical blood lead concentration (assumed 1.9 µg/dL) in adults (i.e., women of child-bearing age) in the absence of exposures to the site that is being assessed.
PbS =	Soil lead concentration (µg/g) (appropriate arithmetic average concentration for individual).
BKSF =	Biokinetic slope factor relating (quasi-steady state) increase in typical adult blood lead concentration to average daily lead uptake (0.4 µg/dL blood lead increase per µg/day lead uptake).
IR_s =	Intake rate of soil, outdoor soil, soil-derived dust (0.20g/day).
AF_s =	Absolute gastrointestinal absorption fraction for ingested lead in soil and lead in dust derived from soil (0.12 dimensionless).
EF_s =	Exposure frequency for contact with assessed soils and/or dust derived in part from these soils (days of exposure during the averaging period); may be taken as 7 days per year for continuing, long term exposure.
AT =	Averaging time; the total period during which soil contact may occur; 365 days/year for continuing long term exposures.
PEF =	Particulate Emission Factor $[4\,E+08(m^3-air)/(\text{kg}-\text{soil})]$
ET =	Exposure time [6.6 hours/day]
IR_{ao} =	Outdoor inhalation rate $[1.6\ m^3/hr]$
1000 =	Conversion (g/kg)
PT=	Percentage of time sent on medium during recreational activities (10 percent)

Source: U.S. Environmental Protection Agency, 1996 and 2003

Then:

$$\text{PbB}_{\text{fetal},0.95} = (PbB_{adult,central})(GSD_{i,adult}^{1.645})(R_{fetal/maternal})$$

$PbB_{fetal,0.95,goal}$ =	Goal for the 95th percentile blood lead concentration (µg/dL) among fetuses born to women having exposures to the specified site soil concentration. This is interpreted to mean that there is a 95% likelihood that a fetus, in a women who experiences such exposures, would have a blood lead concentration no greater than $PbP_{fetal,0.95,goal}$ (i.e., the likelihood of a blood lead concentration greater than 10 µg/dL would be less than 5% for the approach described in this report.)
$GSD_{i,adult}$ =	Estimated value of the individual geometric standard deviation (assumed 1.9 dimensionless); the GSD among adults (i.e., women of child-bearing age) that have exposures to similar on-site lead exposures. The exponent, 1.645, is the value of the standard normal deviate used to calculate the 95th percentile from a lognormal distribution of blood lead concentration.
$R_{fetal/maternal}$ =	Constant of proportionality between fetal blood lead concentration at birth and maternal blood lead concentration (0.90 dimensionless).

Source: U.S. Environmental Protection Agency, 2003

ATTACHMENT B

==========

Model Version: 1.0 Build 263
User Name: Douglas Morell
Date: January 2, 2009
Site Name: Independence Mine Site, Triumph, Idaho
Operable Unit: North Star Neighborhood
Run Mode: Research Child Resident

==========

The time step used in this model run: 1 - Every 4 Hours (6 times a day).

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (ug Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(ug/day)
.5-1	5.530
1-2	5.780
2-3	6.490
3-4	6.240
4-5	6.010
5-6	6.340
6-7	7.000

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 ug Pb/L

****** Soil & Dust ******

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
.5-1	687.000	200.000
1-2	687.000	200.000
2-3	687.000	200.000
3-4	687.000	200.000
4-5	687.000	200.000
5-6	687.000	200.000
6-7	687.000	200.000

****** Alternate Intake ******

Age	Alternate (ug Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

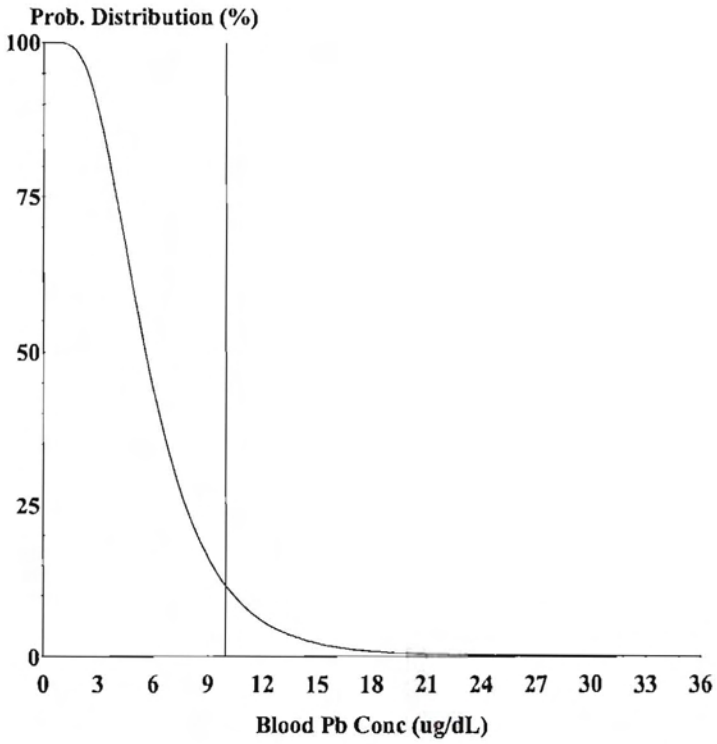
****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 2.500 ug Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

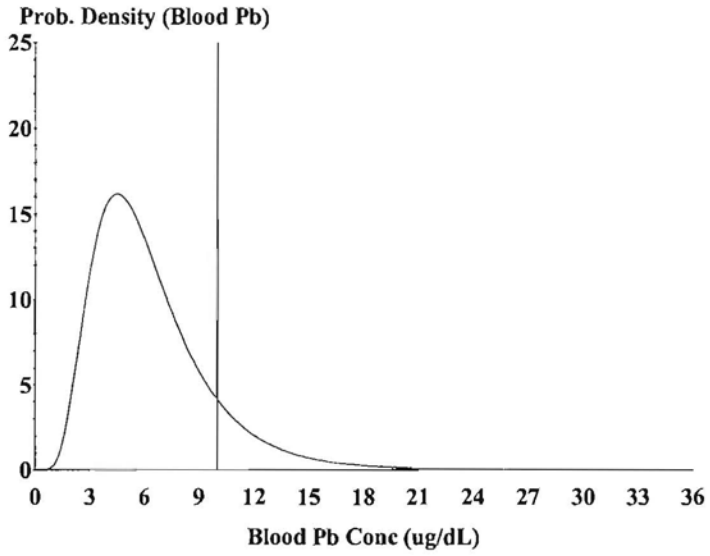
Year	Air (ug/day)	Diet (ug/day)	Alternate (ug/day)	Water (ug/day)
.5-1	0.021	2.405	0.000	0.348
1-2	0.034	2.465	0.000	0.853
2-3	0.062	2.821	0.000	0.904
3-4	0.067	2.765	0.000	0.939
4-5	0.067	2.761	0.000	1.011
5-6	0.093	2.952	0.000	1.080
6-7	0.093	3.281	0.000	1.106

Year	Soil+Dust (ug/day)	Total (ug/day)	Blood (ug/dL)
.5-1	9.298	12.073	6.5
1-2	14.480	17.833	7.3
2-3	14.759	18.547	6.9
3-4	15.043	18.814	6.5
4-5	11.554	15.392	5.5
5-6	10.539	14.664	4.6
6-7	10.020	14.501	4.2



Cutoff = 10.000 ug/dl
Geo Mean = 5.853
GSD = 1.600
% Above = 12.720

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Research



Cutoff = 10.000 ug/dl
Geo Mean = 5.853
GSD = 1.600
% Above = 12.720
% Below = 87.280

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Research

==========

Model Version: 1.0 Build 263
User Name: Douglas Morell
Date: January 2,2009
Site Name: Independence Mine Site, Triumph, Idaho
Operable Unit: South Independence Neighborhood Soils
Run Mode: Research Child Resident

==========

The time step used in this model run: 1 - Every 4 Hours (6 times a day).

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (ug Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(ug/day)
.5-1	5.530
1-2	5.780
2-3	6.490
3-4	6.240
4-5	6.010
5-6	6.340
6-7	7.000

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 ug Pb/L

****** Soil & Dust ******

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
.5-1	368.000	200.000
1-2	368.000	200.000
2-3	368.000	200.000
3-4	368.000	200.000
4-5	368.000	200.000
5-6	368.000	200.000
6-7	368.000	200.000

****** Alternate Intake ******

Age	Alternate (ug Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

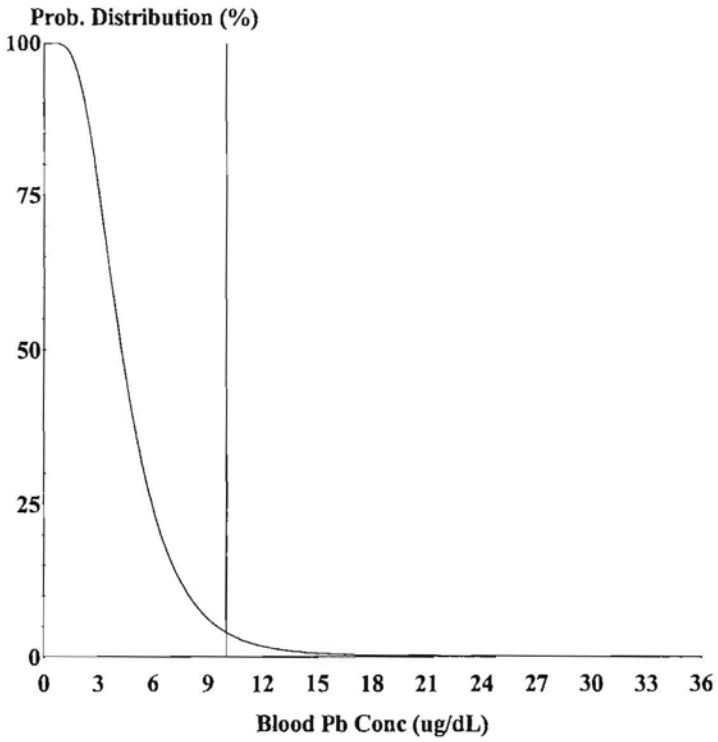
****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 2.500 ug Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

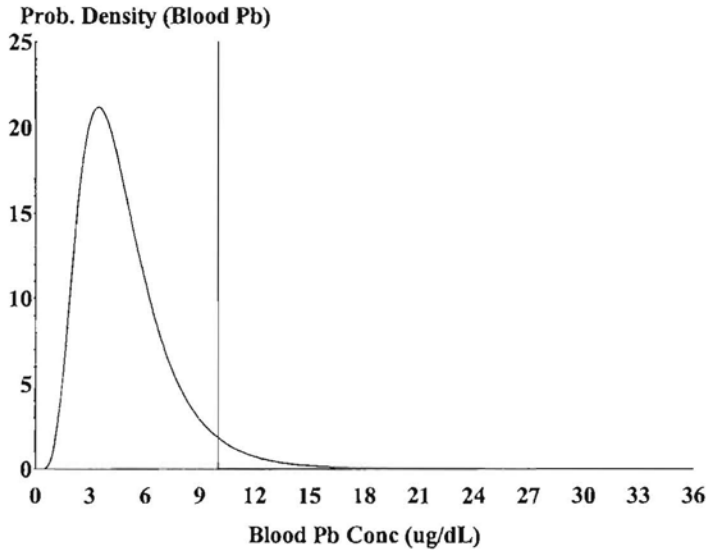
Year	Air (ug/day)	Diet (ug/day)	Alternate (ug/day)	Water (ug/day)
.5-1	0.021	2.488	0.000	0.360
1-2	0.034	2.567	0.000	0.888
2-3	0.062	2.923	0.000	0.937
3-4	0.067	2.852	0.000	0.969
4-5	0.067	2.819	0.000	1.032
5-6	0.093	3.002	0.000	1.099
6-7	0.093	3.330	0.000	1.123

Year	Soil+Dust (ug/day)	Total (ug/day)	Blood (ug/dL)
.5-1	6.325	9.194	5.0
1-2	9.914	13.404	5.5
2-3	10.053	13.975	5.2
3-4	10.203	14.091	4.9
4-5	7.757	11.674	4.1
5-6	7.048	11.242	3.6
6-7	6.687	11.233	3.2



Cutoff = 10.000 ug/dl
Geo Mean = 4.466
GSD = 1.600
% Above = 4.318

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Research



Cutoff = 10.000 ug/dl
Geo Mean = 4.466
GSD = 1.600
% Above = 4.318
% Below = 95.682

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Research

ECOLOGICAL DESIGN, INC.

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208.338.5852 • ecodesigninc@mac.com

MEMO TO: Mike McDonald
Environmental Staff Biologist
Idaho Department of Fish and Game - Magic Valley Region

DeNovo Independence, LLC
C/O Kendra Lindahl
Principal
Landform, Inc.

Dick Vorpahl
DeNovo Properties, LLC

Doug Morell
Kirsi Longley
Golder Associates

Bruce Wicherski
Jeff Fromm
Bruce Schuld
Idaho Department of Environmental Quality

FROM: Rob Tiedemann, CPWS, CWD, CFS, CWB, Ecological Design, Inc.

DATE: January 25, 2009

RE: DeNovo Independence, LLC
DeNovo Independence Site (a.k.a. Triumph Mine Site)
Ecological Risk Assessment - Abstract and Summary of Preliminary Results

I have posted to my Public Folder two documents of interest to Idaho Department of Fish and Game. They are: (a) Abstract of a Summary of Preliminary Results of an Ecological Risk Assessment for the DeNovo Independence Site (a.k.a. Triumph Mine Site, and (b) Summary of Preliminary Results of an Ecological Risk Assessment for the DeNovo Independence Site.

You can access both documents by using the following instructions. To connect to my Public Folder using a web browser:

1. Open your web browser (i.e. Internet Explorer 6 or later, Firefox 1.0.4 or later, or Safari 2.0.2 or later).

2. Enter the following address to your web browser, "idisk.mac.com/ecodesigninc-Public". Be sure to use an uppercase P when typing Public.

3. No password is required. Simply drag the documents in the folder titled "Public" to your desktop.

Both documents have been submitted to the Idaho Department of Environmental Quality (DEQ) as part of a Human Health Risk Assessment (HHRA) prepared by Golder Associates, Inc. The abstract of the ERA appears in the body, and the full report appears as an appendix to the HHRA. Both documents are titled "preliminary results" because they lack some information requested by Idaho DEQ and Idaho Department of Fish and Game - Magic Valley Region (IDFG-MVR). A complete Ecological Risk Assessment (ERA) for the project, to follow these summary reports, will contain the following additional information and a discussion of its relevance to the project area.

1. Species of all fish and wildlife at risk of exposure and their sensitivities to known constituents of potential ecological concern (COPECs).

