

September 30, 2002
Project #2112

Glenn Mallory, Solid Waste Unit Leader
Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive S.
Denver, Colorado 80246-1530

Re: Concrete / Asphalt Disposal from the CSMRI Site

Dear Mr. Mallory:

As you are aware, representatives from New Horizons Environmental Consultants, Inc. (New Horizons) and the Colorado School of Mines (CSM) recently met with representatives from the Colorado Department of Public Health and Environment's Laboratory and Radiation Services Division (LARS) to discuss Project Work Plans for upcoming work at the CSMRI Site in Golden. Based on our meeting with LARS, and the August 21, 2002 letter which we received from W. Jacobi (LARS) and yourself, we have prepared this letter to summarize our understanding of the available disposal options for concrete and asphalt which will be removed from the Site.

- Concrete and asphalt removed from sub-units which were previously shown to have met both the ANSI surface screening level (6,000 dpm/100 cm²) and the ANSI volumetric standard (30 pCi/g) will be released as demolition debris for disposal at a permitted RCRA Subtitle D solid waste landfill or taken for recycling. As with any demolition debris, no additional approvals will be required. Based on the previous characterization performed by URS Corporation, this includes 67 of the 75 sub-units at the Site.
- Concrete and asphalt removed from sub-units which were previously shown to meet the ANSI volumetric standard will be released as demolition debris for transfer to a permitted RCRA Subtitle D solid waste landfill. As with any demolition debris, no additional approvals will be required. Based on the previous characterization performed by URS Corporation, this includes all sub-units at the Site except for sub-unit 104(red).
- The estimated 1.6 cubic yards of materials from sub-unit 104(red) will be stockpiled on-Site and subsequently characterized and managed with soil and/or other materials which may be generated during the subsurface investigation.

We would appreciate it if you would confirm our understanding in writing. If you have any questions or comments regarding this letter, please feel free to contact me at (303) 932-2220.

Sincerely,

Jonathan Spencer, P.E., DEE
President / Principal Engineer

CSM RI
9.1

September 30, 2002
Project #2112

W. Jacobi, Manager
Laboratory and Radiation Services Division
Colorado Department of Public Health and Environment
8100 Lowry Blvd.
Denver, Colorado 80230

**Re: Response to Comments – Project Work Plans for the Colorado School of Mines
Research Institute Site Environmental Assessment**

Dear Mr. Jacobi:

New Horizons Environmental Consultants, Inc. (New Horizons) is herein providing responses to the comments on *Project Work Plans for the Colorado School of Mines Research Institute (CSMRI) Site Environmental Assessment* received from the Colorado Department of Public Health and Environment (CDPHE) in your letter dated August 26, 2002. This letter also responds to the joint letter of August 21, 2002 from Mr. Glenn F. Mallory and you addressing the off-site disposition of the asphalt and concrete identified in the NHEC Task Plan, Sampling and Analysis Plan, Health and Safety Plan and Materials Safety Plan (collectively the "Work Plans"). Moreover, this letter memorializes the agreement reached during the meeting of September 9, 2002 between CDPHE Laboratory and Radiation Services Division (LARS) and Colorado School of Mines (School) at LARS' offices.

**I. September 9, 2002 Meeting and Agreement Regarding Regulatory Status of
Concrete and Asphalt Disposition**

As we discussed at our September 9, 2002 meeting, the School objected to CDPHE's above-referenced August 21, 2002 and August 26, 2002 letters with respect to the regulatory characterization and conditions proposed by CDPHE for the concrete and asphalt materials, the binding use of guidance documents and terms (such as TENORM) not found in Colorado regulations, CDPHE's interpretation of its own regulations, and CDPHE's application of these to Colorado School of Mines Research Institute (CSMRI) Specific Radioactive Materials License No. 617-01 (the "License") and the materials addressed by the Work Plans, which acted, in effect, as a limitation and modification of the License, as well as the licensing of materials not appropriately subject to licensing.

CDPHE LARS and the School reached a mutual understanding on September 9 that the differences between the School's views, as expressed in the Work Plans and at the meeting, and CDPHE's views, as expressed in its two August letters and at the meeting, will be rendered moot by the agreement reached in our September 9, 2002 meeting. We agreed that because of the resolution we developed regarding the off-site disposition of the concrete and asphalt identified in the Work Plans to a solid waste landfill that we did not need to resolve the differences because both parties were in agreement

that all but one of the sub-units at the Site could be disposed of at a solid waste landfill.¹ With LARS stating that these materials could be released to a solid waste landfill, the School was to confirm with Mr. Mallory in separate correspondence that the materials were solid waste demolition debris and could be sent to a solid waste landfill that accepted demolition debris consistent with the School's position. Thus, since both parties agreed to the disposition of the materials there was no need to resolve the respective differences and both parties reserved their rights with respect to these issues as they may or may not apply to these materials, and other materials at the Site whose regulatory status and characterization have not been submitted to LARS for its consideration. In particular, any reference in this letter to NHEC procedures that will follow the provisions in the State of Colorado's radiation control regulations or in non-binding guidance, policies or conditions is not to be construed in any way that such references are applicable or binding to the characterization work and the removal of the concrete and asphalt materials. The School is electing to follow certain provisions but does not agree or admit that it is required to follow such provisions. The School reserves all of its rights on these issues.

