Westinghouse

Westinghouse Electric Company LLC
Hematite Decommissioning Project
3300 State Road P
Festus, MO 63028
USA

ATTN: Document Control Desk
Director, Office of Federal and State Materials and Environmental Management Programs
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

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E-mail: hackmaek@westinghouse.com
Our ref: HEM-09-146
Date: December 29, 2009

Subject: Response to Request for Additional Information – Alternate Waste Disposal (License No. SNM-00033, Docket No. 070-00036)

1) Nuclear Regulatory Commission (NRC, J. J. Hayes) letter to Westinghouse (E. K. Hackmann), dated December 3, 2009, "Westinghouse Hematite 10CFR20.2002 Alternate Disposal Requests for Additional Information"
2) Westinghouse (E. K. Hackmann) letter to NRC Document Control Desk HEM-09-52, dated May 21, 2009, "Request for Alternate Disposal Approval and Exemptions for Specific Hematite Decommissioning Project Waste"

This letter responds to NRC's request for additional information, Reference 1, as it relates to the Westinghouse request for alternate waste disposal approval in accordance with 10 CFR 20.2002 and exemptions from §30.3 and §70.3, Reference 2. Attachment 1 to this letter provides Westinghouse's responses. Attachments 2 through 7 and Enclosures 1 and 2 provide further information which is referred to in the Attachment 1 responses.

Please contact Gerard Couture, Licensing Manager, of my staff at 803-647-2045 should you have questions or need any additional information.

Sincerely,

Ron Outten for EKH

E. Kurt Hackmann
Director, Hematite Decommissioning Project

NMSS01

Attachments:
1) Response to Request for Additional Information - Alternate Waste Disposal Authorization for Hematite Decommissioning Project
2) Dust Study Information
3) RESRAD, Summary: EGL Vadose Zone Analysis
4) Intruder Zone Estimator Worksheet
5) Eagle Resources, April 7, 2005, Site-Specific RESRAD Water Pathway Parameters for the Contaminated Soil, Vadose Zone, and Saturated Zone
6) USEI Radiological Sampling – Air & Soil
7) American Geotechnics, June 28, 2006, Hazardous Waste Facility Siting License Application Cell 16, Grand View, Idaho

Enclosures:
1) Compact Disc (CD) labeled, "Envirosafe Services of Idaho, Inc., Grand View, Idaho, ESII Site B, Site Characterization and Groundwater Monitoring Program, February 1986, Volume IA - Text"
2) CD labeled, "Envirosafe Services of Idaho, Inc., Grand View, Idaho, ESII Site B, Site Characterization and Groundwater Monitoring Program, February 1986, Volume I Appendix A to E and Volume II Appendix F"

cc: J. J. Hayes, NRC/FSME/DWMEP/DURLD
J. W. Smetanka, Westinghouse, w/o attachments/enclosures
W. G. Snell, NRC Region III/DNMS/DB, w/o attachments/enclosures
R. Tadesse, NRC/FSME/DWMEP/DURLD, w/o attachments/enclosures

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Our ref: HEM-10-9
Date: January 21, 2010

Subject: Corrected Compact Disks Concerning Alternate Waste Disposal (License No. SNM-00033, Docket No. 070-00036)

References:
1) Westinghouse (E. K. Hackmann) letter to Document Control Desk (NRC), HEM-09-146, dated December 29, 2009, "Response to Request for Additional Information – Alternate Waste Disposal"
2) NRC (J. J. Hayes) letter to Westinghouse (E. K. Hackmann), dated December 3, 2009, "Westinghouse Hematite 10CFR20.2002 Alternate Disposal Requests for Additional Information"
3) Westinghouse (E. K. Hackmann) letter to Document Control Desk (NRC), HEM-10-6, dated January 19, 2010, "Additional Information Concerning Alternate Waste Disposal"

Reference 1 provided responses to the NRC Reference 2 request for additional information (RAI) concerning 10 CFR 20.2002 alternate waste disposal. Mr. John J. Hayes (NRC) informed Westinghouse that the Enclosures 1 and 2 compact disks of Reference 1 contained discrepancies. The replacement compact disks of Enclosures 1 and 2 herein correct those discrepancies. Westinghouse answers to the RAIs were completed by Reference 3.

Please contact Gerard Couture, Licensing Manager of my staff at (803) 647-2045 should you have questions or need any additional information.