2. Response of an organism to COPECs (e.g. absorption, distribution, metabolic decomposition, and excretion).

3. The consequences of both acute and chronic exposure of fish and wildlife to known COPECs.

4. The potential for, and consequences of bio-accumulation and bio-magnification of known COPECs.

5. Indirect effects to the health and vigor of wildlife due to the loss of their prey base and food resources because of exposure to COPECs.

6. An evaluation of whether exposure of wildlife to locations of elevated concentrations of COPECs is random, or effected by a possible unique appeal of waste piles. Examples include their chemical composition - such as that of naturally occurring salt licks that attract mule deer and elk - or their ability to provide snow free loafing areas in early spring because their black color absorbs greater radiant energy from the sun than the surrounding ground.

7. An evaluation of the locations of elevated concentrations of COPECs relative to known daily or seasonal migration routes of wildlife species.

8. The potential for harm to aquatic life in the East Fork of the Big Wood River that is within the jurisdiction of the US EPA that oversees, and Idaho DEQ that administers §402 of the Clean Water Act.

9. A qualitative assessment of risk to sage grouse (*Centrocercus urophasianus*), a Species of Greatest Conservation Need (SGCN) as identified by the IDFG; and gray wolf (*Canis lupus*), both an endangered species and an experimental non-essential species as identified by the US Fish and Wildlife Service.

10. The potential for seed and container plants installed above waste repositories to attract wildlife.

11. The potential for mobilization of buried COPECs to the soil surface by burrowing animals.

12. The potential for deep-rooted plant species to penetrate the cover of waste repositories.

13. Pathways and routes of exposure to COPECs in the environment (i.e. Pathways: air, surface water, groundwater, soil, solid waste, and food / Routes: ingestion of food and water, skin contact, inhalation, preening, and grooming).

14. Graphical depiction and narrative describing a conceptual model of the relationships between assessment endpoints and stressors (i.e. source, stressors, receptors, potential exposure, predicted effects).

15. A comparison of known concentrations of a COPECs in soil (Sc) to US EPA Ecological Screening Level (Eco-SSL) values for each COPEC (see http://www.epa.gov/ecotox/ecossl/). As with use of the Modified BLM RMC (Level 2 Analysis), these values will be modified to take into account spatial and temporal factors.

16. An uncertainty analysis including a discussion of the variability of the data and factors that contribute to the uncertainty of results.

SUMMARY OF PRELIMINARY RESULTS OF AN ECOLOGICAL RISK ASSESSMENT

DENOVO INDEPENDENCE SITE
BLAINE COUNTY, IDAHO
DENOVO INDEPENDENCE, LLC

Prepared by:
Ecological Design, Inc.
Boise, Idaho
Robert B. Tiedemann, CPWS, CWD, CFS, CWB

Prepared for:
Landform
Kendra Lindahl, Principal

January 7, 2009
Most Recent Revision: January 12, 2009

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Most Recent Revision: January 12, 2009

INTRODUCTION

This report describes materials and methods, and the preliminary results of an ecological risk assessment (ERA) for the DeNovo Independence Site for use by DeNovo Independence, LLC in their planning and engineering of future use of the property, and Idaho Department of Environmental Quality (DEQ) and Idaho Department of Fish and Game (IDFG) in their evaluation of risk, before and after remediation.

Materials and methods of the ERA are an amalgam of those prescribed by the US Bureau of Land Management (BLM) and US Environmental Protection Agency (EPA). Materials and methods I determined to be most appropriate and selected for use for the DeNovo Independence Site are supported by a review of the scientific literature and discussions with peer reviewers of the ERA from Idaho DEQ and colleagues from Golder Associates, Inc.

The study area lies immediately east of Sun Valley, Idaho between it and the town of Triumph. Independence Gulch lies to the north of the property, and the East Fork of the Big Wood River to the south. It is approximately 343 hectares (848 acres) in size on patented ground largely surrounded by public lands.

DESCRIPTION OF THE STUDY AREA

The study area is located in Sections 14, 22, 23, 24, 25, 26, and 35; T4N; R18E in Blaine County, Idaho (see Figure 1) in mountainous terrain. Topographic relief varies in elevation from the 6,000-foot elevation at the mouths of Independence Gulch and Triumph Gulch to the 7,600-foot elevation of unnamed peaks. The morphology of its valleys and ridges are typical of those found throughout the Idaho batholith.

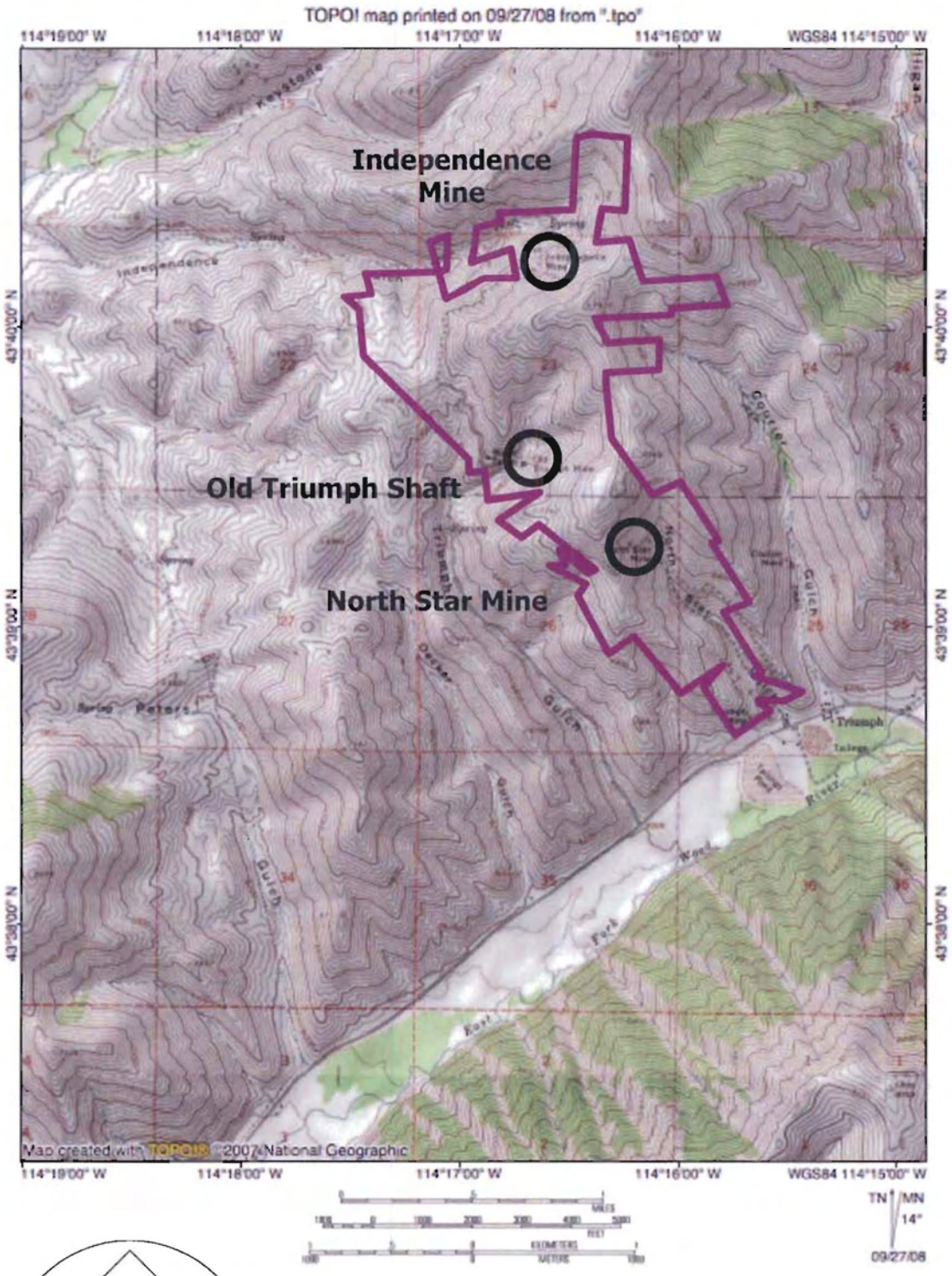

Figure 1 - USGS Quadrangle Map Showing the Study Area
DeNovo Independence Site / DeNovo Independence, LLC
Blaine County, Idaho
January 12, 2009

The study area is bounded by Independence Gulch to the north, Courier Gulch to the east, the East Fork Road and town of Triumph to the south, and Triumph Gulch to the west. The DeNovo Independence Site lies within the study area. It and the surrounding public lands have been, and continue to be, grazed by sheep and provide habitat for both big game and non-game species of wildlife. It is bordered by single family residences that are part of Triumph, Idaho, but is largely unoccupied by structures. Exceptions to this are the relics of past mining activities. Abandoned adits, portals and mine entrances, spoil piles, and a variety of wood structures and supports are scattered across the property.

The mountain sides of the study area are vegetated with herbaceous and woody vegetation typical of the high elevation sagebrush steppe in Idaho. Dominant plants include mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), rabbitbrush (*Chrysothamnus nauseosa*), lupine (*Lupinus* spp.), sticky geranium (*Geranium viscosissimum*), Louisiana sage (*Artemisia ludoviciana*), buckwheat (*Eriogonum* spp.), Indian paintbrush (*Castilleja* spp.), and penstemon (*Penstemon* spp.). The sagebrush steppe is broken by islands of quaking aspen that grow in draws and seeps on hillsides. Rocky talus is common on the south facing slopes of Independence Gulch. Weedy species are largely absent from the study area with the exception of spotted knapweed (*Centaurea stoebe*) and cheatgrass (*Bromus tectorum*) that sparsely grow in areas where ground has been disturbed by past mining activities and active maintenance of unimproved roads.

Although the bed and banks of Independence Creek (which lies largely outside of the DeNovo Independence Site) and Triumph Creek (which lies entirely outside of the DeNovo Independence Site) are poorly defined, the presence of a riparian plant community indicates the seasonal presence of surface water. At the time of this study, water flowed only in Independence Creek and only in its lowest reach near the US Forest Service / Sun Valley property boundary. Riparian species growing in both gulches include black cottonwood (*Populus trichocarpa*), quaking aspen (*Populus tremuloides*), willow (*Salix* spp.), Great Basin wild rye (*Elymus cinereus*), showy milkweed (*Asclepias speciosa*), and wooly sedge (*Carex lanuginosa*). Both waterways have been altered by past mining activities.

North Star Gulch has neither a channel with defined bed and banks, nor a riparian plant community. Because of the small size of its watershed, it likely gathers insufficient volumes of precipitation to form a surface waterway.

BACKGROUND

I met with staff of IDFG - Magic Valley Region (MVR) (i.e. Mike McDonald, Environmental Staff Biologist; and Mark Fleming, Habitat Manager) on Thursday, July 31, 2008 to discuss the ERA and other interests of the agency. Information of interest to IDFG-MVR includes: (a) a qualitative and quantitative analysis of known contaminants and their locations within the DeNovo Independence Site; (b) species of fish and wildlife at risk of exposure and their sensitivities to known contaminants; (c) the consequences of both acute and chronic exposure of fish and wildlife to known contaminants;

and (d) the potential for, and consequences of bio-accumulation and bio-magnification of known contaminants.

I met with staff of Idaho DEQ (i.e. Bruce Wicherski, Voluntary Cleanup Program Manager; Bruce Shulde, Mine Project Coordinator; and Dr. Jeffrey Fromm, Toxicologist) on Wednesday, December 3, 2008 and Dr. Jeffrey Fromm again on Tuesday, December 23, 2008 to discuss the ERA. Risks of particular interest to Idaho DEQ include: (a) direct mortality or morbidity of wildlife by inhalation, ingestion, or other means of contact with a constituent of potential ecological concern (COPEC); (b) indirect effects to the health and vigor of wildlife due to the loss of their prey base and food resource; (c) mobilization of a buried COPEC to the soil surface by burrowing animals; (d) the potential for deep rooted plant species to penetrate the cover of waste repositories; and (e) the potential for seed and container plants installed above waste repositories to attract wildlife.

DESCRIPTION OF THE PROPOSED PROJECT

The proposed project includes remediating spoils and other waste resulting from past mining activities, and future development of the infrastructure to support a limited number of private residences. DeNovo Independence, LLC is presently discussing with the Idaho Department of Environmental Quality (DEQ) the means and methods of remediation. They include excavating and consolidating contaminated soils, where feasible, and entombing them in a permanent waste repository. In some cases, contaminated soils that are inaccessible will be left in-place and prevented from contacting humans and wildlife, or migrating from their source by wind and water. DeNovo Independence, LLC is also discussing with the City of Sun Valley and Blaine County future use of the property for residential development.

METHODS OF STUDY

Soil and Surface Water Sampling

Personnel from Golder Associates, Inc. sampled soils and surface waters within the DeNovo Independence Site in the summer and fall of 2008. Soil samples were collected to determine metals concentrations at the following locations: (a) random locations to establish background levels; (b) waste piles; (c) areas likely affected by dispersion of metals by wind, water, and vehicles; and (d) along a grid within the three proposed neighborhoods. Samples to assess dispersal by wind were collected proximate to waste piles, particularly those that will remain after remediation. Samples to assess dispersal by water were collected at areas of physical erosion of the ground surface by running water. Samples were also collected at varying depths below the ground surface at: (a) repository areas, where waste will be relocated; and (b) secondary borrow areas that may provide native soil and rock to cover relocated waste.

Soil sample positions were placed within each location (e.g. background, waste pile, and dispersal samples) by identifying points within the study area and collecting sub-samples around those points. Sub-samples were combined for chemical analysis. Surface waters were grab sampled within active drainages and seeps.

A contracting laboratory prepared and analyzed soil and water samples according to standard methods for metals including arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, selenium, silver, and zinc.

Personnel from Golder Associates, Inc. combined this data with that provided by Idaho DEQ and calculated the media exposure point concentrations (MEPC) shown in Table 1. MEPC are the upper bounds of the arithmetic mean at the 95% confidence interval or the maximum detected value, whichever is lower, of all data.

Adjustments to Water Quality Criterion and Risk Management Criteria

The bio-availability of metals to aquatic organisms is dependent on the pH and buffering hardness of the water in which they live. US EPA Water Quality Criterion for metals is reported for hardness ($CaCO_3$) equal to 100 mg/L. Measured hardness for surface water samples within the DeNovo Independence Site differ considerably from this hardness value.

For this reason, I adjusted - for each of the surface water samples - the US EPA Water Quality Criterion Maximum Concentration (CMC) for metals for actual hardness ($CaCO_3$) measured for each sample. Metals concentrations reported for the DeNovo Independence Site would have to exceed these adjusted CMCs to be in violation of BLM Risk Management Criteria (RMC) - Freshwater Aquatic Life, Acute Toxicity.

