Summary:
Investigation of the Process Area soils was completed in the period between November 2004 and April 2005 as required by the *Process Areas Work Plan.* All samples collected were analyzed for a suite of potential contaminants of concern which included the radionuclides U, Th, and Ra.

A total of 550 soil samples were collected (including duplicates) that were analyzed for radionuclides. Of those samples: 21 (3.8%) exceeded the industrial PRG for Ra-226, 8 (1.5%) exceeded the PRG for Ra-228, 0 (0%) exceeded the PRG for uranium, and 2 (0.4%) exceeded the PRG for thorium.

RAD-DOC-08c: Split Sample Results, Yerington Process Area Investigation

Source: TetraTech for EPA

Date: May 2005

Brief Description: Summary data table and raw lab reports from EPA split samples collected by TetraTech during ARC's Process Area Investigation (groundwater and soil).

Areas Covered: Process Area

Media:
1. Soil (surface and subsurface)
2. Groundwater

Investigation Method/Equipment Used: Laboratory analysis of soil and water samples.

Data:
1. 47 soil samples
2. 5 groundwater samples

Data/Document Format: Summary data tables and original laboratory reports.

Summary:
This data set includes summary tables for soil and groundwater split samples collected by TetraTech for the USEPA. Included are only the pages that list radionuclide results. Analyses completed on the samples include some or all of the following: isotopic uranium (U-234, 235, 238), isotopic thorium (Th-227, 228, 230, 232), isotopic radium (Ra-226, 228), gross alpha, gross beta, and gamma spec. Drinking water MCLs are not provided for any of the analyzed radionuclides so determination of samples that exceed MCLs is not included in the data.

RAD-DOC-08d: Conversion of EPA Process Area Soil Split Results for Comparison of Total Uranium to Thorium-234

Source: Foxfire

Date: November 1, 2005

Brief Description: Conversion of EPA's Th-234 results to allow for comparison of ARC's primary samples and EPA's split samples from the Process Area soils investigation.

Areas Covered: Process Areas

Media: Soil (surface and subsurface)

Investigation Method/Equipment Used: Laboratory analysis of soil samples

Data: 19 samples

Data/Document Format: Two page memo with data table.

Summary: Assuming that Th-234 is in equilibrium with Uranium-234 and -238, a conversion factor can be applied to allow a direct comparison of the analytical results for data review purposes. The results for the data evaluation show that the relative values of the two samples are comparable. Although the converted thorium result is consistently higher, all results are below the industrial PRG for uranium in soil.

RAD-DOC-09a: Yerington Mine Site 2nd Quarter 2005 Air Quality Monitoring Report

Author: Brown and Caldwell for ARC

Date: October 18, 2005

Brief Description: Report of air quality monitoring data from the TSP and PM10 air monitors located on and around the mine site.

Areas Covered: Mine Site Perimeter

Media: Air (fugitive dust)

Investigation Method/Equipment Used: Laboratory analysis of dust collected on filters from 6 TSP (Total Suspended Particles) and PM10 (Particulate Matter less than 10 microns) air monitors. Monitors run for 24 hours once every 6 days.

Data: 5 sample events (analyzed for isotopic U, Th, Ra and Gross alpha/beta)

Data/Document Format: 25 page final report plus figures and appendices (laboratory analytical results, meteorological data, win rose plots, etc.)

Summary:
A total of 6 air monitor stations (plus one duplicate) were installed in 2004, and began operating in January 2005, with the purpose of assessing potential fugitive dust emissions from the site and monitor: 1) particulate matter of a diameter of 10 microns or less (PM_{10}); 2) total suspended particulates (TSP) with a separate air sampler; and 3) concentrations of selected metals and radionuclides collected on the PM_{10} and TSP filters.

Laboratory analysis was performed on only 5 of the 14 sample events during the 2nd quarter of 2005: June 3rd through June 27th. Radionuclides analyzed include: isotopic uranium (U-234, 235, 238), isotopic thorium (Th-228, 230, 232), isotopic radium (Ra-226, 228), gross alpha, and gross beta.