Sincerely,

E. Kurt Hackmann

E. Kurt Hackmann
Director, Hematite Decommissioning Project

NMSS01
FSME

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cc: J. J. Hayes, NRC/FSME/DWMEP/DURLD, w enclosures
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HEM-09-146

ATTACHMENTS

and

ENCLOSURES

ATTACHMENT 1

Response to Request for Additional Information - Alternate Waste Disposal Authorization for Hematite Decommissioning Project

Response to Request for Additional Information -
Alternate Waste Disposal Authorization for Hematite Decommissioning Project

The following provides responses to the NRC request for additional information (RAI) of December 9, 2009. Each RAI is reiterated below, followed by Westinghouse's and/or U. S. Ecology's (USEI) response. Attachment numbers are those of the accompanying transmittal letter.

MC&A

1. **Comment:** Additional information is needed to specify how high-enriched uranium (HEU) remediated and/or recovered materials will be managed for shipping. Up to 30 kilograms could be shipped to U. S. Ecology, Inc.

   Basis: Westinghouse-Hematite anticipated that certain HEU residues may be recovered from the burial pits during the decommissioning project. It is estimated that a total quantity of up to 30 kilograms of materials could be obtained.

   Path Forward: Provide a material control and accounting (MC&A) contingency plan and related MC&A control measures to ensure that the facility is compliant with the regulatory requirements for handling HEU materials, and that discrete quantities of HEU materials will not be shipped to the U.S. Ecology Idaho site, which is not licensed to receive those materials.

   Response:

   WEC Hematite maintains a Material Control and Accounting program in accordance with the NRC approved Fundamental Nuclear Material Control Plan (FNMCP) per 10 CFR Part 74 Material Control and Accounting of Special Nuclear Material. WEC Hematite has submitted to the NRC for approval the Hematite Decommissioning Project (HDP) Fundamental Nuclear Material Control Plan, dated August 5, 2009 which contains the requirements for the control and handling of HEU. MC&A activities conducted in support of the Alternate Disposal Authorization for HDP will be performed in accordance with the FNMCP.

   Section 1.5.1 of the Nuclear Criticality Safety Assessment of the US Ecology Idaho (USEI) Site for the Land Fill Disposal of Decommissioning Waste from the Hematite Site Revision 0 May 2009 contained within the submittal provides a description of how discrete HEU items are identified and removed from the waste stream and are not candidate material to be shipped to USEI.

2. **Comment:** Additional information is needed to describe how the facility's wastes, contaminated with special nuclear material (SNM), will be handled and controlled at the U.S. Ecology Idaho site, a non-U.S. Nuclear Regulatory Commission (NRC) licensed facility.

   Basis: Westinghouse-Hematite plans to dispose of the SNM-contaminated wastes to the U.S. Ecology Idaho site, and this disposal facility does not have an MC&A program for handling Special Nuclear Materials (SNM). In addition, the disposal of SNM is outside of the U.S. Nuclear Regulatory Commission's (NRC's) jurisdiction and oversight, especially given the quantity of SNM involved.

Path Forward: Provide near term and longer term MC&A approaches for disposal of SNM stored at the U.S. Ecology Idaho site with respect to material ownership, material controls, and material final disposal.

Response:

10 CFR 70.42 (d)(2) requires a written certification by the transferee that the recipient is authorized by license or registration certificate to receive the type, form, and quantity of SNM to be transferred, specifying the license or registration certificate number, issuing agency, and expiration date. Since USEI would be exempted from the 10 CFR 70.3 requirement of an NRC licensee to possess SNM, the §70.42 requirement would not apply. Section 9, Records of Transfer, of the submittal provides from a regulatory perspective a proposed method to address the transfer of the material. It is proposed that the permit issued to USEI by the State of Idaho serve as an alternative written certification. DOE/NRC Form 741, Nuclear Material Transaction Report, would be used by WEC as it has in the past to document all transfers of SNM to the disposal facility. A radioactive materials manifest will accompany each shipment, will be signed by USEI upon receipt, and will provide a further confirmation that proper accountability for the material was maintained.