Similarly, I adjusted US EPA Water Quality Criterion Continuous Concentration (CCC). Metals concentrations reported for the DeNovo Independence Site would have to exceed these adjusted CCCs to be in violation of BLM RMC - Freshwater Aquatic Life, Chronic Toxicity.

Arsenic and mercury are not considered by the US EPA to be hardness dependent, therefore I made no adjustments for these metals.

All adjustments were made in accord with methods, conversion factors, and equations published by the US EPA in Current National Recommended Water Quality Criteria - Appendix B Parameters for Calculating Freshwater Dissolved Metals Criteria that are Hardness Dependent (2008) (see http://www.epa.gov/waterscience/criteria/wqctable/).

Selection of Indicator Wildlife Species

ERA endpoints, as defined by the US EPA, for this study are wildlife species of different trophic levels (i.e. primary and secondary consumers) and dietary habitats (i.e. herbivores and carnivores) known to occupy habitat found within the DeNovo Independence Site. Attributes of the ERA endpoints are wildlife species of particular concern to IDFG-MVR [i.e. big game that generate revenue for IDFG by the sale of licenses, tags, and permits; and Species of Greatest Conservation Need (SGCN)] and the US Fish and Wildlife Service (FWS) (i.e. threatened and endangered species).

Indicator wildlife species, selected for this study, that follow defined ERA endpoints and attributes for quantitative comparisons to acceptable risk are red-tailed hawk (*Buteo jamaicensis*), Nuttall's cottontail (*Sylvilagus nuttallii*), mule deer (*Odocoileus heminus*), and

Table 1

Comparison of Modified Bureau of Land Management (BLM) Risk Management Criteria (RMC) - Prior to Remediation
to Calculated Media Exposure Point Concentrations (MEPC)

Data Source: Golder Associates, December 2008

Site	Sample Location	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Zinc (mg/kg)
Background	Milligan Formation	46.1	7.13	48.9	94.8	0.070	872.0
North Star Mine	Waste Dumps with IDEQ Data	2,920.0	148.00	288.0	14,300.0	2.230	7,050.0
North Star Mine	Wind, Water, Vehicle Dispersal	367.0	24.60	93.0	2,990.0	0.271	2,820.0
North Star Mine	Repository Area	693.0	29.80	95.8	1,780.0	0.538	3,870.0
North Star Mine	Secondary Borrow Area	148.0	14.00	57.3	700.0	0.155	1,560.0
Independence Mine	Waste Dumps with IDEQ Data	640.0	9.78	129.0	10,400.0	0.770	1,100.0
Independence Mine	Wind, Water, Vehicle Dispersal	33.7	6.60	36.8	968.5	0.058	471.0
Independence Mine	Repository Area	145.2	5.38	39.3	2,520.0	0.126	569.4
Independence Mine	Secondary Borrow Area	18.2	4.93	33.5	314.8	0.066	617.3
Old Triumph Shaft	Waste Dumps with IDEQ Data	3,130.0	291.00		9,200.0	1.840	12,600.0
Old Triumph Shaft	Wind, Water, Vehicle Dispersal	592.5	15.36	69.3	907.1	0.193	2,070.0
Old Triumph Shaft	Repository Area	32.5	8.74	48.2	325.7	0.167	912.6
Triumph Tunnel	Waste Dumps with IDEQ Data	6,862.9	52.01	1,300.0	7,620.5	13.853	8,050.0
Independence Neighborhood	Independence Neighborhood - North	3.7	0.28	22.7	19.0	0.017	97.9
Independence Neighborhood	Independence Neighborhood - South	238.9	7.34	73.6	368.0	0.048	682.5
North Star Neighborhood	North Star Neighborhood	304.0	15.22	57.0	687.1	0.200	1,880.0
BLM RMC - Red-tailed Hawk (See Note 8 Below)		4.0	0.30	7.0	6.0	1.000	43.0
Modified BLM RMC (Level 2 Analysis) - Red-tailed Hawk		322.0	24.15	563.5	483.0	80.506	3,461.8
BLM RMC - Cottontail		438.0	6.00	358.0	172.0	15.000	373.0
Modified BLM RMC (Level 2 Analysis) - Cottontail		438.0	6.00	358.0	172.0	15.000	373.0
BLM RMC - Mule Deer		200.0	3.00	102.0	106.0	9.000	222.0
Modified BLM RMC (Level 2 Analysis) - Mule Deer		7,122.8	106.84	3,632.6	3,775.1	320.525	7,906.3
Note: Forage Area = 285 hectares							
BLM RMC - Elk		328.0	3.00	131.0	127.0	11.000	275.0
Modified BLM RMC (Level 2 Analysis) - Elk		573,246.9	5,243.11	228,949.2	221,958.4	19,224.742	480,618.6

Note 1: Values shown in blue exceed Modified BLM RMC (Level 2 Analysis) - Red-tailed Hawk.
Note 2: Values shown in green exceed Modified BLM RMC (Level 2 Analysis) - Cottontail.
Note 3: Values shown in orange exceed Modified BLM RMC (Level 2 Analysis) - Red-tailed Hawk and Cottontail.
Note 4: Values shown in red exceed Modified BLM RMC (Level 2 Analysis) - Red-tailed Hawk, Cottontail, and Mule Deer.
Note 5: Assumes 10.67 hectares (26.36 acres) of contaminated waste dumps and wind, water, and vehicle dispersion areas.
Note 6: Assumes all of the areas described in Note 5 are contiguous for this and other quantitative analyses. They are, in fact, a mosaic within the DeNovo Independence Site.
Note 7: Assumption described in Note 6 results in a conservative (i.e. overestimate of risk) Modified BLM RMC - Cottontail.
Note 8: American robin is used as a surrogate for red-tailed hawk for this and other quantitative analysis for BLM - RMC values.
Note 9: Mean body weight of American robin is reported as 77.3 grams and red-tailed hawk in southwest Idaho as 957 grams (US EPA 1993).
Note 10: Because of differences in body weight, the use of American robin as a surrogate results in a conservative (i.e. overestimate of risk) Modified BLM RMC - Red-tailed Hawk.
Note 11: Values highlighed in orange exceed Modified BLM RML (Level 2 Analysis) - Mule Deer if foarge area (FA) = 70 hectares, but do not if FA = 285 hectares.
Note 12: Values described in Note 11 continue to exceed Modified BLM RML (Level 2 Analysis) - Red-tailed Hawk and/or Cottontail.

elk (*Cervus elaphus*). That portion of the life history of each species relevant to the ERA is summarized in Table 2.

Indicator wildlife species, selected for this study, that follow defined ERA endpoints and attributes for qualitative comparisons to acceptable risk are sage grouse (*Centrocercus urophasianus*), a SGCN as identified by the IDFG; and gray wolf (*Canis lupus*), both an endangered species and an experimental non-essential species as identified by the US FWS. Further analysis, to be presented in the complete ERA to follow this summary report, will qualitatively assess risk to these species.

Initial Screening and Further Analysis of Risk

Tools for initial screening and further analysis of ecological risk I reviewed for this study include methodologies and models developed by the US EPA, US BLM, and state agencies. Idaho DEQ has no prescribed guidelines or required methods for the preparation of an ERA. In their absence, Bruce Wicherski (Idaho DEQ) suggested use of methodologies and models described in Risk Management Criteria for Metals at BLM Mining Sites (2004).

The general outline of a work plan for this ERA includes a review and analysis of: (a) the data generated by Golder Associates, Inc. and others, (b) means of transport and fate of COPECs, (c) risk of exposure of wildlife species of particular concern to IDFG-MVR and others (e.g. big game, SGCN, threatened and endangered species), and (d) the consequences of exposure for these species. A work plan for the ERA with greater detail is presented in Attachment 1 of this report.

Methods of study for this ERA follow the approach developed by the US EPA for the initial screening of COPECs. Those not present in concentrations that warrant concern are dropped from further study. For this ERA, concentrations of metals within the DeNovo Independence Site were compared to wildlife species specific values identified in Table 4 of Risk Management Criteria for Metals at BLM Mining Sites (2004) (see Figure 2). The remaining COPECs were further analyzed as described below.

I considered Risk Quotient (RQ) models, such as those prescribed by the US EPA, that quantify environmental risk for a given wildlife species. They require numeric values from the literature for variables that include: (a) food ingestion rate (FIR), (b) proportion of a given food item in the diet of a given species (P), (c) soil ingestion rate (SIR), (d) water ingestion rate (WIR), inhalation rate (IR), and dermal contact rate (DCR). Little if any information exists in the literature for IR and DCR.

Required data for RQ models - specific to the project area or taken from the literature and assumed to be representative of the project area - include: (a) body weight of a given individual of a given species (BW), (b) concentration of a COPEC in a given food item (Fc), (c) concentration of a COPEC in soil (Sc), (d) concentration of a COPEC in water (Wc), and (e) concentration of a COPEC in air (Ac). No data exists for Fc and Ac within the DeNovo Independence Site.

Table 2 - Life History Factors for Wildlife Species Relevant to the Ecological Risk Assessment

Common Name	Scientific Name	Food Habits	Forage Area	Time within the Project Area	Occupied Habitat(s)
Red-tailed Hawk	Buteo jamaicensis	**Carnivore** *Spring, Summer, Fall, Winter:* Large Insects, Snakes, Lizards, Birds, and Small Mammals	*Spring, Summer, Fall, Winter:* *(When* red-tailed hawk *are present within the DeNovo Independence Site)* 859 hectares[1]	January - December	Woodlands, Wetlands, Pastures, Prairies, and Deserts
Nuttall's Cottontail	Sylvilagus nuttallii	**Herbivore** *Spring, Summer, Fall:* Grasses and Fobs *Winter:* Woody Vegetation	*Spring, Summer, Fall, Winter:* *(When* Nutall's cottontail *are present within the DeNovo Independence Site)* 3 hectares[1]	January - December	Shrub Steppe, Rocky Areas, and Riparian Areas
Mule Deer	Odocoileus heminus	**Herbivore** *Spring, Summer, Fall:* Grasses, Forbs, Sedges, and Rushes *Winter:* Shrub Browse	*Spring, Summer, Fall:* *(When* mule deer *are present within the DeNovo Independence Site)* 285 hectares[2, 3, and 4]	March - November	All Habitats Except Dense Forests
Elk	Cervus elaphus	**Herbivore** *Spring, Summer:* Grasses and Forbs *Fall, Winter:* Grasses and/or Shrub Browse	*Winter:* *(When* elk *are present within the DeNovo Independence Site)* < or = 7,770 hectares[5]	December - April	Coniferous Forests, Montane Meadows, and Shrub Steppe

[1] Source: US EPA. 1993. Wildlife Exposure Factors Handbook (Mean Value)
[2] Source: Chapman, J.A and G.A Feldhamer (Editors). 1992. Wild Mammals of North America
[3] Source: Idaho Department of Fish and Game - Magic Valley. 2008. Personal communication with Mike McDonald (Environmental Staff Biologist)
[4] Additional Sources: See Attachment 2
(To be reviewed and verified by Mike McDonald)
[5] Source: Idaho Department of Fish and Game - Magic Valley. 2008. Region Elk Winter Habitat and Group Locations 2
(To be reviewed and verified by Mike McDonald)

Note: The diameter of each circle is proportional to the BLM - RMC for metals, shown in the bottom-most row, and each wildlife species shown in the left-most column of this graphic.

Figure 2 - BLM Risk Management Criteria (RMC) for Indicated Species
(Source: BLM 2004 Risk Management Criteria for Metals at BLM Mining Sites)
DeNovo Independence Site / DeNovo Independence, LLC
Blaine County, Idaho
January 12, 2009

Because of the lack of information from the literature and data specific to the project area, I determined that use of RQ models is impracticable for the DeNovo Independence Site.

Instead, I used the published BLM RMC, with modifications to account for spatial and temporal factors specific to each wildlife species. They are the following factors: (a) the proportion of time a given wildlife species is in contaminated areas, and (b) the ratio of foraging area for a given wildlife species to the area of contamination.

The model takes the form shown below:

> Modified BLM RMC (Level 2 Analysis) = (BLM RMC) x (1/AUF x 1/TUF)
>
> Where:
> BLM RMC = Species specific values identified in Table 4 of Risk Management Criteria for Metals at BLM Mining Sites (2004)
>
> AUF (No Units) = Area > [BLM RMC] for a particular COPEC / foraging area (i.e. Proportion of project area exceeding BLM RMC to foraging area of a given species)
> Range of Values: 0 to 1
>
> TUF (No Units) = Months present / 12 Months (i.e. Proportion of time a given species is present within the project area)
> Range of Values: 0 to 1

I used America robin (*Turdus migratorius*) as a surrogate for red-tailed hawk because there is no BLM RMC for red-tailed hawk. American robin is an imperfect surrogate because its body weight and habitat preferences differ considerably from that of red-tailed hawk, however both are predators and therefore have somewhat similar exposures to metals.

I did not adjust the Modified BLM RMC (Level 2 Analysis) for red-tailed hawk for the difference in body weights between the two species. As such, the calculated Modified BLM RMC (Level 2 Analysis) for red-tailed hawk is conservative (i.e. overstates the potential risk).

Application of the model, results in the Modified BLM RMC (Level 2 Analysis) shown in Tables 3 and 4. My calculation of these Modified BLM RMCs (Level 2 Analysis) assumes the 10.67 hectares (26.36 acres) of contaminated waste dumps and wind, water, and vehicle dispersion areas are contiguous. They are, in fact, a mosaic within the DeNovo Independence Site (see Table 5). This has the potential to reduce the amount of time an individual that forages within a small area is exposed to elevated concentrations of metals. Because of this, the values shown in Tables 3 and 4 are conservative (i.e. overstate the potential risk) for wildlife species (i.e. cottontail) with foraging areas less than 10.67 hectares (26.36 acres) in size.