RAD-DOC-09b: Addenda to First and Second Quarter 2005 Air Quality Monitoring Reports, Yerington Mine Site

Source: Brown and Caldwell for ARC

Date: November 15, 2005

Brief Description: Additional data (laboratory analytical results) for air filter samples collected in the 1st and 2nd quarters of the 2005 air monitoring program.

Areas Covered: Mine Site Perimeter

Media: Air (fugitive dust)

Investigation Method/Equipment Used: Laboratory analysis of dust collected on filters from 6 TSP and PM10 air monitors. Monitors run for 24 hours once every 6 days.

Data: Laboratory analytical results for 11 sample events during the 1st Quarter of 2005 and 14 sample events during the 2nd Quarter for 6 air monitor locations around the mine site (analyzed for isotopic U, Th, Ra and Gross alpha/beta)

Data/Document Format: This document includes a 7 page letter-report summarizing analytical results plus data tables and appendices (laboratory results, data quality control) for 1st Quarter 2005 air filter analytical results. I also includes an additional 7 page letter-report summarizing analytical results plus data tables and appendices (laboratory results, data quality control) for 2nd Quarter 2005 air filter analytical results.

Summary:
Gross alpha and gross beta were detected at very low levels on approximately 65-95% of the samples, and radium-226 and -228 were detected at very low levels on 15-25% of the samples. Uranium and thorium were detected on 0-5% of the samples collected. No critical evaluation of the data is made at this time beyond reporting data results and whether analytes are detectable at minimum laboratory detection limits.

RAD-DOC-10: On-site Monitor Wells and Off-site Domestic Well Water Quality Quarterly Results

Author: Applied Hydrology (AHI) for ARC

Date: 2002 to 2005

Brief Description: Data summary tables for quarterly groundwater monitoring.

Areas Covered:
1. Lined and Unlined Evaporation Ponds
2. Sunset Hills, Mesa, Penrose, Luzier, and Valley View Estates residential areas

Media: Groundwater

Investigation Method/Equipment Used: 1) Groundwater sampling by submersible pump and/or bailer. 2) Laboratory analysis of collected samples.

Data:
1. Two years of quarterly samples from as many as 130 domestic, agricultural and city wells in the vicinity of the mine site, analyzed for uranium and occasionally other metals and parameters.
2. Two years of quarterly groundwater samples from approximately 35 monitor wells and pumpback wells located on the mine site.

Data/Document Format: 10 data summary tables for domestic well sample events from December 2003 to September 2005. 9 data summary tables for on-site monitor well sample events from September 2003 to September 2005.

Summary:
These data sets were created by AHI to fulfill ARC's quarterly groundwater monitoring requirements for the site. The onsite monitor wells were typically analyzed for a full suite of dissolved metals. Uranium was added to the testing program in September 2003 and Radium-226/228 isotopes were added in December 2003. Off-site domestic well sampling began in December 2003 with 52 domestic wells and 6 city wells sampled. Sampling was done on a quarterly basis with the exception of the months of March, April, May, and June 2004 where sampling was completed monthly.

During the duration of the domestic well sampling project, the number of wells gradually grew to include 123 wells, though not all were sampled during each event. Uranium was analyzed each sample event and occasionally additional analysis was completed for arsenic and other dissolved metals. Note that these data are not as reliable as data from properly constructed groundwater monitoring wells

2.2 Summary of Data by Media

In order to aid in the assessment of existing radiological studies for the site, the above listed documents have been categorized by the type of media studied during the investigation. Most investigations included the study of more than one media and are therefore included in all applicable categories. Media types have been subdivided into the following categories: radiation activity, soils, groundwater and air. Additional potential categories of media types include surface water and radon gas, which have yet to be evaluated at the Yerington Mine Site.

2.2.1 Radiation Activity (surface soils)

Radiation activity studies involve the real-time measurement of alpha, beta or gamma radiation emissions given off by potential radiological sources, most commonly soils. Readings are typically given in activity levels, as in micro-Roentgens/hour (uR/hr) or counts/disintegrations per minute (cpm/dpm), or in dose rates such as milli-Rem/hour (mrem/hr). Most of the hand-held survey equipment used at the Yerington site measured primarily gamma radiation, which is the most active and most easily detected energy emission.