II. Response To Comments in CDPHE August 26, 2002 Letter

GENERAL COMMENTS

Comment No. 1

It should be mentioned that groundwater is not part of this site environmental assessment and why.

Response No. 1

Sampling of groundwater will not be part of this soil characterization phase. Potential impacts to Site groundwater will be determined following the soil characterization activities. The planned subsurface investigations will help identify the need for further investigations, including groundwater. Moreover, this issue was already explained in the URS Characterization Survey Work Plan that was approved by LARS and is being implemented by the NHEC Work Plans.

Comment No. 2

Referenced plans and procedures must be available at the site. A statement to that effect should be made in this plan.

Response No. 2

Referenced plans and procedures will be available at the site.

Comment No. 3

The plan does not address notices to workers per Part 10 of the Colorado Rules and Regulations Pertaining to Radiation Control (regulations).

¹ The parties agreed that the approximately 1.6 cubic yards in the last remaining sub-unit would be stored on Site temporarily until its regulatory status and characterization would be re-considered by the parties when the School also considered the regulatory status and characterization of other materials at the Site at the conclusion of NHEC's Site characterization. The parties also agreed that concrete and asphalt materials that met both the surface and volumetric ANSI standards could also be sent for recycling.

Response No. 3

New Horizons will follow the worker notification provisions as specified in Part 10 of the Colorado Rules and Regulations Pertaining to Radiation Control.

Comment No. 4

Pages to the Health and Safety Plan should be numbered.

Response No. 4

The Health and Safety Plan will be modified to include page numbers.

Comment No. 5

New Horizons should state that they have a radioactive materials license.

Response No. 5

New Horizons holds radioactive materials license No. CO-1033-01, issued by CDPHE on July 29, 2002.

Comment No. 6

The plans should address when to stop work due to winds/dust.

Response No. 6

The plans, specifically the Health and Safety Plan (Section 19.5.3 – Severe Weather Events) will be amended to include the following provisions for high winds. “Wind speed will be monitored at the Site by use of available applicable weather information. Activities in potentially impacted areas that generate dust in combination with sustained winds in excess of 20 miles per hour will be halted until the sustained wind subsides, or the potential hazard is eliminated.”

SPECIFIC COMMENTS

TASK PLAN

Comment No. 1

p. 2 4.0 Storm Water Management Plan

The Storm Water Management Plan must be in place before work begins that may disturb more than 1 acre of land or more by clearing, grading, or grubbing.

Response No. 1

The Colorado School of Mines Research Institute Stormwater Management Plan, Facility No. COR-020243, Addendum 1, dated June 12, 2002 is completed and available at the Site.

Comment No. 2

p. 3 5.1, Regulatory Framework. Radioactive materials license 617-01, Amendment 3 (10/21/97) specifically licenses naturally occurring, source, and byproduct radionuclides in soil, ore, and process residues at the Creekside site, contiguous properties if contaminated, and the Clay pits. Furthermore, license conditions 16 through 18 addresses characterization and cleanup of the remainder of the site.

Contaminated materials at Creekside are regulated under the license. Please remove all statements in the text about the material not being under the license. Please review the attached letter from the Division to Robert MacPherson dated September 11, 2000 that discusses the regulatory status of Creekside. Non-contaminated materials (i.e., at or below background) may be considered solid waste demolition debris.

Response No. 2

In accordance with our meeting on September 9, 2002, the School and CDPHE have agreed to defer a decision regarding the regulatory status of the materials and the Site until a later date.

Comment No. 3

p. 4 5.1 "...the materials would have been available for unrestricted use and clearance from the License under a variety of potential alternative cleanup standards because... and well below any cleanup standard for unrestricted uses. The data below shows that the concrete and asphalt materials have activity levels below alternative dose standards and the 5/15 Ra-226 concentration standard." These sentences should be rewritten since portions of the concrete and asphalt have surface contamination values that exceed limits. The contamination of the concrete and asphalt is understood at this time to be surficial. Only after bulking (which includes sizing or crushing to a rock-or gravel size) can the asphalt and concrete be compared to a bulk limit. As the facility stands today, there are portions of the site that exceed surface activity limits found in Regulatory Guide 1.86 and ANSI N13.12. Consider changing "activity levels below alternative dose standards" to "concentrations based on alternative dose standards."