Table 3

Bureau of Land Management (BLM) Risk Management Criteria (RMC) - Prior to Remediation
Modified to Account for Temporal and Spatial Factors Specific to Each Wildlife Species (Level 2 Analysis)

Site	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Zinc (mg/kg)
BLM RMC - Red-tailed Hawk (See Note 4 Below)	4.0	0.30	7.0	6.0	1.000	43.0
Time Within Project Area (Months)	12	12	12	12	12	12
TUF	1.00	1.00	1.00	1.00	1.00	1.00
1/TUF	1.00	1.00	1.00	1.00	1.00	1.00
Area > [BLM RMC] for COPEC (hectares)	10.67	10.67	10.67	10.67	10.67	10.67
Year Round Foraging Area (hectares)	859.00	859.00	859.00	859.00	859.00	859.00
AUF	0.01	0.01	0.01	0.01	0.01	0.01
1/AUF	80.51	80.51	80.51	80.51	80.51	80.51
Modified BLM RMC - Red-tailed Hawk	322.0	24.15	563.5	483.0	80.506	3,461.8
BLM RMC - Cottontail	438.0	6.00	358.0	172.0	15.000	373.0
Time Within Project Area (Months)	12	12	12	12	12	12
TUF	1.00	1.00	1.00	1.00	1.00	1.00
1/TUF	1.00	1.00	1.00	1.00	1.00	1.00
Area > [BLM RMC] for COPEC (hectares)	10.67	10.67	10.67	10.67	10.67	10.67
Year Round Foraging Area (hectares)	3.00	3.00	3.00	3.00	3.00	3.00
AUF	1.00	1.00	1.00	1.00	1.00	1.00
1/AUF	1.00	1.00	1.00	1.00	1.00	1.00
Modified BLM RMC - Cottontail	438.0	6.00	358.0	172.0	15.000	373.0
BLM RMC - Mule Deer	200.0	3.00	102.0	106.0	9.000	222.0
Time Within Project Area (Months)	9	9	9	9	9	9
TUF	0.75	0.75	0.75	0.75	0.75	0.75
1/TUF	1.33	1.33	1.33	1.33	1.33	1.33
Area > [BLM RMC] for COPEC (hectares)	10.67	10.67	10.67	10.67	10.67	10.67
Spring, Summer, Fall Foraging Area (hectares)	285.00	285.00	285.00	285.00	285.00	285.00
AUF	0.04	0.04	0.04	0.04	0.04	0.04
1/AUF	26.71	26.71	26.71	26.71	26.71	26.71
Modified BLM RMC - Mule Deer	7,122.8	106.84	3,632.6	3,775.1	320.525	7,906.3
Note: Forage Area = 285 hectares						
BLM RMC - Elk	328.0	3.00	131.0	127.0	11.000	275.0
Time Within Project Area (Months)	5	5	5	5	5	5
TUF	0.42	0.42	0.42	0.42	0.42	0.42
1/TUF	2.40	2.40	2.40	2.40	2.40	2.40
Area > [BLM RMC] for COPEC (hectares)	10.67	10.67	10.67	10.67	10.67	10.67
Winter Foraging Area (hectares)	7,770.00	7,770.00	7,770.00	7,770.00	7,770.00	7,770.00
AUF	0.001373	0.001373	0.001373	0.001373	0.001373	0.001373
1/AUF	728.21	728.21	728.21	728.21	728.21	728.21
Modified BLM RMC - Elk	573,246.9	5,243.11	228,949.2	221,958.4	19,224.742	480,618.6

Note 1: Assumes 10.67 hectares (26.36 acres) of contaminated waste dumps and wind, water, and vehicle dispersion areas.
Note 2: Assumes all of the areas described in Note 1 are contiguous for this and other quantitative analyses. They are, in fact, a mosaic within the DeNovo Independence Site.
Note 3: Assumption described in Note 2 results in a conservative (i.e. overestimate of risk) Modified BLM RMC - Cottontail.
Note 4: American robin is used as a surrogate for red-tailed hawk for this and other quantitative anslysis for BLM - RMC values.
Note 5: Mean body weight of American robin is reported as 77.3 grams and red-tailed hawk in southwest Idaho as 957 grams (US EPA 1993).
Note 6: Because of differences in body weight, the use of American robin as a surrogate results in a conservative (i.e. overestimate of risk) Modified BLM RMC - Red-tailed Hawk.

Table 4

Bureau of Land Management (BLM) Risk Management Criteria (RMC) - After Remediation
Modified to Account for Temporal and Spatial Factors Specific to Each Wildlife Species (Level 2 Analysis)

Site	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Zinc (mg/kg)
BLM RMC - Red-tailed Hawk (See Note 5 Below)	4.0	0.30	7.0	6.0	1.000	43.0
Time Within Project Area (Months)	12	12	12	12	12	12
TUF	1.00	1.00	1.00	1.00	1.00	1.00
1/TUF	1.00	1.00	1.00	1.00	1.00	1.00
Area > [BLM RMC] for COPEC (hectares)	2.12	2.12	2.12	2.12	2.12	2.12
Year Round Foraging Area (hectares)	859.00	859.00	859.00	859.00	859.00	859.00
AUF	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
1/AUF	405.19	405.19	405.19	405.19	405.19	405.19
Modified BLM RMC - Red-tailed Hawk	1,620.8	121.56	2,836.3	2,431.1	405.189	17,423.1
BLM RMC - Cottontail	438.0	6.00	358.0	172.0	15.000	373.0
Time Within Project Area (Months)	12	12	12	12	12	12
TUF	1.00	1.00	1.00	1.00	1.00	1.00
1/TUF	1.00	1.00	1.00	1.00	1.00	1.00
Area > [BLM RMC] for COPEC (hectares)	2.12	2.12	2.12	2.12	2.12	2.12
Year Round Foraging Area (hectares)	3.00	3.00	3.00	3.00	3.00	3.00
AUF	0.71	0.71	0.71	0.71	0.71	0.71
1/AUF	1.42	1.42	1.42	1.42	1.42	1.42
Modified BLM RMC - Cottontail	619.8	8.49	506.6	243.4	21.226	527.8
BLM RMC - Mule Deer	200.0	3.00	102.0	106.0	9.000	222.0
Time Within Project Area (Months)	9	9	9	9	9	9
TUF	0.75	0.75	0.75	0.75	0.75	0.75
1/TUF	1.33	1.33	1.33	1.33	1.33	1.33
Area > [BLM RMC] for COPEC (hectares)	2.12	2.12	2.12	2.12	2.12	2.12
Spring, Summer, Fall Foraging Area (hectares)	285.00	285.00	285.00	285.00	285.00	285.00
AUF	0.01	0.01	0.01	0.01	0.01	0.01
1/AUF	134.43	134.43	134.43	134.43	134.43	134.43
Modified BLM RMC - Mule Deer	35,849.1	537.74	18,283.0	19,000.0	1,613.208	39,792.5
Note: Forage Area = 285 hectares						
BLM RMC - Elk	328.0	3.00	131.0	127.0	11.000	275.0
Time Within Project Area (Months)	5	5	5	5	5	5
TUF	0.42	0.42	0.42	0.42	0.42	0.42
1/TUF	2.40	2.40	2.40	2.40	2.40	2.40
Area > [BLM RMC] for COPEC (hectares)	2.12	2.12	2.12	2.12	2.12	2.12
Winter Foraging Area (hectares)	7,770.00	7,770.00	7,770.00	7,770.00	7,770.00	7,770.00
AUF	0.000273	0.000273	0.000273	0.000273	0.000273	0.000273
1/AUF	3,665.09	3,665.09	3,665.09	3,665.09	3,665.09	3,665.09
Modified BLM RMC - Elk	2,885,162.3	26,388.68	1,152,305.7	1,117,120.8	96,758.491	2,418,962.3

Note 1: Assumes successful remediation of 8.55 (21.12) of 10.67 hectares (26.36 acres) of contaminated waste dumps and wind, water, and vehicle dispersion areas.
Note 2: Assumes 2.12 hectares (5.24 acres) of contaminated waste dumps and wind, water, and vehicle dispersion areas will remain in-place.
Note 3: Assumes all of the areas described in Note 2 are contiguous for this and other quantitative analyses. They are, in fact, a mosaic within the DeNovo Independence Site.
Note 4: Assumption described in Note 3 results in a conservative (i.e. overestimate of risk) Modified BLM RMC - Cottontail.
Note 5: American robin is used as a surrogate for red-tailed hawk for this and other quantitative anslysis for BLM - RMC values.
Note 6: Mean body weight of American robin is reported as 77.3 grams and red-tailed hawk in southwest Idaho as 957 grams (US EPA 1993).
Note 7: Because of differences in body weight, the use of American robin as a surrogate results in a conservative (i.e. overestimate of risk) Modified BLM RMC - Red-tailed Hawk.

Table 5

Calculated Areas Where Waste Will Be Remediated and Where Waste Will Remain In-Place

Data Source: Golder Associates, December 2008

Site	Pile Number	Area (Square Feet)	Area (Acres)	Area (Hectares)
Areas Where Waste Will Be Remediated:				
North Star Mine and North Star Neighborhood		524,931	12.05	4.88
Independence Mine		105,830	2.43	0.98
Old Triumph Mine		111,570	2.56	1.04
Triumph Tunnel		77,727	1.78	0.72
Independence Neighborhood		99,870	2.29	0.93
TOTAL		919,927	21.12	8.55
Areas Where Waste Will Remain In-Place:				
North Star Mine	N8	153,255	3.52	1.42
North Star Mine	N9	1,453	0.03	0.01
Independence Mine	I14	28,640	0.66	0.27
Independence Mine	I15	12,514	0.29	0.12
Independence Mine	I16	4,394	0.10	0.04
Independence Mine	I17	1,460	0.03	0.01
Independence Mine	I18	13,749	0.32	0.13
Independence Mine	I19	5,227	0.12	0.05
Independence Mine	I20	1,697	0.04	0.02
Independence Mine	I21	2,538	0.06	0.02
Independence Mine	I22	666	0.02	0.01
Independence Mine	I23	2,816	0.06	0.03
TOTAL		228,409	5.24	2.12
GRAND TOTAL		1,148,336	26.36	10.67

RESULTS OF INITIAL SCREENING AND FURTHER ANALYSIS

Results in this report are presented and discussed only for those metals for which there exists BLM RMC. While data were also generated for chromium, iron, manganese, selenium, and silver they are not considered by this report because of a lack of recognized standards to which to compare them.

Surface Water Samples

Examination of the data for surface water samples (see Table 6) shows in one sample (i.e. Sample ID: G-TRSW2, Sample Location: Triumph Tunnel) the concentration of arsenic exceeds BLM RMC(adjusted for hardness) - Freshwater Aquatic Life for both chronic and acute toxicity. All other metals concentrations in this sample are less than BLM RMC - Freshwater Aquatic Life for both chronic and acute toxicity.

All other surface water samples - all located in the Independence Creek drainage - have metals concentrations less than BLM RMC (adjusted for hardness) - Freshwater Aquatic Life for both chronic and acute toxicity.

Surface waters within the DeNovo Independence Site flow intermittently, yet there is seasonal opportunity for potential pollutants in Independence Creek to reach the Big Wood River, and in Triumph Creek to reach the East Fork of the Big Wood River. There is also a potential connection between the groundwater seep at the Triumph Tunnel and the East Fork of the Big Wood River by pipe and ditch. At the present time, water flows from the tunnel and infiltrates into the ground. Previously it flowed by pipe to a treatment pond, but that pipe is now not functioning. That pipe will be replaced by DeNovo Independence, LLC. When this occurs water may flow out of the pond into the ditch, and perhaps reach the East Fork of the Big Wood River. It is important to note however, the treatment of water discharging from the Triumph Tunnel is assured by a Record of Decision prepared by the US EPA (1998) and is not a responsibility of DeNovo Independence, LLC.

Further analysis, to be presented in the complete ERA to follow this summary report, will evaluate the potential for harm to aquatic life in the East Fork of the Big Wood River that is within the jurisdiction of the US EPA that oversees, and Idaho DEQ that administers §402 of the Clean Water Act.

Background Soil Samples

The raw data for background soil samples (see Attachment 3) show considerable variability for concentrations of metals. Some values exceed Modified BLM RMC (Level 2 Analysis). A principal components analysis (PCA) of the raw data and further statistical analysis using analysis of variance (ANOVA) and a multiple Students t-test show the first and second principal components scores are significantly different at the 95% level for some sample locations. This analysis separates the data into three groups.

Table 6

Comparison of Bureau of Land Management (BLM) Risk Management Criteria (RMC), Adjusted for Hardness, to Calculated Media Exposure Point Concentrations (MEPC)

Data Source: Golder Associates, Inc., December 2008

Sample Identification Label (e.g. G-TRSW2)	Sample Location	Arsenic (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)	Hardness (CaCO3) (mg/L)	*ln* Hardness (CaCO3) (mg/L)
G-TRSW2	Triumph Tunnel	0.37500	0.00039	<0.01000	<0.00300	<0.00020	0.91500	2,620	7.870930
Conversion Factor (CF) for Criteria Maximum Concentration (CMC)		NA	0.80737	0.96000	0.31514	NA	0.97800		
Conversion Factor (CF) for Criteria Continuous Concentration (CCC)		NA	0.77237	0.96000	0.31514	NA	0.98600		
US EPA CMC		NA	47.63708	291.53728	1,644.11676	NA	1,864.58360		
US EPA CCC		NA	2.34968	145.89502	64.06887	NA	1,879.83582		
G-IMSW1	Independence Creek	<0.00300	0.00089	<0.01000	0.00571	<0.00020	0.02740	429	6.061457
Conversion Factor (CF) for Criteria Maximum Concentration (CMC)		NA	0.88307	0.96000	0.57880	NA	0.97800		
Conversion Factor (CF) for Criteria Continuous Concentration (CCC)		NA	0.84807	0.96000	0.57880	NA	0.98600		
US EPA CMC		NA	8.27906	52.99951	301.70253	NA	402.47253		
US EPA CCC		NA	0.67513	31.08399	11.75691	NA	405.76474		
G-IMSW2	Independence Creek	0.00476	0.00027	<0.01000	<0.00300	<0.00020	<0.01000	377	5.932245
Conversion Factor (CF) for Criteria Maximum Concentration (CMC)		NA	0.88848	0.96000	0.59763	NA	0.97800		
Conversion Factor (CF) for Criteria Continuous Concentration (CCC)		NA	0.85348	0.96000	0.59763	NA	0.98600		
US EPA CMC		NA	7.30439	46.92448	264.26855	NA	360.73577		
US EPA CCC		NA	0.61740	27.83465	10.29817	NA	363.68657		
G-IMSW4	Independence Mine	<0.00300	0.00063	<0.01000	<0.00300	<0.00020	0.18600	590	6.380123
Conversion Factor (CF) for Criteria Maximum Concentration (CMC)		NA	0.86974	0.96000	0.53237	NA	0.97800		
Conversion Factor (CF) for Criteria Continuous Concentration (CCC)		NA	0.83474	0.96000	0.53237	NA	0.98600		
US EPA CMC		NA	11.27369	71.55951	416.33019	NA	527.22754		
US EPA CCC		NA	0.84147	40.81268	16.22379	NA	531.54024		
BLM Risk Management Criteria (RMC) - Freshwater Aquatic Life, Chronic Toxicity (Hardness = 100 mg/L)		0.15000	0.00025	0.00900	0.00250	0.00077	0.12000		
BLM Risk Management Criteria (RMC) - Freshwater Aquatic Life, Acute Toxicity (Hardness = 100 mg/L)		0.34000	0.00200	0.01300	0.06500	0.00140	>0.12000		

Note 1: Values shown in green are less than BLM Risk Management Criteria - Freshwater Aquatic Life, Chronic and Acute Toxicity (Adjusted for Hardness).

