Environmental Engineering and Consulting
Remediation and Management Services

April 20, 2009

Colorado Department of Public
Health and Environment HMWMD-RP-B2
4300 Cherry Creek Drive South
Denver, Colorado 80222-1530

Attention: Mr. Mark H. Rudolph

Subject: Response to the Colorado Department of Public Health and Environment, "*Comments on Draft Work Plan for Valmont Butte Property, 3000 North 63rd Street, Boulder, Colorado"* dated March 10, 2009

Dear Mr. Rudolph:

Casey Resources, Inc. (CRI) has reviewed the Colorado Department of Public Health and Environment (CDPHE) comments on the Draft Work Plan. CRI has reviewed these comments and believe the majority of comments can be incorporated or the actions agreed upon. Our responses to comments are provided in the following paragraphs.

Please note that since the submittal of the Draft Work Plan, CRI has subcontracted with Mr. Steve Brown, CHP to assist CRI with the assessment of radiological constituents at the Valmont Butte Property. Mr. Brown is a board certified health physicist and diplomat of the American Academy of Health Physics with over 35 years of nuclear industry experience. He is recognized as an expert in environmental, safety and health aspects of uranium processing facilities and is a member of national and international advisory committees. Mr. Brown has reviewed the CDPHE comments on the Draft Work Plan and has assisted in responding to your comments.

Preliminary Voluntary Cleanup Schedule Comment

While the schedule proposed does not meet the most recent extension of the Radioactive Materials License, CDPHE understands that certain tasks take longer than others. Your proposed work includes further more detailed investigations as the areal boundaries of site related contamination above a commercial risk use scenario. CDPHE can proceed along with the proposed schedule and will update one further extension in December 2009 as long as the timeline schedule as shown is being met and that progress is ongoing. That being said, if work is not progressing, the current deadline of Jan 2010 will be enforced.

Response: The City is committed to proceeding with the project and will strive to meet the schedule. Casey Resources, Inc. (CRI) personnel will maintain contact with your office to provide updates on the progress made.

Work Plan Comments

§ 3.1 Scope of Work

Comment 1: Is the commercial / recreational use of this property appropriate?

Response: Yes. These designated uses are consistent with Boulder County zoning designations and the City of Boulder's likely land uses for the property. The remediation plan will be designed to identify impacted soil areas outside the tailings impoundment and to either excavate, consolidate, and cap these impacted materials in the tailings impoundment area or to cap these materials in place. The capped materials will be subject to covenant restrictions.

Comment 2: For a commercial scenario, a lead concentration of 800 ppm or less is ok. Arsenic needs to be less than 1.6 ppm, unless a site specific background study is conducted and an alternative arsenic number is proposed.

Response: Arsenic concentration in soil is variable throughout Colorado. For example, soil remediation values as high as 70 mg/Kg have been used for residential remediation in the Denver area. Other sites have residential arsenic values ranging from 8.6 mg/Kg to 24 mg/Kg approved both by CDPHE and the City and County of Denver Environmental Division.

Project documents indicate that CDPHE previously approved a 10 mg/Kg soil cleanup value for arsenic at Valmont Butte, based on a background study conducted by Terracon (Attachment A). Soil concentration data available for the Property (Table 1) suggests that the 10 mg/Kg concentration level underestimates the background condition. Depending on the site investigation results, further consideration of the background arsenic concentration numbers may be appropriate.

Comment 3: A screening level of 60 uR/hr was proposed in the work plan. The regulation based screening number for radiation dose needs to be 48 uR/hour or less to achieve an annual dose rate of 100 mRem.

Response: The Work Plan has been revised to establish a screening level of 48 µR/hr above background to be consistent with CDPHE regulations @ 6 CCR 1007 -1, Part 4, *Standards for Protection Against Radiation, para. 4.14*, which establishes an annual exposure limit for a member of the public of 100 mrem / year above background. It is assumed that the future exposure scenario is based on an industrial / commercial land use (i.e., an "on site worker scenario") involving an individual member of the public spending 2000 hours / year on the site.