Response No. 3

This issue was resolved as a result of the September 9 meeting.

Comment No. 4

p.4 5.2 Dose Impact Modeling. The RESRAD results are still being evaluated. The Program may submit comments on the RESRAD runs under separate cover if warranted. It should be noted that the authors of RESRAD discourage the use of default values and recommend site-specific values be used wherever possible. A cursory review of the RESRAD data raises the following questions:

- a. Clarify the basis for the radionuclide concentrations used in the model?
- b. Why are the progeny accounted for in the asphalt runs, but only U-238 and U-234 in the concrete runs?
- c. What is the basis for using the default value for "length parallel to aquifer flow?"

Response No. 4

This issue was resolved as a result of the September 9 meeting. Nonetheless, the following responds to the comments:

- (a) *The regulatory cleanup criteria or largest values found in previous investigations were used as radionuclide of concern input values.*
- (b) *For the asphalt sample results, both analyses (individual radionuclide and radionuclides plus progeny) produced similar results.*

- (c) *The default value for length parallel to aquifer was used because justifying another specific value was not feasible since the ultimate fate of the material was unknown. The default was used simply in lieu of having another value that could reasonably be substituted.*

Comment No. 5

p.4 5.2 Dose Impact Modeling. Since the concrete and asphalt are being removed from the site, and since the material is covered by the license, most of the preceding text is unnecessary and should be shortened or deleted.

Response No. 5

This issue was resolved as a result of the September 9 meeting. Nonetheless, the RESRAD dose modeling performed by New Horizons is relevant because it demonstrates minimal potential for exposure from those materials which will be removed from the Site or even if they were to be left at the Site.

Comment No. 6

p. 6 5.3 Comparison of Data to 5/15 Cleanup Standard. This section should be removed in its entirety. Soil standards do not apply to materials. Only after the materials have been sized and bulked can a volumetric standard be applied to the conditional release of the material. Furthermore, since the material is to be removed from the site, the soil standard will apply to the underlying soils.

Response No. 6

This issue was resolved as a result of the September 9 meeting.

Comment No. 7

- p.6 5.4 Review of URS Data Using ANSI N13.12 Screening Levels.
- a. This section should be shortened considerably; much of it is not germane.
 - b. It should be noted in the first paragraph that ANSI standards are often adopted as the basis for regulations. It is common practice for the regulators to reference standards such that the regulations don't have to be repromulgated as standards are modified.
 - c. The averaging used by New Horizons (sub-units) in its tables are not consistent with Section 4.4 of the ANSI Standard and need to be redone. If New Horizons would prefer to not use the ANSI values, the Reg. Guide 1.86 surface activity values that limit averaging to 1 m² can be used.

Response No. 7

This issue was resolved as a result of the September 9 meeting. Nonetheless, with respect to the averaging comment in (c), LARS and the School agreed in the September 9 meeting that the averaging is consistent with ANSI.

Section 4.3 of the ANSI Standard states that volumetric measurements for clearance may be used in lieu of surface levels provided that:

- *the item's size or shape makes it unreasonable to perform radiological surveys of all of the surfaces of the item, and*

- the item can be representatively sampled for laboratory analysis, and
- it can be demonstrated that the use of volumetric measurements for clearance is as protective as using surface measurements.

Clearance of the concrete and asphalt slabs which remain at the Site should be preferentially based on the volumetric concentration measurements collected by URS since:

- the geometry of the slabs made it impossible for URS to survey all of the surfaces during the characterization phase (only the top surface was exposed and available for screening)
- concrete and asphalt core samples collected by URS represented the complete vertical profile of the material
- RESRAD dose impact modeling performed by New Horizons indicated that concrete and asphalt exhibiting elevated activity levels which will be removed from the Site and subsequently deposited into a solid waste landfill will result in negligible exposure (i.e. less than 5 mrem/year)

In accordance with Section 4.4 of the ANSI Standard, process knowledge may be used to support a determination that activity concentrations are homogeneously distributed throughout the material. In these instances, single in-situ or in-toto measurement techniques may be used to determine conformance with the surface and volumetric standards in lieu of multiple representative measurement sampling.