Note 2: Values shown in red exceed BLM Risk Management Criteria - Freshwater Aquatic Life, Chronic and Acute Toxicity (Adjusted for Hardness).

Note 3: US EPA Water Quality Criterion Maximum Concentration (CMC) are values adjusted for hardness that would have to be exceeded by surface water samples to be in violation of BLM RMC - Freshwater Aquatic Life, Acute Toxicity.

Note 4: US EPA Water Quality Criterion Continuous Concentration (CCC) are values adjusted for hardness that would have to be exceeded by surface water samples to be in violation of BLM RMC - Freshwater Aquatic Life, Chronic Toxicit

Note 5 : Arsenic and mercury are not considered by the US EPA to be hardness dependent, therefore no conversion factors or equations that adjust values for hardness ≠ 100 mg/L have been published.

Note 6: See http://www.epa.gov/waterscience/criteria/wqctable/ for conversion factors and equations that adjust values for hardness ≠ 100 mg/L.

Note 7: Metal concentrations in surface water samples reported as "Less Than" (i.e. symbol "<") are less than practical detection limits of analysis.

Current National Recommended Water Quality Criteria

EPA's compilation of national recommended water quality criteria is presented as a summary table containing recommended water quality criteria for the protection of aquatic life and human health in surface water for approximately 150 pollutants. These criteria are published pursuant to Section 304(a) of the Clean Water Act (CWA) and provide guidance for states and tribes to use in adopting water quality standards.

- Fact Sheet (May 25, 2005)
- Print version of this table (PDF) (25 pp., 199 K)
- Previous versions of national recommended water quality criteria table
- Chemical-specific criteria documents from the 1980s
- Water quality standards

Priority Pollutants | Non Priority Pollutants
Organoleptic Effects (e.g., taste and odor) | **Additional Notes**

- **Appendix A**—Conversion Factors for Dissolved Metals
- **Appendix B**—Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent
- **Appendix C**—Calculation of Freshwater Ammonia Criterion
- **Gold & Red Books**

Appendix A—Conversion Factors for Dissolved Metals

Metal	Conversion Factor			
	freshwater CMC	freshwater CCC	saltwater CMC	saltwater CCC[1]
Arsenic	1.000	1.000	1.000	1.000
Cadmium	1.136672-[(ln hardness)(0.041838)]	1.101672-[(ln hardness)(0.041838)]	0.994	0.994
Chromium III	0.316	0.860	—	—
Chromium VI	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	1.46203-[(ln hardness)(0.145712)]	1.46203-[(ln hardness)(0.145712)]	0.951	0.951
Mercury	0.85	0.85	0.85	0.85
Nickel	0.998	0.997	0.990	0.990
Selenium	—	—	0.998	0.998
Silver	0.85	—	0.85	—
Zinc	0.978	0.986	0.946	0.946

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Appendix B—Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent

Chemical	m_A	b_A	m_C	b_C	Freshwater Conversion Factors (CF)	
					CMC	CCC
Cadmium	1.0166	-3.924	0.7409	-4.719	1.136672-[(*ln*hardness)(0.041838)]	1.101672-[(*ln*hardness)(0.041838)]
Chromium III	0.8190	3.7256	0.8190	0.6848	0.316	0.860
Copper	0.9422	-1.700	0.8545	-1.702	0.960	0.960
Lead	1.273	-1.460	1.273	-4.705	1.46203-[(*ln*hardness)(0.145712)]	1.46203-[(*ln*hardness)(0.145712)]
Nickel	0.8460	2.255	0.8460	0.0584	0.998	0.997
Silver	1.72	-6.59	—	—	0.85	—
Zinc	0.8473	0.884	0.8473	0.884	0.978	0.986

Hardness-dependant metals' criteria may be calculated from the following:

CMC (dissolved) = $\exp\{m_A [\ln(\text{hardness})] + b_A\}$ (CF)

CCC (dissolved) = $\exp\{m_C [\ln(\text{hardness})] + b_C\}$ (CF)

The location of background samples that are significantly different and the three groups to which each belong are shown in Figure 3. Some have speculated this may be due to the locations of exposure at the ground surface of the ore bearing geological formation (i.e. Milligan Formation, symbol Dm) that is naturally high in concentrations of metals. This compares to low concentrations of metals expected for background samples gathered from non-Milligan Formation locations. Further analysis would be required to conform this theory.

Examination of the data for background soil samples shows MEPC of metals less than Modified BLM RMC (Level 2 Analysis) for mule deer and elk (see Table 1), the species least sensitive to exposure to metals. The same is true for red-tailed hawk, a species moderately sensitive to exposure to metals.

This compares to MEPC of cadmium and zinc that exceed Modified BLM RMC (Level 2 Analysis) for cottontail, the species most sensitive to exposure to metals.

An understanding of background concentrations of metals at the DeNovo Independence Site is important because Idaho DEQ does not require remediation of areas with high concentrations of metals below site-specific background concentrations.

Soil Samples Prior to Remediation

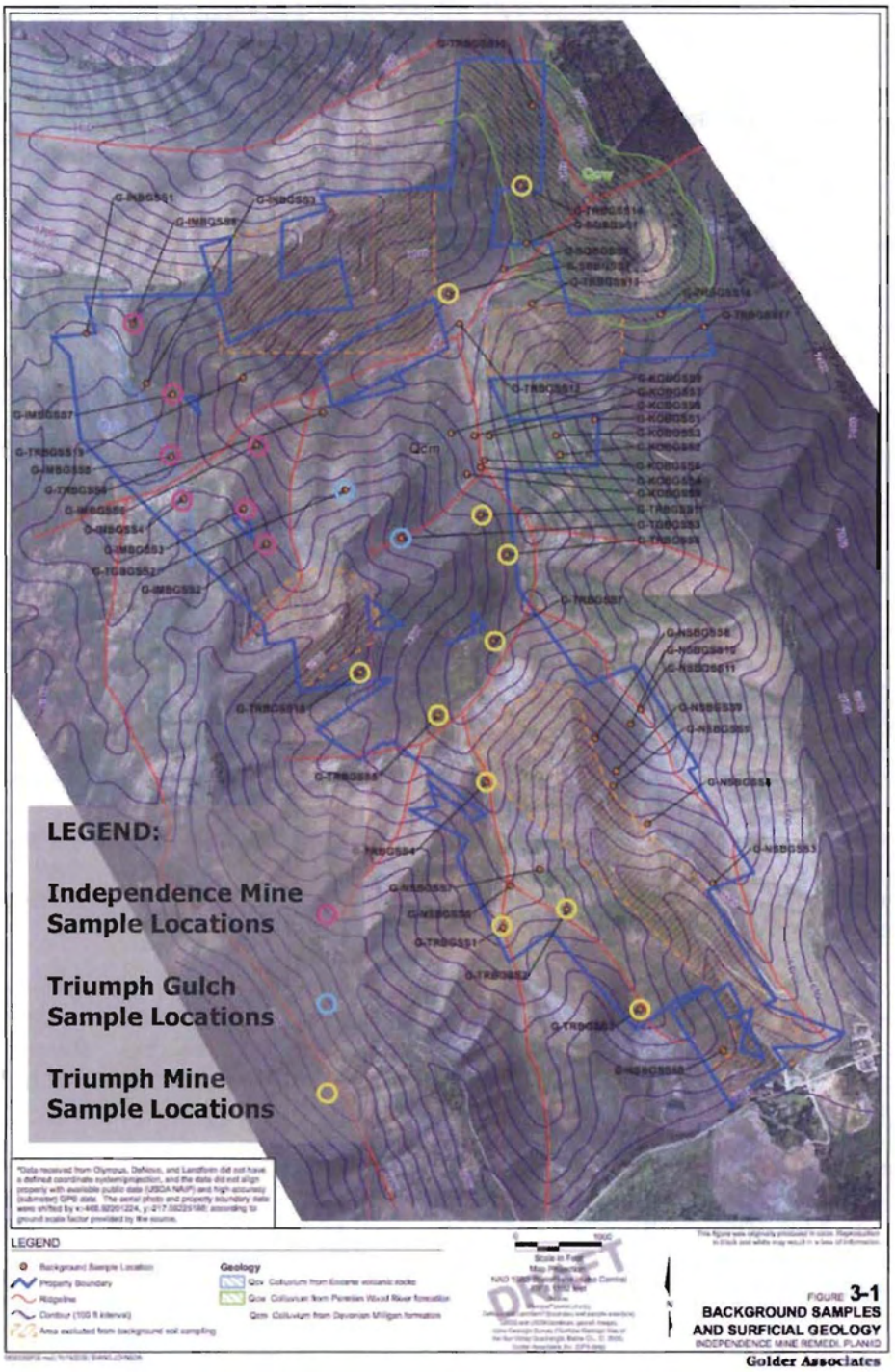
Examination of the data for soil samples - prior to remediation - shows MEPC of all metals at all site and sample locations are less than Modified BLM RMC (Level 2 Analysis) for elk (see Table 1).

MEPC of cadmium, lead, and zinc are greater than the values of Modified BLM RMC (Level 2 Analysis) for mule deer for at least two and as many as four site and sample locations. MEPC of all metals, except mercury, exceed Modified BLM RMC (Level 2 Analysis) for red-tailed hawk for at least one (i.e. copper) and as many as eleven (i.e. lead) site and sample locations. And, MEPC of all metals, except mercury, exceed Modified BLM RMC (Level 2 Analysis) for cottontail for at least one (i.e. copper) and as many as fourteen (i.e. zinc) site and sample locations.

Concentrations of arsenic, cadmium, lead, and zinc notably exceed Modified BLM RMC (Level 2 Analysis) at more site and sample locations than copper and mercury. As expected, MEPC of all metals are greatest at waste dumps.

The numbers, if qualitatively evaluated in accord with Risk Management Criteria for Metals at BLM Mining Sites (2004), may be interpreted in the following fashion:

Less than criteria = low risk
1 to 10 times the criteria = moderate risk
10 to 100 times the criteria = high risk
Greater than 100 times the criteria = extremely high risk



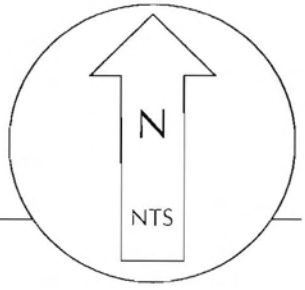


Figure 3 - Map Showing Sample Locations Where Background Concentrations of Metals are Significantly Different
(Source of Underlying Graphic: Golder Associates, Inc.)
DeNovo Independence Site / DeNovo Independence, LLC
Blaine County, Idaho
January 12, 2009

As such, risk of exposure to metals - prior to remediation - is low for elk, and low to moderate for mule deer, red-tailed hawk, and cottontail.

Soil Samples After Remediation

Examination of the data for soil samples - after remediation - shows MEPC of arsenic, cadmium, and lead notably less than MEPC prior to remediation (see Table 7). After remediation, MEPC of all metals is less than Modified BLM RMC (Level 2 Analysis) for mule deer at all site and sample locations.

After remediation, MEPC of arsenic and cadmium exceed Modified BLM RMC (Level 2 Analysis) for red-tailed hawk and cottontail at only one, and for lead at two site and sample locations; namely the waste dumps at North Star Mine and Independence Mine. MEPC of all metals, except mercury, exceed Modified BLM RMC (Level 2 Analysis) for cottontail for at least one (i.e. copper) and as many as thirteen (i.e. zinc) site and sample locations.

Remediation goals have not been finally determined for copper, mercury, and zinc. However, Golder Associates, Inc. has concluded they represent no risk to human health. Concentrations of these metals shown in Table 7 are those reported by Golder Associates, Inc. as present prior to remediation. With the exception of zinc and a single site and location for copper, they also represent low risk to all wildlife indicator species. Concentrations of zinc are of moderate risk to cottontail at thirteen of fifteen site and sample locations.

The numbers, if qualitatively evaluated in accord with Risk Management Criteria for Metals at BLM Mining Sites (2004), show risk of exposure to metals - after remediation - is low for elk and mule deer, and low to moderate for red-tailed hawk and cottontail.

However, this simple evaluation ignores as much as a 90% reduction in concentration of arsenic and cadmium, and 87% reduction in concentration of lead at the Triumph Tunnel waste dumps. Notable reductions in concentrations of metals are shown for other site and sample locations.

CONCLUSIONS

Risk of exposure to metals for wildlife species of greatest interest to IDFG is low for elk, both prior to and after remediation, and low to moderate for mule deer prior to remediation. Risk for mule deer is greatly improved after remediation. All site and sample locations within the DeNovo Independence Site are qualitatively described as having low risk (see Table 8).

A reduction in risk of exposure for red-tailed hawk - below that of Modified BLM RMC (Level 2 Analysis) after remediation - is shown for five site and sample locations for arsenic, four for cadmium, nine for lead, and four for zinc. A reduction in risk of exposure for cottontail - below that of Modified BLM RMC (Level 2 Analysis) after remediation - is shown for five site and sample locations for arsenic, three for cadmium, two for lead, and one for zinc.