Alpha and beta readings were taken in the Process Area investigation primarily for health and safety monitoring on equipment swipes and airborne dust monitoring. The equipment used was a stationary table top unit that would take readings on samples collected on a paper filter. The TENORM materials found on-site, uranium, thorium, and radium, are typically alpha and gamma emitters. Table 2-2 summarizes the documents that included some data or discussion relating to radiation activity surveys by the areas on the mine site and in the surrounding communities that were included in each survey.

Table 2-2. Documents That Include Radiation Activity Data

Study Areas:		RAD-DOC-01	RAD-DOC-02	RAD-DOC-03	RAD-DOC-04	RAD-DOC-05	RAD-DOC-06	RAD-DOC-07
Anaconda Process Area	Process Areas				x	x	x	x
Arimetco Plant Site							x	
Yerington Pit	Open Pit							
Lined Evaporation Ponds	Evap Ponds			x			x	x
Lined Pumpback Ponds							x	x
Unlined Evaporation Ponds (1 & 1A)		x	x	x	x		x	
Unlined Finger Ponds				x	x		x	
Sulfide Tailings	Tailings			x	x		x	
Oxide (VLT) Tailings			x				x	
Phase I Heap Leach Pad/Pond	Leach Pads & Ponds		x				x	
Phase II Heap Leach Pad/Pond			x				x	
Phase III South Heap Leach Pad/Pond								
Phase III 4x Heap Leach Pad/Pond							x	
Phase IV Slot Heap Leach Pad/Pond			x			x	x	
Phase IV VLT Heap Leach Pad/Pond			x					
Sulfide Waste Rock Area (S-32)	Waste Rock						x	
W-3 Waste Rock Area							x	
South Waste Rock Area							x	
North side residential (Sunset Hills, etc)	Residential						x	
Paiute Reservation							x	
Yerington, NV							x	
Wabuska, NV							x	
Mason Valley, NV							x	
Schurtz, NV							x	

Most of the existing investigations have focused on the process area, evaporation ponds, and tailings areas. The EPA's Scanner Van survey covered a majority of the areas on the mine site but generally only a small fraction of each of those areas were surveyed as the van drove by on accessible roads. The scanner van also completed the most thorough evaluation to date of off-site residential areas that may have been impacted by the use of mine materials for building foundation or road gravel. Figure 1 shows the general areas covered by each document that includes data on radiation activity levels.

2.2.2 Soil

Soil investigations typically include surface and/or subsurface soil sample collection which are then submitted to a laboratory for chemical or activity analysis. Common radiological testing that has been done on the samples collected at the Yerington Mine Site include:

- Uranium – Total and Isotopes (U-234, 235, 238)
- Thorium – Total and Isotopes (Th-228, 230, 232)
- Radium – Isotopes (Ra-226, 228)
- Gross Alpha
- Gross Beta
- Gross Gamma or Gamma Spectrum

In some of the studies, the material collected for analysis included process related solids such as precipitated salt or mine tailings rather than native soil. Most of the existing investigations focused on the process area and the evaporation ponds and tailings areas. Table 2-3 summarizes the documents and areas where soil studies were completed for radionuclide analysis in the Yerington area. Figure 2 shows these areas on a map.

Table 2-3. Documents That Include Soil Data

Study Areas:		RAD-DOC-02	RAD-DOC-03	RAD-DOC-04	RAD-DOC-05	RAD-DOC-08
Anaconda Process Area	Process Areas			x	x	x
Arimetco Plant Site						
Yerington Pit	Open Pit					
Lined Evaporation Ponds	Evap Ponds		x			
Lined Pumpback Ponds						
Unlined Evaporation Ponds (1 & 1A)			x	x		
Unlined Finger Ponds			x	x		
Sulfide Tailings	Tailings		x	x		
Oxide (VLT) Tailings		x				
Phase I Heap Leach Pad/Pond	Leach Pads & Ponds	x				
Phase II Heap Leach Pad/Pond		x				
Phase III South Heap Leach Pad/Pond						