In preparing the summary Tables that were presented in the Task Plan, New Horizons relied on Site characterization data collected by URS and subsequently presented in the Final Concrete and Asphalt Characterization Report dated July 15, 2002. Field and laboratory measurements were grouped by URS into survey sub-units based on areas exhibiting similar material properties, release status, and geographic location. Table 6 in the URS Report summarizes beta/gamma surface activity measurements by sub-unit and Table 10 summarizes radionuclide concentrations in core samples collected from the various sub-units.

A review of the URS data indicates that only 1 core sample (taken from sub-unit 104 Red) exceeded the ANSI volumetric standard (30 pCi/g). Concrete removed from this sub-unit will be stockpiled on-site and subsequently managed with material which may be generated during the subsurface investigation. The regulatory classification of these materials will be re-considered at a later date.

As previously indicated in the Task Plan, 67 out of the 75 sub-units surveyed by URS met the ANSI surface screening level (6,000 dpm/100 cm²). Core samples taken from these sub-units also met the ANSI volumetric standard. Concrete and asphalt removed from these sub-units may be disposed of in a solid waste landfill or recycled.

Concrete and asphalt to be removed from all sub-units, except sub-unit 104(Red), meet the ANSI volumetric standard. These materials are demolition debris and will be transferred to an appropriate Subtitle D solid waste landfill.

Comment No. 8

- p.8 6.0 Removal of Concrete/Asphalt
- a. How will the concrete and asphalt be broken up into manageable sections?
 - b. Describe or reference the dust suppression activities that will be utilized during the removal and preparation for transport.

Response No. 8

- a. *The concrete and asphalt will be broken into sections by the use of a track-hoe-mounted jackhammer or ram. Smaller sections may be broken with a hand-operated jackhammer.*
- b. *Water will be used to mitigate dust emissions from the work zones during dust generating activities including the breaking and loading of concrete and asphalt. Water spray or mist will be applied, as needed, during visible dust generating activities in an amount sufficient to mitigate the visible dust from crossing work zone boundaries.*

Comment No. 9

- p.9 7.0 Transport of Concrete/Asphalt
- a. Please update the wording in the first paragraph to reflect solid waste and TENORM.
 - b. Transport of TENORM shall follow applicable portions of Part 17 of the Colorado Rules and Regulations Pertaining to Radiation Control. Update this portion of the plan to be consistent with shipping practices of TENORM.
 - c. Staff would like to review the response plan for potential accidents or spills that may occur during material transport.

Response No. 9

This issue was resolved as a result of the September 9 meeting. Nonetheless, the following responds to the comments in part:

- a. *The first paragraph will be updated to reflect solid waste.*
- b. *The transport of solid waste materials will follow the appropriate portions of Part 17 of the Colorado Rules and Regulations Pertaining to Radiation Control.*
- c. *The New Horizons Accident and Spill Response Plan will be available for review at the Site prior to material shipments.*

Comment No. 10

p.10 8.0 Disposal of Concrete/Asphalt
RS staff has met with the Solid Waste Section of the Hazardous Materials and Waste Management Division and provided them with input on what would be acceptable for disposition of TENORM in permitted facilities. The suggested guidance from RS is supportive of the concept of disposal of low activity TENORM in solid waste facilities, with certain caveats. The RS Program has determined that the contaminated portions of the asphalt and concrete are licensed materials. Material that does not meet the averaging requirements of ANSI N13.12 (if any) will have to be disposed as radioactive material.

Response No. 10

This issue was resolved as a result of the September 9 meeting.

Comment No. 11

- p.10 9.0 Survey of Surface Soils
- a. Will the grid be tied into an existing survey point?
 - b. Please reference the appropriate portion of the sampling and analysis plan for instrumentation that will be used for the surface scans.

- c. Consider mixing the samples for homogeneity before separating aliquots.
- d. Please reference the list of isotopes and metals to be analyzed.

Response No. 11

- a. Proposed grid layouts for the survey of surface soils will be tied into available existing survey points, as appropriate.
- b. Instruments to be used for the surface scans are identified in Section 3.2 of the Sampling and Analysis Plan.
- c. New Horizons will consider mixing samples for homogeneity before separating aliquots.
- d. The list of isotopes and metals to be analyzed are provided in Section 4.6.1.4 Soil Sampling for Radionuclide Analysis, and Section 4.6.1.5 Soil Sampling for Metals Analysis of the approved Characterization Survey Work Plan prepared by URS Corporation dated July 23, 2001.