Comparison of Modified Bureau of Land Management (BLM) Risk Management Criteria (RMC) - After Remediation
to Remediation Goals and Calculated MEPC Prior to Remediation

Data Source: Golder Associates, December 2008

Site	Sample Location	Arsenic (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)	Comments (for Arsenic, Cadmium, and Lead)	Copper (mg/kg)	Mercury (mg/kg)	Zinc (mg/kg)
Background	Milligan Formation	46.1	7.13	94.8	No Change in Metals Concentrations After Remediation	48.9	0.070	872.0
North Star Mine	Waste Dumps with IDEQ Data	2,920.0	148.00	14,300.0	No Change in Metals Concentrations After Remediation	288.0	2.230	7,050.0
North Star Mine	Wind, Water, Vehicle Dispersal Ar	300.0	24.60	1,000.0	Anticipated Remediation Level	93.0	0.271	2,820.0
North Star Mine	Repository Area	300.0	29.80	1,000.0	Anticipated Remediation Level	95.8	0.538	3,870.0
North Star Mine	Secondary Borrow Area	148.0	14.00	700.0	No Change in Metals Concentrations After Remediation	57.3	0.155	1,560.0
Independence Mine	Waste Dumps with IDEQ Data	640.0	9.78	10,400.0	No Change in Metals Concentrations After Remediation	129.0	0.770	1,100.0
Independence Mine	Wind, Water, Vehicle Dispersal Ar	33.7	6.60	968.5	Change for Cadmium Only / Remediation Goal	36.8	0.058	471.0
Independence Mine	Repository Area	145.2	5.38	1,000.0	Change for Cadmium and Lead / Remediation Goal	39.3	0.126	569.4
Independence Mine	Secondary Borrow Area	18.2	4.93	314.8	No Change in Metals Concentrations After Remediation	33.5	0.066	617.3
Old Triumph Shaft	Waste Dumps with IDEQ Data	300.0	30.00	1,000.0	Anticipated Remediation Level		1.840	12,600.0
Old Triumph Shaft	Wind, Water, Vehicle Dispersal Ar	300.0	15.36	907.1	Change for Arsenic and Cadmium / Remediation Goal	69.3	0.193	2,070.0
Old Triumph Shaft	Repository Area	32.5	8.74	325.7	Change for Cadmium Only / Remediation Goal	48.2	0.167	912.6
Triumph Tunnel	Waste Dumps with IDEQ Data	300.0	30.00	1,000.0	Anticipated Remediation Level	1,300.0	13.853	8,050.0
Independence Neighborhod	Independence Neighborhood - Nor	46.1	7.10	94.8	Remediation Goal / At or Below Background Concentrati	22.7	0.017	97.9
Independence Neighborhod	Independence Neighborhood - Sou	46.1	7.10	94.8	Remediation Goal / At or Below Background Concentrati	73.6	0.048	682.5
North Star Neighborhood	North Star Neighborhood	46.1	7.10	94.8	Remediation Goal / At or Below Background Concentrati	57.0	0.200	1,880.0
BLM RMC - Red-tailed Hawk (See Note 8 Below)		4.0	0.30	6.0		7.0	1.000	43.0
Modified BLM RMC (Level 2 Analysis) - Red-tailed Hawk		1,620.8	121.56	2,431.1		2,836.3	405.189	17,423.0
Note: Forage Area = 859 hectares								
BLM RMC - Cottontail		438.0	6.00	172.0		358.0	15.000	373.0
Modified BLM RMC (Level 2 Analysis) - Cottontail		619.8	8.49	243.4		506.6	21.226	527.8
Note: Forage Area = 2.12 hectares								
BLM RMC - Mule Deer		200.0	3.00	106.0		102.0	9.000	222.0
Modified BLM RMC (Level 2 Analysis) - Mule Deer		35,849.1	537.74	19,000.0		18,283.0	1,613.208	39,792.5
Note: Forage Area = 285 hectares								
BLM RMC - Elk		328.0	3.00	127.0		131.0	11.000	275.0
Modified BLM RMC (Level 2 Analysis) - Elk		2,885,162.3	26,388.68	1,117,120.8		1,152,305.7	96,758.491	2,418,962.3
Note: Forage Area = 7,770.00 hectares								

Note 1: Values shown in blue exceed Modified BLM RMC (Level 2 Analysis) - Cottontail

Note 2: Values shown in green exceed Modified BLM RMC (Level 2 Analysis) - Red-tailed Hawk.

Note 3: Values shown in orange exceed Modified BLM RMC (Level 2 Analysis) - Cottontail and Red-tailed Hawk

Note 4: Values shown in red exceed Modified BLM RMC (Level 2 Analysis) - Cottontail, Red-tailed Hawk, and Mule Deer

Note 5: Assumes successful remediation of 8.55 (21.12) of 10.67 hectares (26.36 acres) of contaminated waste dumps and wind, water, and vehicle dispersion areas.

Note 6: Assumes 2.12 hectares (5.24 acres) of contaminated waste dumps and wind, water, and vehicle dispersion areas will remain in-place.

Note 7: Assumes all of the areas described in Note 6 are contiguous for this and other quantitative analyses. They are, in fact, a mosaic within the DeNovo Independence Site.

Note 8: Assumption described in Note 7 results in a conservative (i.e. overestimate of risk) Modified BLM RMC - Cottontail.

Note 9: American robin is used as a surrogate for red-tailed hawk for this and other quantitative analysis for BLM - RMC values.

Note 10: Mean body weight of American robin is reported as 77.3 grams and red-tailed hawk in southwest Idaho as 957 grams (US EPA 1993).

Note 11: Because of differences in body weight, the use of American robin as a surrogate results in a conservative (i.e. overestimate of risk) Modified BLM RMC - Red-tailed Hawk.

Note 12: Values highlighed in orange exceed Modified BLM RML (Level 2 Analysis) - Mule Deer if foarge area (FA) = 70 hectares, but do not if FA = 285 hectares.

Note 13: Values described in Note 12 continue to exceed Modified BLM RML (Level 2 Analysis) - Red-tailed Hawk and/or Cottontail.

Note 14: Concentrations of copper, mercury, and zinc shown in this table are those reported by Golder Associates, Inc. as present prior to remediation. As such, they are Media Exposure Point Concentrations (MEPC).

Note 15: Values highlighted in green are the remediation goals for mule deer and therefore, for this Ecological Risk Assessment. None of the remediation goals for arsenic, cadmium, or lead or MEPC for other metals exceed this value.

Comparison of Risk of Exposure to Metals for Mule Deer,
Prior to and After Remediation at the DeNovo Independence Site

Site	Sample Location	Risk Prior to / After Remediation					
		Arsenic	Cadmium	Copper	Lead	Mercury	Zinc
Background	Milligan Formation	Low / Low	Low / Low	Low / Low	Low / Low	Low / Low	Low / Low
North Star Mine	Waste Dumps with IDEQ Data	Low / Low	Moderate / Low	Low / Low	Moderate / Low	Low / Low	Low / Low
North Star Mine	Wind, Water, Vehicle Dispersal Area	Low / Low	Low / Low	Low / Low	Low / Low	Low / Low	Low / Low
North Star Mine	Repository Area	Low / Low	Low / Low	Low / Low	Low / Low	Low / Low	Low / Low
North Star Mine	Secondary Borrow Area	Low / Low	Low / Low	Low / Low	Low	Low / Low	Low / Low
Independence Mine	Waste Dumps with IDEQ Data	Low / Low	Low / Low	Low / Low	Moderate / Low	Low / Low	Low / Low
Independence Mine	Wind, Water, Vehicle Dispersal Area	Low / Low	Low / Low	Low / Low	Low / Low	Low / Low	Low / Low
Independence Mine	Repository Area	Low / Low	Low / Low	Low / Low	Low / Low	Low / Low	Low / Low
Independence Mine	Secondary Borrow Area	Low / Low	Low / Low	Low / Low	Low / Low	Low / Low	Low / Low
Old Triumph Shaft	Waste Dumps with IDEQ Data	Low / Low	Moderate / Low	Low / Low	Moderate / Low	Low / Low	Moderate / Low
Old Triumph Shaft	Wind, Water, Vehicle Dispersal Area	Low / Low	Low / Low	Low / Low	Low	Low / Low	Low / Low
Old Triumph Shaft	Repository Area	Low / Low	Low / Low	Low / Low	Low	Low / Low	Low / Low
Triumph Tunnel	Waste Dumps with IDEQ Data	Low / Low	Low / Low	Low / Low	Moderate / Low	Low / Low	Moderate / Low
Independence Neighborhood	Independence Neighborhood - North	Low / Low	Low / Low	Low / Low	Low	Low / Low	Low / Low
Independence Neighborhood	Independence Neighborhood - South	Low / Low	Low / Low	Low / Low	Low	Low / Low	Low / Low
North Star Neighborhood	North Star Neighborhood	Low / Low	Low / Low	Low / Low	Low	Low / Low	Low / Low

Note 1: Qualitative evaluations of numeric calculations of risk shown in this table are based on those from Risk Management Criteria for Metals at BLM Mining Sites (2004) and are shown below.
Note 2: BLM RMC = US Bureau of Land Management Risk Management Criteria
Note 3: Modified BLM RMC (Level 2 Analysis) = BLM RMC modified to account for spatial and temporal factors particular to each wildlife indicator species.

Less than BLM RMC (Level 2 Analysis) = low risk
1 to 10 x BLM RMC (Level 2 Analysis) = moderate risk
10 to 100 x BLM RMC (Level 2 Analysis) = high risk
> BLM RMC (Level 2 Analysis) = extremely high risk

Remaining risk for red-tailed hawk and cottontail would, perhaps, be of concern if not for the fact that neither the waste dump at the North Star Mine, nor that at the Independence Mine have any vegetative cover to provide habitat for prey, and no perch sites (i.e. trees common to riparian areas) for red-tailed hawk to settle on, and from which to prey. Further assurance is provided by the fact that MEPC for all metals after remediation at all site and sample locations is notably reduced, and at all but two site and sample locations are less than Modified BLM RMC (Level 2 Analysis) for red-tailed hawk.

Further, because of their difference in body weight, the use of American robin (average body weight 77.3 grams) as a surrogate for red-tailed hawk (average body weight 957 grams) results in a conservative (i.e. overestimate of risk) Modified BLM RMC (Level 2 Analysis) for red-tailed hawk. If body weight were to be considered by the risk model to be a multiplicative variable to BLM RMC, level of risk would be below this further Modified BLM RMC.

And, although cottontail is an important prey species in the sagebrush steppe of Idaho, those animals that prey upon them (e.g. red-tailed hawk, owls, coyotes, and bobcats) have large foraging areas, of which the DeNovo Independence Site is but a small portion. Their exposure to metals is therefore greatly diminished by this dilution of cottontail with potentially elevated concentrations of lead. One analogy to help understand this phenomenon is that if we were to eat only seafood in our diet we might suffer from chronic exposure to mercury, however our diet is diverse and as a result our exposure is lessened.

And finally, it must be remembered that my calculation of Modified BLM RMCs (Level 2 Analysis) assumes the 10.67 hectares (26.36 acres) of contaminated waste dumps and wind, water, and vehicle dispersion areas are contiguous. They are, in fact, a mosaic within the DeNovo Independence Site. This has the potential to reduce the amount of time an individual that forages within a small area is exposed to elevated concentrations of metals. Because of this, the values shown in Tables 3 and 4 are conservative (i.e. overstate the potential risk) for wildlife species (i.e. cottontail) with foraging areas less than 10.67 hectares (26.36 acres) in size.

Further analysis, to be presented in the complete ERA to follow this summary report, will answer several concerns of Idaho DEQ. Those concerns - which were expressed in a meeting with Dr. Jeffrey Fromm on Tuesday, December 23, 2008 - are described below.

1. Idaho DEQ will require and DeNovo Independence, LLC will provide, in the complete ERA to follow this summary report, a comparison of Sc to US EPA Ecological Screening Level (Eco-SSL) values for each COPEC (see http://www.epa.gov/ecotox/ecossl/). As with use of the Modified BLM RMC (Level 2 Analysis), these values will be modified to take into account spatial and temporal factors.

2. Because they are sparsely vegetated and provide little or no wildlife habitat (i.e. living space, reproductive space,

food and water, cover from predators and thermal extremes), waste piles are not a likely attractant to wildlife. However, their appeal may be affected by other factors and unique circumstances. Idaho DEQ will require and DeNovo Independence, LLC will provide, in the complete ERA to follow this summary report, an evaluation of whether exposure of wildlife to locations of elevated concentrations of COPECs is random, or affected by a possible unique appeal of waste piles. Examples include their chemical composition - such as that of naturally occurring salt licks that attract mule deer and elk - or their ability to provide snow free loafing areas in early spring because their black color absorbs greater radiant energy from the sun than the surrounding ground.

3. Idaho DEQ will require and DeNovo Independence, LLC will provide, in the complete ERA to follow this summary report, an evaluation of the locations of elevated concentrations of COPECs relative to known daily or seasonal migration routes of wildlife species.

4. Repositories of waste encapsulated with a cover of soil and revegetated with grasses and forbs may be attractive to wildlife. DeNovo Independence, LLC and Idaho DEQ will consider this in their development and review of final design specifications for remediation, and avoid this risk by selection of species that are not inordinately attractive.

I certify that I have prepared this report and that I am a qualified expert, as demonstrated by the following professional certifications.

RB Tiedemann

Ecological Design, Inc. by
Robert B. Tiedemann
Principal

Certified Professional Wetland Scientist
(Society of Wetland Scientists No. 000702)
Certified Wetland Delineator
(US Army Corps of Engineers April 15, 1994)
Certified Fisheries Scientist
(American Fisheries Society No. 1,717)
Certified Wildlife Biologist
(The Wildlife Society December 10, 1986)

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ATTACHMENT 1

WORK PLAN FOR THE ECOLOGICAL RISK ASSESSMENT - PRELIMINARY DRAFT

ECOLOGICAL DESIGN, INC.
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MEMO TO: Denovo Properties, Inc.
C/O Kendra Lindahl
Principal
Landform, Inc.

Bruce Wicherski
Jeff Fromm
Bruce Schuld
Idaho Department of Environmental Quality

Mike McDonald
Idaho Department of Fish and Game - Magic Valley Region

Dick Vorpahl
DeNovo Properties, Inc.

Doug Morell
Golder Associates

FROM: Rob Tiedemann, CPWS, CWD, CFS, CWB, Ecological Design, Inc.

DATE: December 19, 2008
Most Recent Revision: January 11, 2009

RE: DeNovo Independence, LLC
Triumph Mine Site
Ecological Risk Assessment - Work Plan

At an office meeting and telephone conference conducted Wednesday, December 3, 2008 with the persons listed above, with the exceptions of Kendra Lindahl and Mike McDonald, we discussed the elements of a work plan for the ecological risk assessment (ERA).

It was agreed Rob Tiedemann would provide Idaho Department of Environmental Quality (DEQ) the following for review prior to a preliminary draft of the ERA: (a) an outline of the ERA, (b) guiding assumptions, (c) identification of constituents of potential ecological concern (COPEC), (d) factors unique to the Triumph Mine Site not common to other remediation sites, and (e) a description of methods for initial screening of COPEC and further study.

That work plan is described in the following narrative and graphics.

Outline
The ERA will largely follow the content and format described in guidelines authored by the US Environmental Protection Agency (EPA) and shown in Appendix A of this memo.

Guiding Assumptions
Variables required by models to evaluate risk will be taken from recognized sources including, but not limited to, the following:

- US EPA 1993 Wildlife Exposure Factors Handbook
- BLM 2004 Risk Management Criteria for Metals at BLM Mining Sites
- Chapman, J.A and G.A Feldhamer (Editors) 1992 Wild Mammals of North America

Indicator wildlife species, selected for this study, that follow defined ERA endpoints and attributes for quantitative comparisons to acceptable risk are red-tailed hawk (*Buteo jamaicensis*), Nuttall's cottontail (*Sylvilagus nuttallii*), mule deer (*Odocoileus heminus*), and elk (*Cervus elaphus*). That portion of the life history of each species relevant to the ERA is summarized in Table 1.