Table 2-3. Documents That Include Soil Data - Continued

Study Areas:		RAD-DOC-02	RAD-DOC-03	RAD-DOC-04	RAD-DOC-05	RAD-DOC-08
Phase III 4x Heap Leach Pad/Pond						
Phase IV Slot Heap Leach Pad/Pond		x			x	
Phase IV VLT Heap Leach Pad/Pond		x				
Sulfide Waste Rock Area (S-32)	Waste Rock					
W-3 Waste Rock Area						
South Waste Rock Area						
North side residential (Sunset Hills, etc)	Residential					
Paiute Reservation						
Yerington, NV						
Wabuska, NV						
Mason Valley, NV						
Schurtz, NV						

2.2.3 Groundwater

Two studies have been completed to date with the specific purpose of investigating radionuclides in groundwater. The process area investigation included the collection of 27 groundwater samples specifically in the central processing area operated by Anaconda. Samples from on-site monitoring wells and off-site monitoring and domestic wells have also been analyzed for radionuclides. A third investigation is currently in-progress to evaluate the off-site groundwater conditions, including background conditions, primarily north of the mine site in the Sunset Hills residential area and involves the collection of groundwater samples at various depths throughout the aquifer and installation of monitor wells for on-going monitoring. Table 2-4 and Figure 3 summarize the documents and areas that have included groundwater radiological investigations.

Table 2-4. Documents That Include Groundwater Data

Study Areas:		RAD-DOC-08	RAD-DOC-10
Anaconda Process Area	Process Areas	x	
Arimetco Plant Site			
Yerington Pit	Open Pit		
Lined Evaporation Ponds	Evap Ponds		x
Lined Pumpback Ponds			x
Unlined Evaporation Ponds (1 & 1A)			x
Unlined Finger Ponds			x
Sulfide Tailings	Tailings		
Oxide (VLT) Tailings			
Phase I Heap Leach Pad/Pond	Leach Pads & Ponds		
Phase II Heap Leach Pad/Pond			
Phase III South Heap Leach Pad/Pond			
Phase III 4x Heap Leach Pad/Pond			
Phase IV Slot Heap Leach Pad/Pond			
Phase IV VLT Heap Leach Pad/Pond			
Sulfide Waste Rock Area (S-32)	Waste Rock		
W-3 Waste Rock Area			
South Waste Rock Area			
North side residential (Sunset Hills, etc)	Residential		x
Paiute Reservation			x
Yerington, NV			x
Wabuska, NV			
Mason Valley, NV			
Schurtz, NV			

2.2.4 Air/Fugitive Dust

Air surveys completed to date have been focused on the monitoring of radionuclides contained in the fugitive dust being transported on or off-site by the wind. The two initial investigations into the "Site Worker Radiological Dose Assessment" and the "Fugitive Dust Radiological Dose Assessment" (RAD-DOC-02 and 03) did not actually collect air samples, but instead modeled potential fugitive emissions based on analysis of soil samples collected and actual weather data collected from the Yerington weather station. The current and on-going air quality monitoring program involves the collection of wind blown dust samples from high volume and low volume sample stations around the perimeter of the mine site. Table 2-5 and Figure 4 summarize the documents and areas that have included air/fugitive dust radiological investigations.

Table 2-4. Documents That Include Air/Fugitive Dust Data

Study Areas:		RAD-DOC-02	RAD-DOC-03	RAD-DOC-07	RAD-DOC-09
Anaconda Process Area	Process Areas			x	
Arimetco Plant Site					
Yerington Pit	Open Pit				
Lined Evaporation Ponds	Evap Ponds		x		
Lined Pumpback Ponds				x	
Unlined Evaporation Ponds (1 & 1A)			x		
Unlined Finger Ponds			x		
Sulfide Tailings	Tailings		x		
Oxide (VLT) Tailings					
Phase I Heap Leach Pad/Pond	Leach Pads & Ponds				
Phase II Heap Leach Pad/Pond					
Phase III South Heap Leach Pad/Pond					
Phase III 4x Heap Leach Pad/Pond					
Phase IV Slot Heap Leach Pad/Pond					
Phase IV VLT Heap Leach Pad/Pond		x			
Sulfide Waste Rock Area (S-32)	Waste Rock				
W-3 Waste Rock Area					
South Waste Rock Area					
North side residential (Sunset Hills, etc)	Residential				
Paiute Reservation					
Yerington, NV					
Wabuska, NV					
Mason Valley, NV					
Schurtz, NV					
Site Perimeter					x