Comment No. 12

p.11 10.0 Subsurface Investigation

- a. What are the DQOs to be satisfied? Please reference the location of the DQOs for the project.
- b. A 2-inch slit spoon sampler will be used. Note: In Section 5.3 on page 14 of the Sampling and Analysis Plan states that a 3-inch split spoon sampler will be used. Which is correct?
- c. Will the sampling be continuous and what will be the length of the split spoon?
- d. Will the soils be described and if so, what method or system will be used?
- e. Will the amount or percentage of recovery in each sample be recorded?
- f. Will the trench be the same depth as the boring depth, 10 feet?
- g. Have you considered trenching in areas where cores show elevated radioactivity?
- h. The subsurface investigation must have a component that addresses subsurface contamination that may not have a surface expression, e.g., drains, sumps, fill used for utility padding or retaining walls. The plan must address investigation of known drains (such as those that exist near the old pond, and from drains found during demolition.) Provide in the plan how buried utilities will be investigated.
- i. Please reference the list of isotopes and metals to be analyzed.
- j. Will the downhole gamma logging be deconvoluted? Will the detector be collimated?
- k. Consider mixing the sample for homogeneity before splitting into aliquots.
- l. How will impacted soils be stockpiled on the site to be managed? Will they be drummed, covered with tarps?

Response No. 12

- a. The DQOs are identified in section 1.2 of the approved Characterization Survey Work Plan prepared by URS Corporation dated July 23, 2001.
- b. Either a 2-inch, 3-inch (or both) split-spoon sampler(s) will be used for the subsurface investigation where practicable.
- c. The sampling will be continuous if site conditions allow. The length of the proposed split-spoon sampler is 12 inches.
- d. No, soil descriptions will not be part of this phase of work.
- e. Yes, the percentage of recovery of each sample will be recorded.
- f. The trenches will be excavated to a depth of 10 feet.

- g. Trenching will be performed in areas where core samples are not retrievable due to core refusal.
- h. The subsurface investigation will include the characterization of soils in depressions, around drains, sumps, trenches, retaining walls, and around utility piping etc. New Horizons fully intends to investigate potential contamination pathways to the extent practicable. New Horizons will work with CDPHE representatives to prepare and implement a specific plan detailing feasible procedures for investigating specific subsurface anomalies once the site concrete and asphalt has been removed, and the potential pathways are identified.
- i. Please see response to Comment No. 11d.
- j. The downhole gamma logging will be deconvoluted. The detector will not be collimated.
- k. New Horizons will consider mixing the sample for homogeneity before splitting into aliquots.
- l. Impacted soils will be stockpiled on-site for future management. Soil stockpiles will be limited to a height of 20 feet, or less in height. Stockpiles will be covered with tarps, as appropriate.

Comment No. 13

p.12 11.0 Removal of Impacted Soil

What dust control measures will be used to control an estimated 100 cubic yards of radiologically impacted soils generated by the investigation and temporarily stored on site?

Response No. 13

Please see response to Comment No. 12(l).

Comment No. 14

p. 12 12.0 Radionuclide Analysis of Soil

What isotopes will be reported from the gamma spectroscopy?

Response No. 14

The reported isotopes will satisfy the radionuclide DQOs that are summarized in Table 1 of the approved Characterization Survey Work Plan prepared by URS Corporation dated July 23, 2001.

Comment No. 15

Table 2. Volumetric Calculations

The table does not conform to the averaging requirements of ANSI N13.12. Please evaluate and regroup to be as consistent as possible with the ANSI standard.

Response No. 15

See response to Comment No. 7.

SAMPLING AND ANALYSIS PLAN

Comment No. 16

p.2 2.1.1 Determine Instrument Background

Background (particularly gamma) varies with the diurnal fluctuations and weather events. It is suggested that the weekly determination be tracked as presented, but the daily responses be more consistent with the ANSI N323.B requirements for hand-held instruments, which are $\pm 20\%$.

Response No. 16

Background will be tracked and determined on a daily basis. The weekly background will be used as a basis for comparison/evaluation of the daily values.

Comment No. 17

p.3 2.1.2 Determine Instrument Efficiency

This section is not consistent with current NRC practice. Efficiency for surface activity measurements includes source efficiency as well as instrument efficiency. NUREG-1507 and MARSSIM provide sections on calculating efficiency and converting from counts to activity.

Response No. 17

The instrument efficiency will be evaluated versus a certified source of known efficiency. The procedure identified in this section is an internal procedure meant to evaluate the reproducibility of measurements rather than absolute efficiency which is determined by a licensed third-party vendor.

Comment No. 18

p. 4 2.1.3 Incoming Equipment Surveys

- a. During the Transportation Survey, will the tires, floorboards, and pedals be checked? Please provide a more descriptive narrative for what a vehicle survey entails. The Reg. Guide 1.86 values cited in the plan are acceptable.
- b. Consider conducting the equipment surveys with a pancake or other beta detector since they are more rugged in the field and not as susceptible to shielding from dirt, grease, moisture, etc. that interferes with alpha detectors. For this material, one can assume a ratio of alpha:beta of 1:1.
- c. What instrumentation will be used to count smears?