Special Nuclear Material will be handled and controlled at the USEI site in accordance with the State of Idaho's radioactive materials regulations and USEI's radioactive materials Waste Acceptance Criteria (WAC), and the facility's operating permit. This includes waste tracking from the railcar unloading facility to the disposal facility, tracking during receipt and stabilization (if RCRA regulated materials are present), and disposal. Three-dimensional location coordinates are recorded once waste is placed in the disposal cell and a Certificate of Disposal is provided to WEC Hematite to confirm that all waste received was properly disposed. Section 1.9 of the Nuclear Criticality Safety Assessment of the US Ecology Idaho (USEI) Site for the Land Fill Disposal of Decommissioning Waste from the Hematite Site Revision 0 May 2009 contained within the submittal provides a description of how the material is handled and controlled.

3. **Comment:** Additional information is needed for the use of U. S. Department of Energy (DOE)/NRC Form 741, Nuclear Material Transaction Reports.

Basis: Westinghouse-Hematite will process DOE/NRC Form 741 for transfer of SNM to the U.S. Ecology Idaho site, and this disposal facility does not have an MC&A program for meeting the reporting requirements of 10 CFR 74.15 associated with DOE/NRC Form 741.

Path Forward: Provide the practices to be employed by Westinghouse-Hematite and the U.S. Ecology Idaho facilities to meet the reporting requirements of 10 CFR 74.15.

Response:

WEC Hematite maintains a Material Control and Accounting program in accordance with the NRC approved Fundamental Nuclear Material Control Plan (FNMCP) per 10 CFR Part 74 Material Control and Accounting of Special Nuclear Material. The FNMCP contains the reporting requirements of 10 CFR 74.15 associated with DOE/NRC Form 741 for the WEC Hematite facility.

As USEI is not an NRC licensee (which is the reason for the requested exemption), in accordance with USNRC NUREG/BR006 revision 7, Appendix B "Inventory Change Type Codes for Completing Blocks 26c and 27c of DOE/NRC Form 741", the DOE/NRC Form 741 will be completed by indicating that the inventory change type code is "54" Shipments-Miscellaneous. The Shipments-Miscellaneous code instruction states "Enter quantities of material shipped in two-party transactions where only shipper's data are reported or shipments of quantities of material falling below the reporting level are reported and now cumulatively total 1 gram or more of SNM or 1 kilogram or more for source material. The DOE/NRC Form 741 will indicate that both the shipper and receiver RIS as "ZWQ" which is the WEC Hematite RIS.

Health Physics

1. **Comment:** Additional information is needed to ensure Westinghouse Electric Company (WEC) is compliant with U.S. Ecology (USEI) Waste Acceptance Criteria.

   Basis: WEC estimates a waste volume of 22,809 m^3 (50,000 tons). This volume plus the non-contaminated materials is a large volume of material to be remediated, sampled and surveyed, and transported.

   Path Forward: Provide a description of the radiological sampling and survey measurement procedures and quality control and assurance procedures to be employed by WEC to ensure WEC is compliant with the USEI waste acceptance criteria and the 3000 pCi/g total concentration limit.

Response:

With respect to radiological sampling and survey measurement procedures, scan surveys of gamma radiation will be performed over the surface of exposed soil during excavation to:

(1) identify soil volumes and/or components that potentially contain an amount of radioactivity that approach the action level established for criticality safety;

(2) identify soil volumes that are likely to contain radioactivity concentrations that exceed the derived concentration guideline level (DCGL) and therefore requiring removal as waste; and

(3) identify soil volumes that are likely to contain radioactivity concentrations that are less than the DCGL, suggesting that the survey units have been adequately prepared for evaluation using final status survey protocols.

The protocols include scan surveys of gamma radiation and visual inspection over the surface of exposed soil during excavation to identify soil volumes and/or components that potentially contain an amount of radioactivity that exceeds an action level established for criticality safety. These surveys will also serve to segregate soil volumes that are likely to meet the derived concentration guideline level (DCGL) from those that exceed the DCGL and require remediation. Depending upon the magnitude of the observed count rate, additional measurements and/or sampling and analysis by gamma spectroscopy may be performed to ensure criticality safety, or the soil may simply be removed and disposed as waste. This process of survey and sampling will continue to segregate contaminated soil during the process of excavation until the measurements suggest that the remaining soil is likely to contain radioactivity concentrations that are less than the DCGL, and therefore the survey unit has been adequately prepared for evaluation using final status survey protocols.