Comment 4: Additionally, commercial development on the property is fine as long as there are no proposed buildings or structures situated on the capped impoundments. A parking lot situated on the impoundments would be appropriate.

Response: Agreed.

§3.3 Sample locations

Comment 5: Concerning the areas of additional characterization where increased dose or contamination are known: what is the justification for a sampling grid of 50 feet? MARSIM uses a 10 meter grid for evaluation.

Response:

Regarding MARRSIM criteria and methods (NUREG 1575, "Multi Agency Radiological Site Survey and Investigation Manual", 2000), MARRSIM only applies for documenting residual radioactivity on building surfaces and in surface soil for the purpose of performing final status radiological surveys for certain types of sites including DOE and DOD installations. Nonetheless, MARRSIM will be consulted to the extent that it is helpful to addressing the VCUP work.

For radiological characterization, the Work Plan has been revised to reflect execution of real time, direct gamma scanning using a properly calibrated µR/scaler ratemeter with scintillation probe. Soil sampling for radionuclides will be performed at all locations in excess of the direct gamma trigger level of 48 µR / hr above background for verification purposes.

Comment 6: What is the justification for increasing the sampling grid in the areas beyond the tailings impoundment? The probability that an area of contamination will be missed increases with this technique.

Response: There have been several environmental investigations completed at the Property. The information collected suggests that five elevated radiation areas and several areas of elevated lead concentration remain outside the tailings impoundments. The investigation described in the Work Plan was designed to confirm the results of these previous investigations and to quickly assess (screen) the remainder of the Property to determine if there are any other impacted areas on the Property.

It is anticipated that soil immediately adjacent to the tailings impoundment will exhibit elevated metal concentrations and possibly elevated radiation levels. Therefore, the 100 foot sampling grid was selected to limit the time and cost to assess this area. The 200-foot grid is reasonable for the balance, where there is low probability of lead, arsenic, or radiation impact. As presented in the Draft Work Plan, areas where impacts are identified will be further evaluated.

§3.4 Field Screening Procedures

Comment 7: You will need to demonstrate a good correlation between the XRF measurements and laboratory measurements. R>0.8. Both lead and arsenic will need to be done.

Response: Establishing a correlation factor of 0.8 is not appropriate for the XRF screening as proposed. For example, if the XRF indicates a total lead reading of 2,000 mg/Kg and the laboratory result is 5,000 mg/Kg, both results are well above the investigation criterion of 800 mg/Kg. Even though the correlation factor is low, the results are usable for this evaluation.

Where the XRF concentrations would come under closer scrutiny is when the XRF measurement is near the 800 mg/Kg screening level for lead.

Table 1 is a listing of laboratory results for total arsenic concentrations and total lead concentrations for several soil samples collected and analyzed by URS (2005). As shown in Table 1, the total arsenic concentration in samples collected at the Property rarely exceeded 10 mg/Kg with the higher arsenic values associated with the higher lead concentrations. The XRF equipment is capable of detecting arsenic at concentrations greater than approximately 9 mg/Kg; however, the detection limit for total arsenic is compromised in the presence of total lead.

To address the correlation question, prior to initiating the field screening investigation, 12 locations will be selected for field XRF measurement. At these locations, a soil sample will be collected from the top six inches of the soil profile and placed in a plastic bag for field measurement. The soil samples from each location will be processed (EPA Method 6200) and a 30 gram aliquot analyzed by the XRF. This 30 gram sample will then be submitted to the laboratory for analysis. Linear regression analysis will be run on the results for these 12 sampling locations to establish the correlation for field XRF measurement, processed XRF measurement, and laboratory measurement. The correlation between the prepared sample XRF analysis and laboratory analysis will show that the XRF is capable of detecting and measuring lead concentrations in the same range as the laboratory.

Comment 8: If you are going to use the Ludlum Model 3 to screen the site quantitatively, then you will need to calibrate the system to radium and check the site with an energy-sensitive detector and multichannel analyzer for interfering radiation.