Response No 18

- (a) *The transportation survey will primarily focus on tires, tailgates, and other potential contaminated material contact surfaces. Since the operator of the vehicle will not normally be in contact with the load contents, floorboards and pedals are not expected to be affected. The potential radiation dose in the operator's area will be measured prior to leaving the Site. This measurement will be performed using a gamma scintillation instrument. If elevated gamma measurements are observed in the equipment cab, detailed surface evaluations will follow using alpha and beta sensitive instruments.*
- (b) *Both a pancake-type beta detector (Geiger-Muller detector) and an alpha scintillation detector will be used for incoming and outgoing equipment surveys.*
- (c) *A Ludlum 2929 or equivalent instrument will be used for counting wipe samples.*

Comment No 19

p. 4 2.1.4 Outgoing Equipment Survey

The Reg. Guide 1.86 values are upper limits. A commitment must be made to reduce contamination ALARA (e.g., brushing, wiping, hosing) before release of vehicles or equipment.

Response No. 19

This issue was resolved as a result of the September 9 meeting. Nonetheless, contamination will be reduced to the required values specified in Regulatory Guide 1.86 and to ALARA, as appropriate, before release of vehicles or equipment.

Comment No. 20

p. 6 3.2 Survey Instrumentation

- a. There is a discrepancy in the text with respect to detector size. Please correct.
- b. What is the minimum coverage that the gamma survey will achieve?
- c. Will the data be converted to exposure rate (uR/h) or stay in counts? How will the conversion be accomplished? Will it be cross-correlated with a PIC?

Response No. 20

- (a) *Alpha detection will be performed using either a 50 or 75 square centimeter detector. Other detectors may be used with appropriate modification of calculations as necessary. Beta radioactivity will customarily be measured using a pancake-type detector. Gamma scintillation measurements will be made using either a 2-inch sodium iodide detector or a Ludlum microR meter or equivalent.*
- (b) *Gamma surveys are detailed in Section 4.3 of the approved Characterization Survey Work Plan prepared by URS Corporation dated July 23, 2001.*
- (c) *Survey data for radiation safety purposes i.e., individual and work area dose equivalents, will be measured directly in μR per hour using a Ludlum microR meter or equivalent cross calibrated with a pressurized ion chamber. Surface survey data will be measured and reported in counts per minute with background value noted. Gamma scintillation detectors used for surface surveys will also be cross calibrated against a pressurized ion chamber so that dose equivalents may be calculated from the survey results.*

Comment No. 21

p. 6 3.2.1 Determine Instrument Background
See comment 16.

Response No. 21

Please see response to Comment 16.

Comment No. 22

p. 7 3.2.2 Determine Instrument Efficiency
See comment 17.

Response No. 22

Efficiency checks during Site activities are intended to track the reproducibility of measurements, not their absolute value. Third-party certified efficiency calibrations will be used as the basis for tracking instrument stability.

Comment No. 23

p. 8 3.2.4 Calculate the Minimum Detectable Activity

This methodology has been replaced by methods in NUREG-1507 and MARRSIM. Rewrite this section to provide MDC and scan MDC values.

Response No. 23

Scan MDCs will be determined for each instrument in accordance with the cited calculation procedure. Survey traverse rate(s) will be specified for each instrument based on individual instrument type scan MDCs. The instrument MDCs will be calculated in conformance with MARSSIM and NUREG 1507.

Comment No. 24

p. 9 3.4.1 General Site Survey

- a. Determine the scan MDC for this survey. Current GPS technology achieves 1 – 2 second acquisitions. Is there a reason why a point will only be collected every 5 seconds.
- c. How will the data be evaluated (Surfer, Pathfinder, Aspen)?

Response No. 24

- (a) *Please see response to previous comment. Scan traverse rates will be calculated and adjusted as needed to ensure that individual instrument/instrument type scan MDCs are achieved. Data acquisition rates will be modified based on the scan MDC. It has been our experience that too-frequent data acquisition produces more 'noise' than useful data. If CDPHE prefers a 2-second data acquisition or some other interval, it will be accommodated to the extent of the capability of the instrumentation and GPS station.*
- (b) *The data evaluation and display software has not yet been determined. A currently standard evaluation/presentation software will be used for this purpose, but the specific type has not yet been selected.*

Comment No. 25

p. 9 3.4.2 ISOCS Measurements

- a. What calibration standards and geometrics will the ISOCS use? Will the instrument just be used in-situ or can samples be retrieved and counted in a fixed geometry?
- b. What is the MDC for ISOCS for natural radionuclides