The detection sensitivity is sufficient to identify radioactivity concentrations in soil volumes and/or components that approach the action level established for criticality safety and the weighted DCGL ($DCGL_{(w)}$). Since the requirements for detection sensitivity imposed by criticality safety and by the need to measure concentrations at the DCGL are equivalent to a small fraction of the concentration limit specified in the Waste Acceptance Criteria (WAC), the probability of failing to identify an average concentration in the waste stream that exceeds the WAC is very small.

Additionally, subsequent to the disturbance caused by the process of excavation and handling, the soil will undergo a second visual inspection. In the event that the inspection identifies a suspect condition (e.g., component, or stained soil) an additional scan survey will be performed to confirm the absence of soil volumes and/or components that potentially contain an amount of radioactivity that approach the action level established for criticality safety. Following this second evaluation (that includes the investigation of any significant hot spots or components) the soil will be loaded and transported to the waste staging area. During this portion of the work, the radioactivity concentration will be measured in a bulk volume (e.g., truckload or container) using gamma spectroscopy, or will measured through the collection of a composite sample obtained from each 100 cubic yards of soil that will be subsequently analyzed by gamma spectroscopy.

With respect to quality control and assurance procedures, to ensure accurate data are obtained using the protocols described above that include an iterative process for evaluating soil during excavation and preparation for transport, the instrumentation used for these measurements of radioactivity will be calibrated for the radiation types and energies of interest, or to a conservative (typically lower) energy source. Instrument calibrations will be documented with calibration certificates and/or approved forms and maintained with the instrumentation records.

The radioactive sources used for calibration will be traceable to the National Institute of Standards and Technology (NIST) and calibrations will be performed in geometries expected to match the conditions at the time that measurements are obtained.

Following calibration, initial response data will be obtained. These initial measurements will be used to establish performance standards (response ranges) for use as a comparator to the results obtained during daily operability checks. Acceptable operability checks for field instrumentation will be within ±20 percent of the performance standard. Laboratory instrumentation operability checks will be within ±3-sigma of the performance standard.

When a characterized high-purity germanium (HPGe) detector is used, suitable NIST-traceable sources will be used for operability testing, and the appropriate modeling parameters applied to accurately describe the measurement geometry.

2. **Comment:** Additional information is needed to clarify how materials, waste and other debris will be managed on site for processing.

Basis: WEC estimates a waste volume of 22,809 m^3 (50,000 tons). This volume plus the non-contaminated materials is a large volume of material to be remediated, sampled and surveyed, and transported.

Path Forward: Provide the methods and logistics to be employed to ensure radioactive waste homogeneity and the measures to ensure non-contaminated soil and materials are not blended or intentionally mixed with radioactive soil and debris to reduce the specific activity of the waste.

Response:

Scan surveys of gamma radiation and visual inspection will be performed over the surface of exposed soil during excavation to identify soil volumes and/or components that potentially contain an amount of radioactivity that exceeds an action level established for criticality safety. These surveys will also serve to segregate soil volumes that are likely to meet the derived concentration guideline level (DCGL) from those that exceed the DCGL and require remediation. Depending upon the magnitude of the observed count rate, additional measurements and/or sampling and analysis by gamma spectroscopy may be performed to ensure criticality safety, or the soil may simply be removed and disposed as waste. This process of survey and sampling will continue to segregate contaminated soil during the process of excavation until the measurements suggest that the remaining soil is likely to contain radioactivity concentrations that are less than the DCGL, and therefore the survey unit has been adequately prepared for evaluation using final status survey protocols.

The next step in the process for excavation and material handling includes placing the soil at an interim lay-down area. There the soil will undergo a second visual inspection and scan survey of gamma radiation in the event that the inspection identifies a suspect condition (e.g., component, or stained soil) to confirm the absence of soil volumes and/or components that potentially contain an amount of radioactivity that approach the action level established for criticality safety. This process will also provide the opportunity for further comparison against the WAC. Following this second evaluation (that includes the investigation and removal of any significant hot spots or components) the soil will be loaded and transported to the waste staging area. During this portion of the process, the radioactivity concentration will be measured in a bulk volume (e.g., truckload or container) using gamma spectroscopy, or will measured through the collection of a composite sample obtained from each 100 cubic yards of soil that will be subsequently analyzed by gamma spectroscopy to confirm that the final waste form meets the WAC.

Performance Assessment

1. **Comment:** More information is needed about the airborne dust study.