Response: Traditional scintillation probes (Sodium Iodide - NaI, e.g.) used for field characterization of uraniferous material (uranium series radionuclides in soil, e.g., radium) will be energy dependent and are usually calibrated by their manufacturer to Cesium 137 with a much higher photon energy than radium. Accordingly, the Work Plan has been revised to indicate the scaler ratemeter and scintillation probe will be calibrated against a primary standard, e.g., a pressurized ion chamber (PIC) so that appropriate corrections can be made to account for energy response dependence.

§3.4.1 XRF Screening

Comment 9: I am very interested in the comparison of the in-the-field screening results and the processed and controlled geometry measurements. I have found the latter to have much more reliable results when correlated with laboratory analysis. In-situ measurements with the XRF have not been very reliable.

Response: Please see our response to Comment 7.

Comment 10: It was inferred in the work plan that the correlation test between XRF and Laboratory measurements will be on a composite sample run on XRF compared to that same sample or a split of that composite sent to the laboratory. That does not test for the correlation for an insitu-XRF sample and an associated laboratory sample. If an insitu-XRF sample is run, a

grab point sample from that spot should be sent in for confirmatory laboratory data. This should be done at a number of locations that would statistically show satisfactory correlation between the two data sets. Twelve is the minimum statistical number, if the population has a simple normal distribution.

Response: The procedure to show correlation has been re-written and will use grab samples collected from the top six inches of the soil profile (see response to Comment 7). Again, the correlation desired is to show the XRF is capable of providing reasonable data as a screening tool; not to show that a field measurement is the same as a laboratory result. There are too many variables that can interfere with this sort of a comparison.

Comment 11: In whatever manner that XRF is used and associated laboratory confirmation, XRF and Lab samples for comparison need to from the same sample aliquot. A grab sample for XRF analysis can not be correlated to a composite sample with laboratory analysis, even if the single XRF point is one of many points in that composite sample.

Response: See the response to Comment 10.

Comment 12: Composite samples will be one kilogram or more passing a ¼ inch screen.

Response: It is not necessary to collect a composite soil sample of 2.2 pounds for metals analysis. The refined and processed soil volume for XRF analysis requires only about 30 grams of soil (analysis cup) and the laboratory only pulls 5-grams of soil from the sample volume for analysis. Collecting this large volume of soil for metals analysis would add time, effort, and cost to no effect.

Comment 13: Start with a 10% laboratory comparison. You also need blanks, dupes, and spikes (one in 20) each, along with the standard laboratory QC. If the correlation is good, then the laboratory percentage can be reduced.

Response: As discussed in the response to Comment 7, the reliability of the XRF screening data will be established prior to initiating the grid sampling program. Given this, there is no need to increase the analytical QC costs for the screening project from 1 in 20 to 1 in 10.

The analytical laboratory will run a Method Blank sample to prove the lab background is clean. One or two equipment blank samples or rinsate samples could be analyzed; however, if any metals were detected, they would be at concentrations well below the action value of 800 mg/Kg for lead or the preliminary concentration of 10 mg/Kg for arsenic. If VOCs were being analyzed, field blanks would be justifiable due to the part per billion action levels for VOCs. There is no need to add blank sample analysis costs to this screening project. Duplicate samples can be collected, but again these results do not tend to correlate well due to the heterogeneity of the soil sample. As part of the project, a duplicate and matrix/matrix spike sample will be collected for every 20 soil samples that are sent to the laboratory.

§3.4.2 Radiation Screening

Comment 14: The radiations detection system will be calibrated and checked before starting the survey.

Response: The Work Plan has been revised to indicate that the radiation detection system that will be used for performance of direct gamma surveys will be properly calibrated relative to the photon energies of interest (see response to Comment 8 above) and instrument performance will be verified daily via a gamma check source of appropriate photon energy.

Comment 15: Justify background locations' physical similarity to the survey site.

Response: The Stazio Recreation Complex, located to the west and southwest (upgradient) of the Valmont Butte property, will be utilized to establish "background" radiation contribution. The geology of the Stazio Recreation Complex is similar to the Valmont Butte property as surface soil consists of alluvium (Broadway alluvium) underlain by the Pierre Formation.

Comment 16: Why not use a GPS & data logger with the radiation detector system to document the survey? It is easy to produce a map and is more reliable than visual spotting.