Response No. 25

- a. *No fixed standards are used. Mathematical calculations using MCNP are used for ISOCS standards and geometrics. Detector standards used for quality control are of known certified standards. The ISOCS instrument can be used for both in-situ and fixed geometry samples.*
- b. *Typically, for a 10-meter field of view (6-inch depth profile), the MDCs are 1 pCi/g for americium, 0.5 pCi/g for U-235, and 4 pCi/g for U-238 (based on a 20-minute count).*

Comment No. 26

p. 13 4.6 Sample Analytical Requirements

This paragraph is not consistent with Section 12 of the task plan. Will isotopic or total uranium and thorium be performed?

Response No. 26

Please see response to Comment No. 11d.

Comment No. 27

- p. 13 4.7 Decontamination
- a. Why is an acid rinse being proposed?
 - b. How will the decon water and acid be disposed?

Response No. 27

- a. Acid rinse may be used to reduce contamination levels below the Regulatory Guide 1.86 if conventional methods are not effective. Based on past project activities, it is not anticipated that an acid rinse will be necessary.
- b. Excess decontamination water (if generated) will be used for dust control. Acid rinseates (if generated) will be collected, sampled, characterized, packaged, and disposed in accordance with applicable regulations.

Comment No. 28

- p. 13 5.1 Sample Site Selection Criteria

Response No. 28

Not applicable

Comment No. 29

See Comment 12-h.p 14.5.3 Core Sampling Methodology

- a. 3-inch split spoon core sampler-see above
- b. The investigation must be able to characterize drains or other utilities to be investigated, even if they are located at a depth greater than 10'.

Response No. 29

- a. Please see response to Comment No. 12b
- b. The subsurface investigation will include the characterization of potentially impacted soils located around drains or other utilities. Anomalies such as drains or utilities will be investigated to the extent practicable, or to the extent directed by the CDPHE or the School.

Comment No. 30

p. 14 5.4 Downhole Gamma Radiation Survey
See comment 12-j.

Response No. 30

Please see response to Comment 12j.

Comment No. 31

p. 15 5.5 Sample Interval Selection

Consider screening cores with a pancake detector if gamma instrumentation does not clearly identify where a horizon exists.

Response No. 31

New Horizons will consider screening cores with a pancake detector if gamma instrumentation does not clearly identify where a horizon exists.

Comment No. 32

p. 16 5.8 Sample Analytical Requirements

- a. See comment 26.
- b. Analyze samples for target metals list agreed to by URS.

Response No. 32

- a. *Please see response to Comment 11d.*
- b. *Please see response to Comment 11d.*

Comment No 33

p. 16 5.8 Dosimetry

- a. Dosimeters must be worn between the belt and the collar.
- b. Who will provide the dosimetry service? They must be NVLAP certified.
- c. Where will the control badges be placed?
- d. The dosimetry program must be compliant with Part 4 of the regulations.

Response No. 33

- a. *Site personnel subject to the dosimetry program will be instructed to wear dosimeters between the belt and the collar.*
- b. *The dosimetry service will be provided by Landauer®. Landauer® is NVLAP certified.*
- c. *The dosimetry control badge(s) will be placed in the site office located outside of the fenced area.*
- d. *The dosimetry program will be compliant with Part 4 of the regulations.*

Comment No. 34

p. 17 7.2 Personal Air Monitoring

How will the efficiency, buildup factors, and lower limits of detection be determined? NUREG-1400 is recommended for consideration. Provide an adequate air sampling and calculation procedure.

Response No. 34

Personal air samples will be analyzed preliminarily using an on-site Ludlum model 2929 or equivalent detector. Detection limits are principally mass and volume of sample dependent. If the instrument MDA can achieve the specified exposure limit for the limiting radionuclide, further analysis of a specific personal air sample may be avoided if it can be shown that the limiting exposure standard was not exceeded. In any event, a portion of personal exposure air samples will be sent for definitive isotopic analysis at an off-site laboratory so that definitive personal exposure values to Site radionuclides of interest can be calculated.

Comment No. 35

p. 16 7.0 Exposure Monitoring

- a. How will site perimeter air monitoring be done-upgradient and downgradient of wind? The public may be concerned about possible exposure. How will you demonstrate dose to off-site receptors?
- b. Site monitoring must also have the appropriate correction factors applied. See comment 34-a.