Basis: The internal dose to the workers is dependent on the concentration of respirable dust in the air at their work locations while they are working. In the description of the airborne dust study in Section 6.1 of the safety assessment, it is stated that the airborne dust study was conducted for representative job categories and work locations. However, it is not clear if these job categories and locations are the same ones considered in the dose assessment. It is also not clear how the samples address the range of dust levels that could be present and whether they adequately represent mean concentrations for the workers.

Path Forward: Provide information about the locations sampled in the airborne dust study and the applicability of those locations and concentrations to the job functions evaluated in Table 2.

Response:
In August 2008 USEI safety personnel, under the direction of American Ecology's Director of Corporate Health & Safety and Radiation Safety Officer planned and conducted an industrial hygiene sampling project to assess exposure to total dust and respirable fraction dust for maximally exposed workers. Additional information about the equipment, procedures, and results of this study are found in Attachment 2.

Selection of Maximally Exposed Individuals

Based on site operating experience, the maximally exposed activity for dust is expected to be personnel cleaning out residual amounts of waste remaining in the gondola railcars unloaded at the Rail Transport Facility (RTF) with shovels and brooms following removal of the vast majority of the waste by an excavator. This activity was projected to create the highest exposure rate since workers would be in direct contact with this residual loose soil. As a result, this activity was specifically targeted for this project and related exposure analyses.

Identification of Exposed Individuals

Activities were assessed for all workers who may come into contact with Westinghouse Hematite project waste. The following activities were identified:

- RTF excavator operator
- RTF gondola sweeper / shoveling
- Field technicians (Radiological surveys, etc)
- Process Supervisors

In contrast, all other workers at both the RTF and disposal facility are protected from dust exposure by either waste containment liners in the gondola railcars and trucks, or by the fact that they only handle waste from the remote, enclosed cab of heavy equipment such as excavators or bulldozers. The potential for dust exposures is considered similar for all workers operating heavy equipment (excavators in the RTF or stabilization building or bulldozers in the disposal cell). Excavator operators at the RTF were selected to represent this equipment operating group.

Study Parameters

Eleven individuals representing four different job activities participated in the study. This included five individuals responsible for sweeping / cleaning gondolas and six other individuals responsible for operating excavators, surveying railcars, or providing general supervisory support.

All workers during the program were actively engaged in unloading gondola railcars lined with burrito-style IP-1 liner systems filled with contaminated soil and debris (concrete, wood rocks, etc.). This replicated, as closely as reasonably possible, the types of soils and debris waste and packaging program to be employed by Westinghouse on the Hematite project.

Equipment & Protocols Utilized

Personal sampling pumps and sampling equipment supplied by Galson Labs were used for this project. Total dust and respirable fraction dust samples were obtained for each different job activity during normal waste unloading operations at the RTF including the operations of the excavator, operation of the trackmobile used to move gondola railcars, sweeping and shoveling remaining waste from the gondolas, washing and decontaminating gondolas cars for release, and conducting monitoring and sampling of the gondolas and truck/trailers.

The sampling was conducted in accordance with NIOSH Method 0600 for respirable fraction dust and NIOSH Method 0500 for total dust. All sample pumps used were calibrated before and after each use. The respirable fraction of dust samples were gathered using a cyclone attachment which should separate out particles greater than 10 um at a sample rate of 2.5 L per minute, each sample event was performed for three to four hours each. The total dust samples were gathered at a rate of 2.0 L per minute for roughly three to four hours each. Certain activities at the RTF are conducted outside where environmental conditions such as wind and the surrounding desert may increase dust exposure. This "background" dust loading was not subtracted from the results, providing a conservative result. Galson Labs is an AIHA and NELAC certified laboratory.

Two of the ten samples run for respirable Fraction Dust produced results at or above the detection limit concentration. Both of those samples were taken from employees whose primary task during the monitoring included sweeping and shoveling out gondola rail cars. The highest result obtained indicated a total exposure of 0.23 mg/m3 of respirable dust exposure. The remaining 8 samples did not produce results above the detection limit.

Ten samples were gathered for the Total Dust exposure. The range of exposure results included a low of 0.29 mg/m3 for an employee whose primary task was operating the excavator to a high of 1.50 mg/m3 for an employee whose primary task was washing and cleaning gondola railcars.

All results of personal exposure monitoring were posted at the location and discussed with the employees who participated in the project.