SECTION 3.0
CONCLUSIONS AND RECOMMENDATIONS

The radiological data compiled from the Yerington Mine Site and surrounding areas is discussed below. The documents and site investigations described in this RDC provide data sets for the following:

- Process Areas
- Sulfide Tailings
- Oxide Tailings
- Waste Rock Areas
- Heap Leach Pads
- Evaporation Ponds
- Offsite Areas

Each of these areas has been the subject of sampling and/or radiological surveying activities, generically referred to as assessment activities, as described in Section 2 of this RDC. The objective of these assessment activities is to provide sufficient information for site closure and, as necessary, a risk assessment associated with residual TENORM. Each of the areas listed above has been the subject of differing amounts of assessment activities, since each area has different characteristics, internal variability, and potential for quantities or concentrations of radiological materials. This section of the RDC provides conclusions for each area with regard to the adequacy of the assessment activities to date, and the potential to implement on site remedial activities based on existing data.

One key component to drawing conclusions regarding the radiological data is comparing the values to background soil and groundwater concentrations or radiation levels. Naturally-occurring concentrations of radionuclides in soils and rock formations in the area of the Yerington Mine Site are known to be elevated based on the following: 1) the occurrence of uranium-oxide minerals within the copper porphyry ore body area (described in Appendix A); 2)

the U.S. Geological Survey National Uranium Resource Evaluation (NURE) data for the Walker Lake Quadrangle; and 3) recent EPA scanner van surveys, which consistently detected higher radiation levels near rock outcrops in the offsite areas. Since the range of background concentrations has not yet been determined, a comparison of observed mine-related TENORM characteristics relative to ambient conditions cannot yet be made.

3.1 Process Areas

Based on recent sampling, Process Areas soils exhibit limited residual radionuclide (radium, uranium and thorium) concentrations. Pursuant to the Process Areas Work Plan, the majority of the soil sampling in the Process Areas performed to date has been focused on the areas with the greatest potential for concentrating TENORM around process components, utility pipelines and equipment. In addition to this biased sampling, modified grid sampling has been performed on BLM property on the east side of the Process Areas (see RAD-DOC-08b). Radionuclide analyses were not performed for specified portions of the Process Areas, in areas where no ore processing solutions were contained or conveyed (e.g., administration building and maintenance shops), pursuant to the Process Areas Work Plan.

Additional efforts to evaluate background soil concentrations in and around the mine site need to be made in order to formulate a relevant remediation goal for Process Areas soils. As described in RAD-DOC-08b, a limited number of soil samples exceed the EPA's preliminary remediation goal (PRG) for industrial sites, such as the Yerington Mine Site. The analytical results from these sample locations where Industrial PRGs have been exceeded for selected radionuclides, and any additional confirmatory sampling from these localized occurrences, should be compared to background soil samples to determine site-specific Derived Concentration Guideline Limits (DCGLs). The Process Areas are most likely categorized as MARSSIM Class 1 areas (i.e., areas with known contamination or the potential for contamination above the DCGLs). Depending on the outcome of the determination of background radionuclide concentrations, and the calculation of DCGLs, capping of much of the Process Areas may be initiated. An alternative remedial activity may be required for the "radiological control area" located adjacent to the iron launders (see RAD-DOC-04a).

Groundwater grab samples from boreholes and samples from monitor wells indicate that uranium occurs at concentrations that exceed the maximum contaminant level (MCL) in the alluvial fan groundwater flow system under much of the Process Areas (see RAD-DOC-08a). In addition, localized occurrences of thorium and radium also occur in the groundwater samples. The results of offsite groundwater investigations, including the determination of the range of background radionuclide concentrations in the area of the Yerington Mine Site, should provide useful data to evaluate the occurrence of radionuclides in groundwater below the Process Areas.

3.2 Sulfide Tailings

The sulfide tailings are expected to exhibit relatively uniform TENORM concentrations, given that the processing of sulfide ores involved consistent milling and flotation steps. However, some variability of radionuclide concentrations in the process solution recycle ponds section of the sulfide tailings (see RAD-DOC 03a and 03b) would be expected. The radiological assessments performed to date have included materials sampling, hand-held and activity surveys including the scanner van survey.