Response No. 35

- a. *Perimeter air monitoring is not planned for this phase of work. Perimeter air monitoring will be included as part of any remedial action phases, if needed. Off-site receptor concentrations will be determined based on the results of personal air monitoring within the work zones.*
- b. *Please see response to Comment 34a.*

Comment No. 36

p. 18 7.5 Dose Calculation and Recording
How will radon be evaluated?

Response No. 36

For an outdoor site, radon evaluation is problematic at best. If required by CDPHE, passive radon monitoring dosimeters may be included in the program.

HEALTH AND SAFETY PLAN

Comment No. 37

1.1 Purpose

Do visitors have to read the health and safety plan as it applies to them?

Response No. 37

All visitors will be required to attend a mandatory site orientation prior to site access. The site orientation will include the applicable portions of the Health and Safety Plan, results of air monitoring and dosimetry data, and other pertinent health and safety information.

Comment No. 38

2.1.2 Inorganic Metals

Regarding personal hygiene, what rules are in effect for smoking and chewing?

Response No. 38

No smoking or chewing will be allowed within any work zone.

Comment No. 39

3.0 Project Responsibilities

Consider changing the requirements for site visitors to be escorted while on-site.

Response No. 39

All site visitors will be required to attend the mandatory site health and safety orientation (please see response to Comment 37). While on-Site, all visitors will be escorted by a New Horizons representative.

Comment No. 40

9.0 Site Facilities

How will drinking water be handled at the site?

Response No. 40

Drinking water is available for all site personnel (including visitors) in the site office trailer located outside the fenced area.

Comment No. 41

10.4 Instrumentation

Provide appropriate procedures for calibration and use of equipment.

Response No. 41

Calibration of site instrumentation is performed in accordance with applicable manufacturers procedures and specifications. Calibration procedures are available at the site.

Comment No. 42

10.0 Personal Protective Equipment

- a. Provide reference to or participation in an approved respiratory protection program including maintenance and fit testing.
- b. What protection factors will the respirators provide?

Response No. 42

- a. *New Horizons maintains an up-to-date respiratory protection program that is compliant with OSHA regulations. The respiratory protection program (which includes maintenance and fit-testing of respirators) is included in New Horizons Corporate Health and Safety Manual. The New Horizons Corporate Health and Safety Manual will be available on the site.*
- b. *The protection factors for the respirators will be dependent upon the specific respirators used. Typically, the respirators that will be used for the anticipated project activities will have a protection factor of 10.*

Comment No. 43

16.0 Personnel Training

- a. All training shall be documented. All trainees shall sign an acknowledgment that they have received and understood the subject material.
- b. Provide syllabi for training.
- c. Training and notification to workers shall be compliant with Part 10 of the regulations.

Response No. 43

- a. All training for site personnel, including site orientation, Tailgate Safety Meetings, Health and Safety Plan review will be documented. All trainees will sign an acknowledgement that they have received and understand the subject material.
- b. Training syllabi for site personnel will be dependant upon job description. For example, visitors who receive basic site orientation (must be escorted) will receive substantially less training than that of full-time site personnel. The health and safety training of site personnel will be on-going. Daily Tailgate Safety Meeting syllabi will be prepared as the job progresses based on the changing site conditions and activities. Pre-job training for full-time site personnel includes, but is not limited to, OSHA 40-hour Training for Hazardous Materials and Hazardous Waste Operations, Basic Radiation Safety, Part 10 of the Colorado Rules and Regulations Pertaining to Radiation Control, the New Horizons Corporate Health and Safety Manual, and the site-specific Health and Safety Plan.
- c. Training and notification to site workers will follow the appropriate Part 10 regulations.

Comment No. 44

18.2 Emergency Services

Please also include a copy of the map in the plan.

Response No. 44

A hospital route map will be posted in the site office trailer.

Comment No. 45

24.2 Accident Investigation

All incidents involving radioactive material must be immediately reported to the Program.

Response No. 45

All incidents involving radioactive materials will be immediately reported to the Program.

MATERIALS TRANSPORTATION PLAN

Comment No. 46

2.0 Materials Classification

- a. Edit this section to account for TENORM as well as solid waste.
- b. How will class 9 materials shipments be marked?

Response No. 46

This issue was resolved as a result of the September 9 meeting. Nonetheless, the following responds to the comments in part:

Any Class 9 material shipments will be marked in accordance with the appropriate provisions set forth in 49 CFR.

Comment No. 47

Please address free liquids and dust control in this section.

Response No. 47

Free liquids will not be permitted in any shipment of solid waste material. For dust control response, please see response to Comment 8b.

If you have any questions regarding the response to comments, please contact Jonathan Spencer at (303) 932-2220 or myself at (303) 647-1055.

Sincerely,

Robert Krumberger, Project Manager
Senior Project Scientist