In summary, a dust exposure study was conducted by US Ecology to identify maximally exposed individuals and determine total and respirable dust exposure while performing activities similar to those that will be performed on the Westinghouse Hematite project. The study was conducted in a conservative manner, assessing maximally exposed individuals, not subtracting background dust levels from the surrounding desert during the month of August (very hot and dry), nor taking credit for respiratory protection. The resulting dust exposure results were used by US Ecology in calculating potential inhalation dose for the Hematite project.

2. **Comment:** Additional information is needed about the source term.

Basis: It is not clear how the inventory in Table 1 was derived, and sample data supporting this derivation were not provided. In addition, in the Residual Radioactivity (RESRAD) analysis, the inventory of radionuclides from the Hematite waste was assumed to be evenly distributed across an area of 88,220 m^2 and a thickness of 33.6 m. The concentrations used for the contaminated zone in RESRAD were diluted from the concentrations in the waste provided in Table 1 to account for this. If the waste from the Hematite site was disposed of in a more concentrated manner, then the resulting dose could be higher.

Path Forward: Provide a description of the methodology used to develop the inventory in the source term and associated sample data. Provide the basis for the assumption that the waste from the Hematite site will be disposed of homogeneously across the site and effectively diluted from the concentrations provided in Table 1.

Response:

Regarding the source term methodology, the radioactivity concentration values in Table 1 of Reference 2 are based on the weighted contributions from several strata of soil that have been shown to contain residual radioactivity from licensed activities. These strata include the soil at ground surface to a depth of 15 centimeters (cm) below ground surface (bgs); soil that is greater than 15 cm bgs but not below 1.5 meters (m) bgs; and soil that is greater than 1.5 m bgs to a depth of approximately 6 m bgs. The contribution to the total amount of volume and contained radioactivity in the volume of soil to be excavated is based on the median value within each stratum, which was subsequently weighted by the contribution to volume (based on thickness for that stratum) to the total amount.

The median value for each stratum was deemed to be most representative of the concentration due to the presence of high-outliers within the population, and the presence of multiple samples within areas of higher concentration as a result of further investigation sampling during site characterization.

To add conservatism to this evaluation, negative concentration values were assigned a value of zero (0). Also, the population of samples included only those from areas designated as requiring excavation. Additionally, a portion of the soil volume located immediately adjacent to, but outside of the areas to be excavated will likely become a part of the waste form due to inadvertent commingling during excavation. This soil volume contains licensed radioactivity at levels less than the DCGL and is expected to result in a reduction in the concentration in the final waste form; however this reduction was not accounted for in the evaluation.

For purposes of modeling the site's overall performance for USEI's IDEQ permit (a separate effort from the RESRAD modeling performed for an alternate disposal request), USEI has traditionally assumed that waste from a project will be disposed homogenously across a disposal cell with an area of 88,220 m^2 or approximately 21.7 acres. However, Hematite project waste will not be disposed homogenously across the entire landfill at US Ecology. Rather, it will be intermixed with other waste received during the same time period. Over the past 5 years, USEI has received and disposed an average of 711,000 tons of hazardous and radioactive waste per year. Current projections are that the 50,000 tons of Westinghouse project waste will be received over at least an 18 month time period, a conservative assumption, since the project may be received over as many as three calendar years.

USEI's active landfill has been built in four phases. Each phase of USEI's disposal cell has capacity to receive about 1.4 million tons of material and a footprint of about 10 acres (40468 m^2). USEI expects that Westinghouse's waste will be disposed in three to four phases of the disposal cell, or over an area greater than 30 acres in extent.

A new RESRAD analysis was conducted for the Westinghouse alternate disposal request. The analysis involved limiting the area of the "contaminated zone" to a 20 acre footprint (slightly less than the modeled area for USEI's permit) and reducing the average radionuclide concentration to reflect the intermixing with approximately 2 million tons of other waste material. The model calculates a maximum dose of 2.931 millirem in year 247 (see Attachment 3). This dose calculation is conservative and remains within the NRC's "few millirem" guideline.

3. **Comment:** Clarification is needed about the inventory and decay time assumed in the Microshield analyses.

   Basis: Table 1 in the safety assessment contains a list of the radionuclides considered in the dose assessment and their expected concentrations. Many of these radionuclides have radioactive progeny, and it is not clear how the activities of the progeny used in the dose modeling were generated and what decay time was assumed. Additionally, it is not clear if the inventory in Table 1 corresponds to the current inventory in the waste or the inventory in the waste at its time of burial at the Hematite Site.