Indicator wildlife species, selected for this study, that follow defined ERA endpoints and attributes for qualitative comparisons to acceptable risk are sage grouse (*Centrocercus urophasianus*), a SGCN as identified by the IDFG; and gray wolf (*Canis lupus*), both an endangered species and an experimental non-essential species as identified by the US FWS. Further analysis, to be presented in a complete ERA to follow a summary report, will qualitatively assess risk to these species.

Soil concentrations of COPEC less than those shown in Risk Management Criteria for Metals at BLM Mining Sites (2004) will be eliminated from further study.

Factors Unique to the Triumph Mine Site
Natural and cultural features, disturbances, events, and history unique to the Triumph Mine Site include the following:

- Presence of water is limited to intermittent streams and isolated seeps.
- Motorized access via Triumph Gulch is prohibited from December 1 to April 30.
- Past land use and practices (e,g, grazing) have affected the quality of habitat.
- Natural disturbances and events (e.g. fire) have affected the quality of habitat.

Table 1 - Life History Factors for Wildlife Species Relevant to the Ecological Risk Assessment

Common Name	Scientific Name	Food Habits	Forage Area	Time within the Project Area	Occupied Habitat(s)
Red-tailed Hawk	Buteo jamaicensis	**Carnivore** *Spring, Summer, Fall, Winter:* Large Insects, Snakes, Lizards, Birds, and Small Mammals	*Spring, Summer, Fall, Winter:* *(When* red-tailed hawk *are present within the DeNovo Independence Site)* 859 hectares[1]	January - December	Woodlands, Wetlands, Pastures, Prairies, and Deserts
Nuttall's Cottontail	Sylvilagus nuttallii	**Herbivore** *Spring, Summer, Fall:* Grasses and Fobs *Winter:* Woody Vegetation	*Spring, Summer, Fall, Winter:* *(When* Nutall's cottontail *are present within the DeNovo Independence Site)* 3 hectares[1]	January - December	Shrub Steppe, Rocky Areas, and Riparian Areas
Mule Deer	Odocoileus heminus	**Herbivore** *Spring, Summer, Fall:* Grasses, Forbs, Sedges, and Rushes *Winter:* Shrub Browse	*Spring, Summer, Fall:* *(When* mule deer *are present within the DeNovo Independence Site)* 285 hectares[2, 3, and 4]	March - November	All Habitats Except Dense Forests
Elk	Cervus elaphus	**Herbivore** *Spring, Summer:* Grasses and Forbs *Fall, Winter:* Grasses and/or Shrub Browse	*Winter:* *(When* elk *are present within the DeNovo Independence Site)* < or = 7,770 hectares[5]	December - April	Coniferous Forests, Montane Meadows, and Shrub Steppe

[1] Source: US EPA. 1993. Wildlife Exposure Factors Handbook (Mean Value)
[2] Source: Chapman, J.A and G.A Feldhamer (Editors). 1992. Wild Mammals of North America
[3] Source: Idaho Department of Fish and Game - Magic Valley. 2008. Personal communication with Mike McDonald (Environmental Staff Biologist)
[4] Additional Sources: See Attachment 2
(To be reviewed and verified by Mike McDonald)
[5] Source: Idaho Department of Fish and Game - Magic Valley. 2008. Region Elk Winter Habitat and Group Locations 2
(To be reviewed and verified by Mike McDonald)

- Plant associations, and therefore wildlife habitat, within the project area are those native to southwest Idaho and include the sagebrush steppe, aspen groves, isolated springs and seeps, and riparian areas. Their present condition is good to very good, with the exception of isolated springs and seeps and portions of Independence Creek and Triumph Creek altered by placed fill and the relics of past mining activities including abandoned adits, portals and mine entrances, spoil piles, and a variety of wood structures and supports. Weedy species are largely absent from the study area with the exception of spotted knapweed (*Centaurea stoebe*) and cheatgrass (*Bromus tectorum*) that sparsely grow in areas where ground has been disturbed by past mining activities and active maintenance of unimproved roads.

Methods for Initial Screening of Constituents of Potential Ecological Concern (COPEC)

Initial screening of COPEC will be accomplished by comparison of Media Exposure Point Concentrations (MEPC) calculated by Golder Associates to BLM Risk Management Criteria (RMC) shown in Risk Management Criteria for Metals at BLM Mining Sites (2004). This comparison is shown in Figure 1 and Table 2.

Methods for More Refined Analysis of COPEC and Risk to Wildlife

Refinement of the initial screening of COPEC will be accomplished by recognized risk quotient (RQ) models (see Table 3), or modification of BLM Risk Management Criteria (RMC) to account for the following: (1) the proportion of time a given wildlife species spends in contaminated areas, and (2) the ratio of foraging area for a given wildlife species to the area of contamination.

Note: The diameter of each circle is proportional to the BLM - RMC for metals, shown in the bottom-most row, and each wildlife species shown in the left-most column of this graphic.

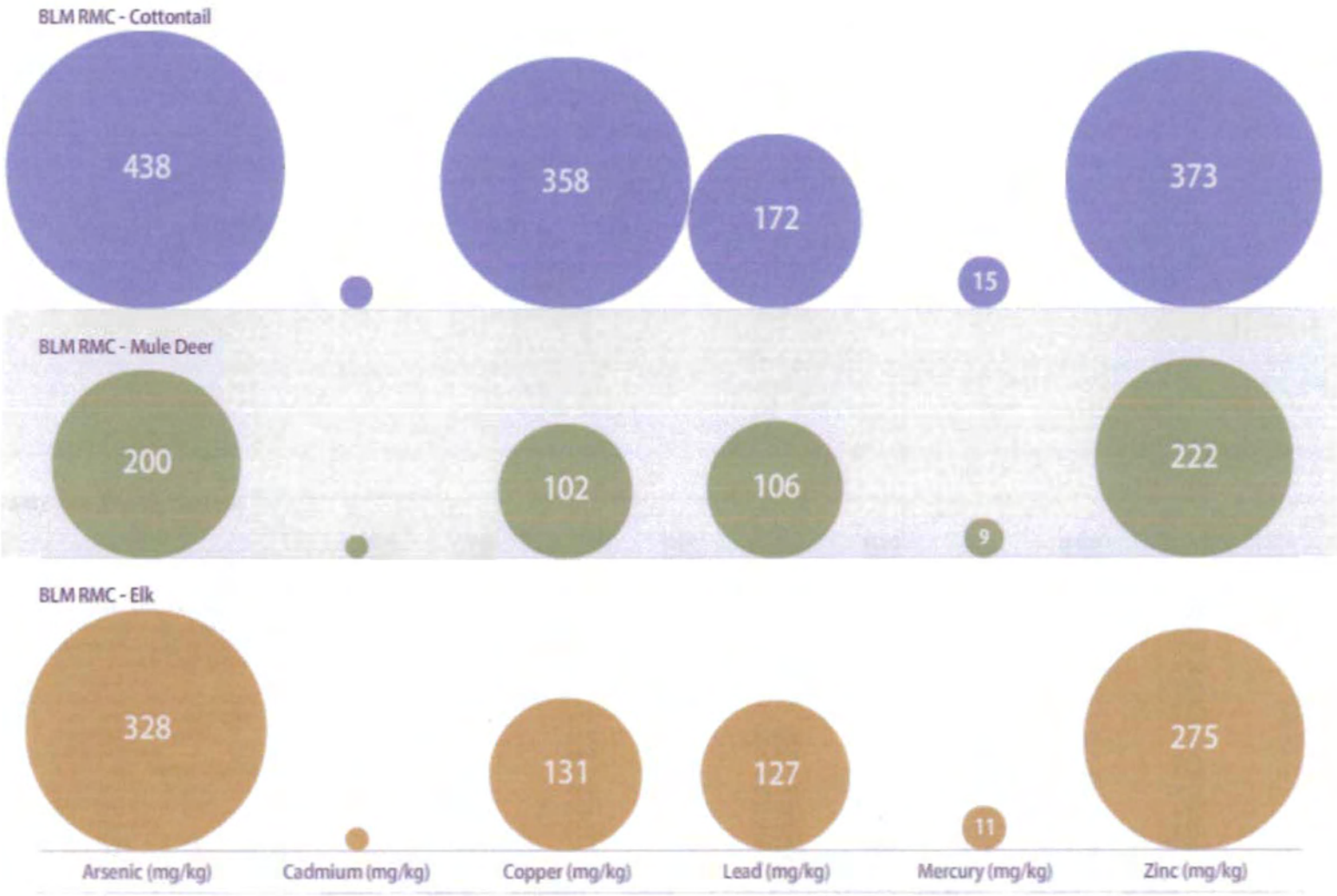

Figure 1 - BLM Risk Management Criteria (RMC) for Indicated Species
(Source: BLM 2004 Risk Management Criteria for Metals at BLM Mining Sites)
DeNovo Independence Site / DeNovo Independence, LLC
Blaine County, Idaho
January 7, 2009

Comparison of Bureau of Land Management (BLM) Risk Management Criteria (RMC)
to Calculated Media Exposure Point Concentrations (MEPC) Within the Triumph Mine Site

Data Source: Golder Associates, December 2008

Site	Sample Location	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)
North Star Mine	Waste Dumps with IDEQ Data	2,920.0	148.00	54.4	288.0	68,700	14,300.0	1,600	2.230	7.49	118.0	7,050.0
North Star Mine	Wind, Water, Vehicle Dispersal	367.0	24.60	70.6	93.0	23,200	2,990.0	1,540	0.271	5.46	22.9	2,820.0
North Star Mine	Repository Area	693.0	29.80	72.6	95.8	20,100	1,780.0	1,350	0.538	5.51	11.8	3,870.0
North Star Mine	Secondary Borrow Area	148.0	14.00	95.4	57.3	21,100	700.0	1,260	0.155	7.68	3.9	1,560.0
Independence Mine	Waste Dumps with IDEQ Data	640.0	9.78	58.6	129.0	40,300	10,400.0	465	0.770	19.50	101.0	1,100.0
Independence Mine	Wind, Water, Vehicle Dispersal	33.7	6.60	75.3	36.8	17,500	968.5	361	0.058	2.34	12.9	471.0
Independence Mine	Repository Area	145.2	5.38	48.6	39.3	17,900	2,520.0	243	0.126	6.17	35.2	569.4
Independence Mine	Secondary Borrow Area	18.2	4.93	71.0	33.5	20,600	314.8	373	0.066	1.02	3.8	617.3
Old Triumph Shaft	Waste Dumps with IDEQ Data	3,130.0	291.00	23.3			9,200.0		1.840	9.00	70.0	12,600.0
Old Triumph Shaft	Wind, Water, Vehicle Dispersal	592.5	15.36	67.6	69.3	27,300	907.1	920	0.193	2.56	7.2	2,070.0
Old Triumph Shaft	Repository Area	32.5	8.74	63.3	48.2	24,300	325.7	1,131	0.167	2.79	1.9	912.6
Triumph Tunnel	Waste Dumps with IDEQ Data	6,862.9	52.01	72.6	1,300.0	17,900	7,620.5	656	13.853	3.40	25.0	8,050.0
Independence Neighborhood	Independence Neighborhood - North	3.7	0.28	39.4	22.7	14,300	19.0	459	0.017	0.25	0.3	97.9
Independence Neighborhood	Independence Neighborhood - South	238.9	7.34	50.5	73.6	24,410	368.0	548	0.048	2.44	3.4	682.5
North Star Neighborhood	North Star Neighborhood	304.0	15.22	72.0	57.0	22,800	687.1	1,130	0.200	3.21	6.3	1,880.0
BLM RMC - Cottontail		438.0	6.00		358.0		172.0		15.000			373.0
BLM RMC - Mule Deer		200.0	3.00		102.0		106.0		9.000			222.0
BLM RMC - Elk		328.0	3.00		131.0		127.0		11.000			275.0
Note: Values Shown in Red Exceed BLM RMC - Mule Deer												

Table 3 - Variables Taken from the Literature, Calculated Media Exposure Point Concentrations (MEPC) (Source: Golder Associates, Inc.), Estimated Exposure (EE), and Calculated Risk Quotent (RQ) for Indicated Species

Variable	Nuttall's Cottontail	Mule Deer	Elk
Body Weight (BW)			
Food Ingestion Rate (FIR)			
Concentration in Food (Fc)			
Soil Ingestion Rate (SIR)			
Concentration in Soil (Sc)			
Water Ingestion Rate (WIR)			
Concentration in Water (Wc)			
Proportion of Food Item in Diet (P)			
Accumulation Factor (AF)			
Proportion of Time Spent in Area (TUF) (I.e. months/year)			
Proportion of Foraging Area Within Contaminated Portions of Project Area (AUF)			
Estimated Esposure (EE) (Calculated)			
Toxicity Response Value (TRV)			
Risk Quotent (RQ) (Calculated)			

Note 1: RQ = EE / TRV

Note 2: EE = [(FIR*Fc*P) + (SIR*Sc) + (WIR*Wc)] * (AUF*TUF)

Appendix A - US EPA Guidelines for Ecological Risk Assessment
(Source: http://www.epa.gov/risk/ecological-risk.htm)

Planning Phase - Planning and Scoping Process

1. Identification of Individuals, Populations, Communities, and Ecosystems at Risk
2. Identification of Constituents of Potential Ecological Concern (COPEC)
3. Source(s) of COPEC
4. Pathways and Routes of Exposure in the Environment (i.e. Pathways: air, surface water, groundwater, soil, solid waste, and food / Routes: ingestion of food and water, skin contact, inhalation, preening, and grooming)
5. Response of an Organism to COPECs (e.g. absorption, distribution, metabolic decomposition, and excretion)
6. Physiological and Ecological Effects to an Organism
7. Time of Exposure within the Life History of a Species, and Duration of Exposure for Resulting Acute and Chronic Effects

Phase 1 - Problem Formulation

1. Definition of Assessment Endpoints (e.g. species, functional group, community, ecosystem, and habitat)
2. Attributes of the Assessment Endpoints at Risk (e.g. threatened and endangered species, species of commercial importance, and indicators of ecological health)
3. Graphical Depiction and Narrative Describing a Conceptual Model of the Relationships Between Assessment Endpoints and Stressors (i.e. source, stressors, receptors, potential exposure, predicted effects)

Phase 2 - Analysis

1. Qualitative and Quantitative Analysis of the Level of Exposure and Predicted Effects (e.g. Hazard Quotient = [COPEC] / [Screening Benchmark], comparison of field data to BLM Risk Management Criteria)

   Required Parameters Include, but are not Limited to: (a) Area of Use, (b) Food Ingestion Rate, (c) Bioaccumulation Rate, (d) Bioavailability, and (e) Life Stage

Phase 3 - Risk Characterization

1. Estimate and Characterization of the Risk to Assessment Endpoints (i.e. acute response and chronic response, severity of effects, time frame of exposure, species at risk, vulnerable portions of their life stage)
2. Discussion of the Variability of Data and Uncertainty of Results

Attachment 2

Review of the Literature Related to Mule Deer Foraging Area

ECOLOGICAL DESIGN, INC.
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MEMO TO: DeNovo Independence, LLC
C/O Kendra Lindahl
Principal
Landform, Inc.