Response: Given the scope of the investigation and VCUP requirements, use of this specialized and very expensive equipment is unnecessary.

§3.5 Surface Soil Sampling

Comment 17: What is the justification for an initial soil sample only of the first half inch of soil? Typically, the first six inches are sampled. Samples will be at least 1 kilogram screened through a ¼ inch screen.

Response: With regard to sampling of elevated radiation areas, the Work Plan has been revised to reflect surface soil sampling of the first 15 cm of depth (approximately 6 inches) in accordance with standard practice for radiological environmental sampling programs. Additionally, 200 - 300 grams of soil is usually adequate to achieve acceptable minimum detectable levels of uranium and radium in soil and this requirement has also has been incorporated into the Work Plan revision.

For the XRF sampling, the Work Plan will also be modified to reflect surface soil sampling of the top six inches of the soil profile at each sampling point within the established grid. It will be necessary to place the soil sample into a plastic sealable freezer bag, thoroughly mix the soil, and then run the XRF field test on the bagged soil. Note that each grid has five sampling points with the XRF values averaged to represent the concentration within that grid. For grids that will be sampled for laboratory analysis (1:20), one of the five sampling locations will be selected for processing following EPA Method 6200 for XRF analysis. After processing, an aliquot from the processed soil sample will be selected for XRF office analysis and submittal to a local laboratory.

§3.9 Decontamination

Comment 18: Is the Arvada water treatment facility permitted to take the water described? Why isn't the Boulder treatment facility being used?

Response: The decontamination water does not need to be treated if the metal concentrations are below groundwater quality standards. In addition, CDPHE regulations @ 6 CCR 1007-1, Part 4, Standards for Protection Against Radiation provides tables that indicate the decontamination water does not require treatment if the radium 226 or 228 concentration is ≤ 60 pCi / liter, and uranium (natural) concentration is ≤ 300 pCi / liter. Decontamination water meeting these criteria could potentially be used for dust control and other onsite uses in restricted areas. Should concentrations exceed these criteria, the water can be treated at Arvada Treatment Center or possibly the City of Boulder's wastewater treatment plant assuming the decontamination water meets industrial discharge requirements. Otherwise, alternative treatment options will need to be identified.

Please contact Terry McGowan or me at 303-940-7800 should you have any questions with regard to these responses.

Sincerely,
CASEY RESOURCES, INC.

Paul L. Casey, P. E.
Principal

Attachments:

cc: Elizabeth Temkin, Esq. - TWHL

TABLES

TABLE 1

LABORATORY DATA - URS (2005)
SURFACE SOIL SAMPLES

CONSTITUENT	SAMPLE NUMBER							
	VB-SL-20	VB-SG-03	VB-SG-04	VB-SG-27	VB-SU-04	VB-SU-05	VB-SU-08	VB-SU-10
	Background	Background Fence	Background Fence	Secondary Tailings Pond	Surface Water Ditch	6717 Valmont Rd. Yard	6379 Valmont Rd. Yard	6327 Valmont Rd. Yard
Arsenic (mg/Kg)	6.0 J+	9.1 J	7.8 J+	8.4 J	4.1 J+	5.1 J+	6.3 J+	5.8 J+
Lead (mg/Kg)	48.6 J	407	320	297	53.5	48.2	171	77.2

CONSTITUENT	SAMPLE NUMBER							
	VB-SU-12D	VB-SU-13	VB-SL-10	VB-SL-01	VB-BD-M0-01	VB-BD-M0-03	VB-BD-MS-02	VB-SL-23
	Area 3 Wood Shop	Area 5 - Ore Storage	NE of ASTs	Used Parts Area	Disposal Pit (0-1")	Disposal Pit (0-1")	Disposal Pit (0-18")	Railroad Bed
Arsenic (mg/Kg)	24.0 J	13.4 J	104 J	13.4 J	8.8	8.7	8.4 J+	11.8
Lead (mg/Kg)	480	408	1,270	474	33.8 J	30.5 J	48.0 J	272 J