   Path Forward: Clarify if the inventory presented in Table 1 corresponds to the current inventory in the waste, or the inventory at the time the waste was originally buried at the Hematite site. If Table 1 reflects the current inventory, provide inventories of daughter radionuclides at the current time. If Table 1 reflects the inventory at the time the waste was originally buried at the Hematite site, provide a description of how the activities of the current daughter radionuclides are generated, including the assumed decay time from the point of initial burial at the Hematite site.

   Response:

   The inventory represents the present concentration of parent nuclides, and was decayed for a period of 30 years to allow for in-growth of short-lived progeny. This was accomplished using the Microshield© software program, and can be confirmed by inspection of the output files included with the application (Reference 2).

4. **Comment:** Information is needed about the chemical form and solubility of the uranium in the waste.

   Basis: Uranium that is in the soluble form could leach from the waste and reconcentrate in the subsurface. This could potentially result in the uranium becoming present in a configuration and concentration that could pose a criticality hazard. The criticality analysis assumes that uranium is not in a soluble form, but the basis for this assumption is not included.

Path Forward: Provide information about the chemical form of uranium present and the solubility of it. If the uranium is in a soluble form, provide an evaluation of the potential for the uranium to reconcentrate in a critical configuration. If the uranium is not in a soluble form, provide a basis for this assumption.

Response:

One of the assumptions in the nuclear criticality safety assessment (NCSA) supporting the alternate disposal request was the absence of uranium solutions. On review, this assumption is not necessary because the evaluation of uranium migration and precipitation in the disposal cell used a conservative concentration factor that accounts for geochemical scenarios that could increase the concentration of uranium by solute transport in groundwater and subsequent sorption or precipitation of uranium from solution. Thus, the information about the chemical form and solubility of the uranium in the waste as requested in the RAI is not needed. The NCSA assumption of the absence of soluble uranium can be deleted.

5. Comment: The dose to an inadvertent human intruder should be analyzed.

Basis: Disposal in Resource Conservation and Recovery Act (RCRA) disposal facilities should evaluate the intruder dose calculations. Simple methods may be used to scope or bound the problem, and more sophisticated approaches should be used as necessary. Radon from source material, byproduct or special nuclear material should be considered.

Path Forward: Evaluate the dose to an inadvertent human intruder.

Response:

The intruder scenario was structured based on the scenario for a low-level radioactive waste disposal facility set forth in NUREG-0782. Unless otherwise noted on the intruder scenario worksheet of Attachment 4, all tables used and assumptions or entries made (except for radionuclides and their concentrations) were those found in or consistent with the scenario instructions in NUREG-0782. Calculated dose to the intruder is 5.61E-1 mrem, well within the "few millirem" standard.

6. **Comment:** The dose to the transportation workers should be assessed.

Basis: The analysis assumes that the disposal worker dose bounds the transportation worker dose based on the length of time of exposure and proximity to the waste. This is reasonable since worker dose at the receiving facility tends to be greater than the transportation worker dose. Still, further explanation should be provided as to what the approximate length of time the railroad employees would be working, what distance they would be from the waste, if the waste is to be covered during transport, and if they would be involved in the loading or unloading processes. A statement of explanation for why the public dose is bounded by the receipt facility worker dose should also be provided (e.g., distance from rail transportation routes to public residences).

Path Forward: Assess the dose to railroad employees and other members of the public during transportation from WEC to USEI, or provide further explanation as to how it is bounded by the receipt facility workers.

Response:

The dose rate at 1m from a loaded gondola car is presented in the report (1.2 μR/hr). While not presented, the dose rate at 1 foot would be 1.5 μR/hr. The maximum external dose to a site worker is 0.49 mrem (490 μR). In order for the dose to a bystander during transportation to exceed that of the site worker and therefore be bounding, the individual would have to spend 408 hr at 1 meter from the gondola (490 μR / 1.2 μR/hr) or 326 hr at 1 foot (490 μR / 1.5 μR/hr), which are not credible external exposure scenarios during transportation. Since the gondola cars are covered during transport, no internal dose would be assigned to a bystander.

7. **Comment:** Clarification is needed for the times to complete a task provided in Table 2.

   Basis: Table 2 provides the amount of time it takes to perform a task, but does not clearly state this is the time per task per worker.

   Path Forward: Confirm that the minutes to perform a task in Table 2 are minutes per task per worker.