The scanner van survey of the sulfide tailings did not detect any elevated levels of radiation. This area has already been the subject of gamma surveys and biased sampling, as outlined in RAD-DOC-3a and RAD-DOC-03b. The results of the sampling indicate that the potential contaminant levels for uranium are well below the generic Industrial PRG and the radium-226 levels are approximately the same as the generic Industrial PRG, and would be expected to be less after background subtraction. The thorium-232 and radium-228 levels in the sulfide tailings exceed their respective generic Industrial PRGs. A comparison of the thorium-232 and radium-228 concentrations should be made to the range of background values for these constituents, which has yet to be determined.

No further sampling is recommended for the sulfide tailings until a thorough background characterization has been completed and site-specific DCGLs (Derived Concentration Guideline Limits) are determined. The Sulfide Tailings area is most likely a MARSSIM Class 2 area

(potentially impacted but not expected to exceed the DCGLs). Depending on the outcome of the determination of background and calculation of DCGLs, additional sampling may be necessary.

3.3 Oxide Tailings

The oxide tailings (i.e., vat leach tailings) should, in general, also be highly uniform in composition and radiological concentrations because these materials were chemically processed in the same manner. This uniformity was demonstrated during characterization of the oxide tailings for use as a cap over the sulfide tailings for recent on-site dust abatement mitigation.

A radiological assessment of the oxide tailings was conducted for ambient radiation level surveys performed by the EPA Scanner Van as detailed in RAD-DOC-06. Although count rates exceeding twice the "background count rate" determined by the scanner van crew (see section 3.8 below) were noted by this survey, the elevated readings are due to the close proximity of the tailings pile to the side of the van. The different geometry (a large pile of material higher than the height of the road surface) from the geometry used to determine background (terrain level with the road surface) limits the usefulness of the higher count rates. Based on the scanner van survey, the oxide tailings are considered a Class 3 area under the MARSSIM classification (minimally impacted or not expected to exceed applicable DCGLs).

If deemed necessary, the radiological character of the oxide tailings may be determined by one of the following two approaches: 1) surveying and biased sampling as performed in the evaporation ponds and sulfide tailings areas (See RAD-DOC-3a and RAD-DOC-03b); or 2) surveying along transects and random sampling. The interpretation of the analytical results from either approach should be placed in the context of background characterization and final determination of site-specific DCGLs. Given that oxide tailings have been used in the past to cap dust-prone areas of the sulfide tailings with low scanner van count rates, these materials may be used in future capping of other portions of the mine site with higher concentrations of TENORM.

3.4 Waste Rock Areas

Radiological characterization of the waste rock areas was conducted for ambient radiation level surveys performed by the EPA scanner van (see RAD-DOC-06). This survey was performed around the perimeter of the areas. No readings exceeding twice background were noted.

The waste rock has not been the subject of any processing activities during mine or mill operations with the exception of the W3 waste rock pile, which was subject to in-place acid leaching. These overburden materials have been subjected to blasting and/or removal from the open pit to access the underlying oxide and sulfide ores, but the minimal disturbance and processing would not be likely to cause the naturally occurring radioactive materials to selectively concentrate radionuclides. With the possible exception of the W3 waste rock pile, these materials should be representative of ambient radiological conditions prior to mining and, pending future sampling and radiological analysis, may be a suitable source of materials to be used in capping other materials with higher concentrations of TENORM.

3.5 Heap Leach Pads

Limited sampling has been performed of the heap leach pads. One composite sample collected by SRK from the VLT heap leach pad has been analyzed. The BLM collected three samples from the same pad and analyzed them for gross alpha beta results. The scanner van survey along one side did not indicate any results exceeding twice background. The study described in RAD-DOC-02 was focused on assessing worker doses from fluid management operations, and concentrated on radionuclide concentrations in the evaporator solution rather than the material of the VLT heap leach pad itself. The other heap leach pads have not been assessed other than by the scanner vans survey, which did not detect elevated levels of radiation.

The Heap Leach Pads are most likely MARSSIM Class 2 areas (potentially impacted but not expected to exceed DCGLs). Pending future sampling and radiological analysis, heap materials may be a suitable source of materials to be used in capping other materials with higher concentrations of TENORM.