CONSTITUENT	SAMPLE NUMBER					
	VB-BS-M0-01	VB-BP-MS-01	VB-BP-MS-03	VB-SL-30	VB-SL-31	VB-SL-35
	Secondary Pond (0-1")	Primary Pond (0-18")	Primary Pond (0-18")	North Secondary Pond	North Secondary Pond	Area 1 - North of Primary Pd.
Arsenic (mg/Kg)	8.6 J+	9.8 J+	8.7 J+	9.9 J+	5.9 J+	31.2
Lead (mg/Kg)	170	259 J	262 J	822 J	86.9 J	3,260 J

J = The concentration is considered an estimated value because quality control criteria were not met. J + indicates high bias, i.e., probably greater concentration than what exists in the sample.

ATTACHMENT A

STATE OF COLORADO

Bill Owens, Governor
Dennis E. Ellis, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

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Colorado Department
of Public Health
and Environment

May 4, 2006

Ms Susanne Cordery-Cotter, P.E.
Senior Project Manager
Terracon Consulting Engineers & Scientists
301 North Howes
Fort Collins, Colorado 80521

Subject: Background Arsenic Concentration at the City of Boulder's Valmont Butte Site

Dear Ms. Cordery-Cotter:

Staff has reviewed your request to use a background number of 10 mg/kg for arsenic at the Valmont Butte site located in Boulder, Colorado as described in your letter dated April 21, 2006. This background number for arsenic is acceptable at this site.

If you have any questions with regards to this letter, please call me at 303.692.3452 or Joe Vranka, Manager of the Radiation Control Program, at 303.692.3402.

Yours Truly,

Philip S. Stoffey
Environmental Protection Specialist
Remediation Program
Hazardous Materials and Waste Management Division

File: Valmont Butte File-3.2
Sabrina Forrest, EPA
Joe Vranka, CDPHE
Bill Boyes, City of Boulder
Chris Roe, Roe Ecological Services, LLC PO Box 1168, Berthoud, Co.805137

ATTACHMENT B

3.4.1 XRF Screening Procedure

Prior to conducting the initial XRF screening, a correlation will be established to account for the XRF response to onsite soils. A total of 12 sampling locations will be selected and at each location a grab soil sample will be collected from the top six inches of the soil profile. The soil sample will be placed in a plastic sealable freezer storage bag, thoroughly mixed, and XRF measurement made. Following field measurement, the soil sample will be dried and ground down to a powder consistency. An XRF sample cup will then be filled with approximately 30 grams of the powdered sample. At least five XRF measurements will be completed on the sample and the results documented and averaged. This procedure generally follows the EPA Method 6200 for XRF analysis. The XRF sample cup will then be submitted for laboratory analysis of total lead and arsenic (EPA Method 6010). The data obtained from each phase of XRF measurement will be compared to the laboratory results; however, it is the comparison of the prepared sample to the laboratory sample that will show that the XRF is capable of detecting total lead similar to the laboratory results.

After reasonable correlation is established, the field screening program will be initiated. The XRF screening of soils will entail collection of soil samples from the top six inches of the soil profile at each corner and center of each grid. Each soil sample will be placed into a plastic sealable freezer storage bag and screened using the XRF. XRF measurements will be collected for a minimum of 60 seconds and a maximum of 120 seconds. The XRF readings from each grid will be averaged to obtain one value for the grid. The intention of this initial screening is to quickly locate the known and unknown areas that exhibit total lead concentrations greater than 800 mg/Kg. For quality assurance purposes, composite samples from every 20th sampling grid will be prepared according to EPA Method 6200 and analyzed by XRF and also submitted to an environmental laboratory for analysis of total lead.

The grid areas identified as containing total lead concentration greater than 800 mg/Kg will be further delineated with the XRF to assess areal extent of the total lead concentrations. Depth of total lead concentration will also be assessed for these areas. At least one quality assurance

sample will be collected from each of the areas that are further delineated. The quality assurance sample will be analyzed for total lead to confirm XRF results.

In addition, a duplicate and matrix/matrix spike sample will be collected for every 20 soil samples submitted to the laboratory.