Dick Vorpahl
DeNovo Properties, LLC

Doug Morell
Kirsi Longley
Golder Associates

Mike McDonald
Environmental Staff Biologist
Idaho Department of Fish and Game - Magic Valley Region

FROM: Rob Tiedemann, CPWS, CWD, CFS, CWB, Ecological Design, Inc.

DATE: January 10, 2009

RE: DeNovo Independence, LLC
DeNovo Independence Site
Ecological Risk Assessment - Review of the Literature (Mule Deer Foraging Area)

The following is a summary of the referenced literature provided to me by Kirsi Longley (Golder Associates, Inc.) on Wednesday, January 7, 2009.

http://www.gsd.harvard.edu/studios/brc/report/28_deer.html
Untitled
This document cites others who estimate the mean distance to water within the home range of mule deer in California coastal environments to be 80 meters. Assuming this also approximates the foraging area of coastal populations within an 80-meter diameter circle, this area is 5,024 square meters (0.5 hectares). The document does not provide any actual information on the size of foraging area or home range.

http://www.jstor.org/pss/1381086
Movement and Activity Patterns of Mule Deer in the Sagebrush-Steppe Region
Lester E. Eberhardt, Eric E. Hanson and Larry L. Cadwell
***Journal of Mammalogy*, Vol. 65, No. 3 (Aug., 1984), pp. 404-409**
The authors of this peer reviewed, published study found the average home range of mule deer in the sagebrush steppe at the Hanford Site in south-central Washington to be 39.3 ± 26.5 km^2 (3,930 hectares) (n=34) in size.

This is equivalent to a home range that varies from 12.8 km^2 (1,280 hectares) to 65.8 km^2 (6,580 hectares) in size. The fact this a peer reviewed, published study conducted in an ecoregion equivalent to the DeNovo Independence site must be recognized. However, the range of values and small sample size (n=34) suggest the variability of this statistic is large and perhaps misrepresented by only 34 observations.

http://sibr.com/mammals/M181.html
Untitled
This document cites others who report "home ranges are usually less than 1.6 km (1 mile) in diameter" for mule deer in an unspecified ecoregion of California. This is equivalent to a home range 2.01 km^2 (201 hectares) in size.

ftp://ftp-fc.sc.egov.usda.gov/WHMI/WEB/pdf/TechnicalLeaflets/Muledeer.pdf
Natural Resources Conservation Service
Wildlife Habitat Management Institute
Wildlife Habitat Management Leaflet Number 28 - Mule Deer
This document reads, in part, "Mule deer home range size varies depending on the region, habitat quality, season, and distribution of vital resources." It reports a mean home range for adult does as 0.3 to 1.2 square miles (77.7 to 310.8 hectares) and for adult bucks as 1.2 to 4 square miles (310.8 to 1,036.0 hectares).

http://www.rw.ttu.edu/newsletter/PDF/Mgmtnotes/MANAGING%20PLAINS%20MULE%20DEER%20IN%20TEXAS%20AND.pdf
Managing Plains Mule Deer in Texas and Eastern Mexico
Bryant, F.C. and B. Morrison
Undated
Range, Wildlife and Fisheries Management
This document states, in part, "Home ranges extend only 0.5 to 1 mile beyond the cover of suitable vegetation or a rimrock, caprock, or ravine." This is equivalent to a home range 50.8 to 203.3 hectares in size within a 0.5 to 1 mile diameter circle.

http://www.biggamehunt.net/sections/Mule_Deer/Mule-Deer-Those-Western-Deer-06010709.html
Mule Deer Hunting
Gruenefeld, G.
2007
Big Game Hunt.net
This document - with no references to the literature, but presumably relying on it - states, in part, "As a general rule, the home range of mule deer, no matter what the subspecies nor the terrain in which they flourish, is fairly small covering little more than 250 hectares."

To this point in time I have used Wild Mammals of North America (1992) edited by Joseph A. Chapman and George A. Feldhamer as the referenced source of the value 70 hectares for the foraging area for mule deer. This book is a respected summary of the scientific literature. It states, in part, "Summer home ranges of does averaged 92 hectares (37 - 207 hectares) (Pac 1976; Steerey 1979), while adult males ranged over areas from 52 to 66 hectares (Steery 1979). Other studies on mountainous summer ranges have also indicated home ranges 40 - 100 hectares in size (White 1960; Leopold et al. 1951)." I selected the midpoint (i.e. 70 hectares) of the range (i.e. 40 - 100 hectares) from those studies conducted in an ecoregion and environment most similar to the DeNovo Independence Site. My review of the literature summarized in this memo suggests there may be reason and rational to alter that selection of value.

In order to continue progress toward completion of the Summary of Preliminary Results of the Ecological Risk Assessment (ERA) for the DeNovo Independence Site, I recommend we proceed with the forage area value for mule deer suggested by Kirsi Longley and accepted by the US Environmental Protection Agency (i.e. 285 hectares) after their review of the terrestrial risk assessment for the Blackbird Mine in Custer County, Idaho (Golder Associates, Inc.)

I further recommend we allow Mike McDonald, Environmental Staff Biologist (Idaho Department of Fish and Game - Magic Valley Region) to review this memo and complete his review of records from his agency; and that we consider his recommended value for foraging area of mule deer, that will be specific to the project area, in the complete ERA to follow the summary report.

ATTACHMENT 3

BACKGROUND CONCENTRATIONS OF METALS IN SOILS DATA

TABLE 3-1

Background Soil Sample Results
Data Source: Golder Associates, November 2008

Sample ID	Sample Location	Collection Date	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)
G-IMBGSS2	G-IMBGSS	10/14/08	13.7	2.67	43.8	48.9	23,700	39.3	379	0.050	1.1	<0.5	315.0
G-IMBGSS3	G-IMBGSS	10/14/08	10.2	<0.20	41.9	29.3	30,900	26.8	332	<0.033	1.2	<0.5	119.0
G-IMBGSS4	G-IMBGSS	10/14/08	2.7	<0.20	61.6	19.2	15,500	16.4	442	<0.033	<0.5	<0.5	63.6
G-IMBGSS5	G-IMBGSS	10/14/08	5.8	0.61	44.4	30.2	11,500	26.9	357	<0.033	0.5	<0.5	171.0
G-IMBGSS6	G-IMBGSS	10/15/08	<2.5	2.13	78.5	14.9	5,570	25.9	132	0.045	0.8	<0.5	182.0
G-IMBGSS7	G-IMBGSS	10/15/08	3.8	2.70	86.6	30.4	14,000	27.0	224	<0.033	<0.5	<0.5	401.0
G-IMBGSS8	G-IMBGSS	10/15/08	11.8	3.28	53.2	45.6	24,200	37.1	237	<0.033	2.1	0.5	370.0
G-INBGSS1	G-INBGSS	10/18/08	2.6	<0.20	41.5	21.0	14,700	11.6	398	<0.033	<0.5	<0.5	67.3
G-INBGSS3	G-INBGSS	10/18/08	5.0	3.63	22.3	29.6	17,200	50.9	372	<0.033	1.5	<0.5	367.0
G-KOBGSS1	G-KOBGSS	10/14/08	5.8	1.99	35.3	23.8	14,300	63.7	288	<0.033	<0.5	<0.5	350.0
G-KOBGSS2	G-KOBGSS	10/14/08	9.9	3.33	78.6	31.5	14,800	111.0	313	<0.033	0.9	0.8	412.0
G-KOBGSS3	G-KOBGSS	10/14/08	11.4	2.42	66.7	24.1	13,700	62.0	313	<0.033	<0.5	<0.5	393.0
G-KOBGSS4	G-KOBGSS	10/14/08	20.6	5.40	70.3	30.2	18,200	47.6	201	<0.033	<2	0.5	884.0
G-KOBGSS5	G-KOBGSS	10/14/08	13.8	5.61	78.3	33.1	19,700	66.5	156	0.037	0.9	0.6	762.0
G-KOBGSS6	G-KOBGSS	10/14/08	11.1	2.09	63.6	27.3	15,000	61.1	164	0.053	1.6	0.5	427.0
G-KOBGSS7	G-KOBGSS	10/14/08	9.2	2.73	58.0	29.2	17,200	65.4	164	0.062	2.0	0.7	358.0
G-KOBGSS8	G-KOBGSS	10/14/08	45.4	14.70	51.0	30.0	18,300	91.8	353	0.163	<2	0.9	1,860.0
G-KOBGSS9	G-KOBGSS	10/14/08	9.8	4.75	53.8	26.9	16,300	83.7	340	0.047	<2	0.7	545.0
G-NSBGSS3	G-NSBGSS	10/14/08	34.7	5.06	63.0	45.6	22,900	145.0	436	0.038	2.5	1.1	777.0
G-NSBGSS4	G-NSBGSS	10/14/08	19.2	4.15	46.8	46.0	16,100	40.4	392	<0.033	1.9	<0.5	353.0
G-NSBGSS5	G-NSBGSS	10/14/08	22.5	3.18	76.4	40.3	18,100	30.3	303	<0.033	4.5	<0.5	477.0
G-NSBGSS6	G-NSBGSS	10/14/08	14.1	2.35	51.8	37.2	20,100	35.3	276	<0.033	1.3	<0.5	396.0
G-NSBGSS7	G-NSBGSS	10/15/08	16.0	1.44	80.0	46.1	25,000	32.2	482	<0.033	1.9	0.7	340.0
G-NSBGSS8	G-NSBGSS	10/15/08	72.7	<0.20	81.3	34.2	35,500	72.3	1,360	0.102	<0.5	0.7	167.0
G-NSBGSS9	G-NSBGSS	10/20/08	17.1	2.59	71.8	40.2	19,700	42.7	400	<0.033	3.3	0.7	306.0
G-NSBGSS10	G-NSBGSS	10/20/08	10.9	2.24	45.3	38.6	18,000	47.1	324	<0.033	0.7	<0.5	280.0
G-NSBGSS11	G-NSBGSS	10/20/08	18.1	0.99	42.9	34.1	18,500	26.4	458	<0.033	<0.5	<0.5	159.0
G-NSBGSS60	G-NSBGSS	10/15/08	12.8	1.50	93.6	52.5	24,500	32.8	397	<0.033	1.8	0.7	224.0
G-SBBGSS1	G-SBBGSS	10/17/08	<2.5	1.30	79.8	20.8	29,400	14.7	631	<0.033	<0.5	0.6	99.6
G-SQBGSS1	G-SQBGSS	10/14/08	<2.5	<0.20	54.4	15.8	19,200	20.4	422	<0.033	<0.5	<0.5	62.7
G-SQBGSS2	G-SQBGSS	10/14/08	11.9	5.21	71.1	47.3	17,200	22.2	177	<0.033	7.5	1.1	449.0
G-TGBGSS2	G-TGBGSS	10/14/08	11.4	4.48	56.0	49.9	29,300	1,820.0	348	0.170	3.9	2.2	2,430.0
G-TGBGSS3	G-TGBGSS	10/14/08	49.7	6.10	57.0	41.1	19,000	104.0	331	0.052	1.8	1.0	796.0
G-TRBGSS1	G-TRBGSS	10/21/08	28.5	16.60	57.8	40.9	19,900	444.0	912	0.058	0.6	2.1	1,150.0
G-TRBGSS11	G-TRBGSS	10/21/08	52.4	12.50	62.9	35.2	18,000	109.0	382	0.075	0.5	1.4	1,290.0
G-TRBGSS12	G-TRBGSS	10/21/08	<2.5	1.19	87.2	26.2	29,000	23.3	1,040	<0.033	<0.5	0.7	121.0
G-TRBGSS13	G-TRBGSS	10/21/08	10.3	4.22	92.5	64.2	16,500	21.0	296	0.052	5.2	1.7	604.0
G-TRBGSS14	G-TRBGSS	10/21/08	<2.5	0.35	99.5	25.2	25,200	15.0	774	0.047	<0.5	<0.5	57.6
G-TRBGSS15	G-TRBGSS	10/21/08	<2.5	0.41	95.8	20.9	21,900	17.4	473	<0.033	<0.5	<0.5	71.0
G-TRBGSS16	G-TRBGSS	10/21/08	<2.5	1.31	81.9	31.0	37,100	15.9	694	<0.033	<0.5	<0.5	121.0
G-TRBGSS17	G-TRBGSS	10/21/08	<2.5	1.52	86.0	29.8	29,900	17.0	664	<0.033	<0.5	<0.5	118.0
G-TRBGSS18	G-TRBGSS	10/22/08	14.1	2.40	69.9	32.4	13,100	79.1	558	0.065	<0.5	0.8	268.0
G-TRBGSS19	G-TRBGSS	10/22/08	10.2	5.47	69.4	35.8	24,200	69.2	355	<0.033	2.4	1.4	616.0
G-TRBGSS2	G-TRBGSS	10/21/08	16.9	4.63	74.5	32.6	22,100	45.7	470	<0.033	<0.5	0.7	334.0
G-TRBGSS3	G-TRBGSS	10/21/08	13.3	3.54	85.5	41.2	19,300	33.2	151	<0.033	2.0	0.8	210.0
G-TRBGSS4	G-TRBGSS	10/21/08	115.0	6.11	71.9	55.9	26,900	72.8	1,520	0.075	3.5	1.9	499.0
G-TRBGSS5	G-TRBGSS	10/21/08	12.7	0.86	57.7	21.9	13,100	14.3	449	<0.033	<0.5	0.5	76.9
G-TRBGSS6	G-TRBGSS	10/21/08	16.1	1.29	64.0	44.2	20,300	19.1	293	0.058	1.0	0.5	131.0
G-TRBGSS7	G-TRBGSS	10/21/08	15.3	2.09	76.8	32.9	18,700	34.7	396	0.062	<0.5	0.6	194.0
G-TRBGSS8	G-TRBGSS	10/21/08	7.6	4.47	69.7	38.5	22,000	132.0	316	<0.033	1.0	1.0	801.0
MINIMUM			<2.5	<0.20	22.3	14.9	5,570	11.6	132	<0.033	<0.5	<0.5	57.6
MAXIMUM			115.0	16.60	99.5	64.2	37,100	1,820.0	1,520	0.170	7.5	2.2	2,430.0
MEAN			19.4	3.72	66.1	34.5	20,289	91.3	433	0.069	2.1	0.9	440.5
BLM Risk Management Criteria - Mule Deer			200	3	-	102	-	106	-	9	-	-	222