3.6 Evaporation Ponds

The evaporation pond contents have been well characterized, as described in RAD-DOC-03 and RAD-DOC-04, and by the scanner van survey (RAD-DOC-06). Concentrations of uranium, and radium-226 are well below the generic Industrial PRGs. The radium-228 concentrations are approximately the same as the generic Industrial PRG, and would be expected to be less after background subtraction. Localized thorium concentrations exceed the generic Industrial PRGs. No further sampling is recommended for the evaporation ponds until background characterization has been completed, and site-specific DCGLs are determined. The evaporation ponds are most likely MARSSIM Class 2 areas (areas potentially impacted but not expected to exceed the DCGLs).

3.7 Yerington Pit Lake

No detailed radiological assessment of the pit lake has been performed to date. The only available data associated with the pit lake are uranium concentrations from the chemical analyses of highwall springs that feed the pit lake (Draft Pit Lake Work Plan; Brown and Caldwell 2003). The east highwall spring, sourced from the Walker River, contained 45 parts per billion of uranium from a sample collected in 2000. The west highwall spring, sourced from the alluvial fan from the Singatse Range, contained 46 parts per billion of uranium from a sample collected in 2000. At the same time these samples were collected, an analysis of Walker River water contained 5 parts per billion of uranium.

3.8 Offsite Areas

The radiological assessment of surface materials in areas located beyond the mine site is limited to the EPA scanner van surveys in the MacArthur Pit and haul road, nearby residential areas and towns. Survey results with respect to background count rates, determined on the basis of count rates in areas associated with Walker River sediments (noted to have lower count rates than other sediments and host rock materials in the surroundings areas) were as follows: off-site areas were noted as "green" (i.e., less than or within 7 standard deviations of the average background count rate or "yellow" (i.e., seven to 14 standard deviations above the average background count rate). Other colors used for areas with count rates that exceeded the range described for "yellow", but

none of these were noted at any locations beyond the mine site. The upper bound of the "yellow" count range is also approximately twice the average background count rate.

The vast majority of areas beyond the mine site were characterized by "green" count rates. "Yellow" count rate areas were associated with natural rock outcrops or man-made granite-based architectural features. Three other locations with "yellow" range count rates were believed to be associated with gravel fill materials used for road construction or parking lots. Elevated terrain features (whether building walls or natural rock formations) can result in higher count rates due to the decreased distance between the surface and the detector in the scanner van.

All of the count rates noted by the scanner van beyond the mine site can be attributed to natural background, and inherent variation in that background due to variation in the composition of the ground surface. This would include the count rates noted where gravel fill has been used. The scanner van results indicate that no further assessment activities beyond the mine site are needed.

3.9 Characterization of Background Conditions

Background concentrations of radionuclides and background radiation levels are needed to determine any potential impact from mine-related activities, and the magnitude of any such impacts, by comparing samples of media established as background samples to the measured concentrations and radiation levels within the mine site. Naturally-occurring concentrations of radioactive material in the Yerington area, especially in the uranium-oxide bearing copper porphyry orebody and surrounding bedrock rock materials, are known to be elevated. For example, the EPA scanner van survey consistently detected higher radiation levels near rock outcrops both within, and away from, the mine site.

The terrain within and around the mine site, assumed as background relative to mine-related TENORM, is composed of several different types of materials. These material types include, at a minimum: 1) flood-plain sediments from the Walker River, which as noted by the EPA scanner van surveys have relatively low background radiation levels; 2) alluvial fan deposits, (i.e. erosion from surrounding hillsides composed of several types of rock outcrops of different origins and

sub-types (volcanic, granitic, copper porphyry, etc.); and 3) bedrock occurrences of similar rock types (volcanic, granitic, copper porphyry, etc.). Each of the materials may contain different concentrations of radioactive materials due to the varying geological processes that led to their formation. As such, each of these material types needs to be evaluated with regard to determining the respective background concentrations of radioactive materials and the suitability of that material as a reference for assessing the TENORM characteristics of the mine site. Until the range of background concentrations has been established, a valid comparison of observed mine-related TENORM characteristics relative to ambient conditions cannot be made and appropriate DCGLs cannot be determined.

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