   Response:

   The minutes assigned for each job function listed in Table 2 are the times estimated by knowledgeable and experienced site personnel for one person to perform each function one time.

8. **Comment:** Clarification is needed on sharing of job functions.

   Basis: Table 2 provides the number of workers sharing a single job function, but it is not clear if any of the same people will be performing more than one job function. If the same person is performing multiple job functions, then the doses for these job functions should be analyzed cumulatively.

   Path Forward: Confirm that the same person will not be performing more than one job function. Or, if they are shared, provide the cumulative effects on the workers sharing job functions.

   Response:

   The excavator operators, truck drivers, stabilization operators and cell operators at the USEI disposal facility do not share job functions. At the RTF the gondola surveyors, gondola clean-out crews and truck surveyors do perform multiple functions. Even assuming one individual performed all of the shared functions at the RTF for the entire project (an impossible scenario), that hypothetical person's calculated dose would be 2.096 mrem and well within the "few millirem" standard.

9. **Comment:** More information is needed on how site stability will be maintained, and the assumed erosion rate.

   Basis: If there is little potential for significant disposal site instability, then a technical basis should be provided for this conclusion. The stability of the site can be impacted by natural surface and subsurface processes, and is also impacted by the stability of the waste and engineered barriers of the disposal facility. The analysis assumes an erosion rate that is ten times less than the default erosion rate in RESRAD. Erosion control barriers can be assessed considering rock durability, gradation, cover design, stability calculations for the slopes of the cover, or other construction considerations important to erosion control. Waste stability can be impacted by methods for waste packing which may help to prevent slumping or collapse of the disposal unit or cover.

Path Forward: Provide a technical basis for the erosion rate. Also, provide sufficient information to verify that the waste will remain structurally stable after disposal.

Response:

On March 13, 1987 the U.S. NRC and U.S EPA published "Joint NRC-EPA Siting Guidelines for Disposal of Commercial Mixed Low-Level Radioactive and Hazardous Wastes." This document identifies eleven guidelines that combine and summarize each agency's technical requirements, standards, and existing guidance. Of these guidelines, Guidelines 5 and 8(2) address this comment.

Guideline 5 states: "The site must be located so that upstream drainage areas are minimized to decrease the amount of runoff that could erode or inundate waste disposal units."

Guideline 8(2) states: "Disposal sites must not be located in areas where: (2) surface geologic processes such as mass wasting, erosion, slumping, landsliding, or weathering occur with such frequency and extent to affect significantly the ability of the disposal facility to meet the performance objectives in Subpart C of 10 CFR Part 61, or may preclude defensible modeling and predicting of long-term impacts."

The disposal cells at the Grandview facility are constructed in compliance with the Resource Conservation and Recovery Act (RCRA) standards and the applicable Minimum Technology Requirements (MTRs). These requirements provide conservative criteria for cell construction to insure long-term stability and are consistent with the erosion design requirements in 10 CFR Part 61, the joint NRC/EPA document cited above, and are protective of human health and the environment.

Waste received from the Westinghouse Hematite project waste will be disposed in Cell 15. The cover system for Cell 15 consists of cover soil aggregates with a variable thickness, ranging from 2.5 feet across the crown to 20 feet along the side slopes. The side slopes of the cover system are benched at 75-foot horizontal intervals to promote sheet flow across the cover soils and inhibit rill erosion. Each bench includes a rip-rap lined ditch which conveys run-off away from the cell in a protected manner. The cover soils are underlain by a synthetic drain layer and a composite geosynthetic liner system.

Cell 15 was designed by a licensed Professional Engineer. The design analysis included long-term stability analysis and an evaluation of erosion rates. The site is located in an arid region, which experiences an average rainfall of less than 7 inches per year. Erosion analysis included considerations for the climatic conditions at the site, the specified cover soil gradations and the geometry of the cover system. The average long-term erosion rate for the Cell 15 cover system was determined to be 0.005 feet per century across the crown of the cell (3 percent slope) and 0.048 feet per century along the side slopes (40 percent slope). This analysis was reviewed and approved by the Idaho Department of Environmental Quality.

Using the derived average long-term erosion rate and assuming a 40% slope, the erosion rate is calculated to be 0.048 feet per century or 0.15 meter per 1000 years. The RESRAD model US Ecology currently uses assumes an erosion rate of 0.1 meters per 1000 years. The current value was derived using the RESRAD Data Collection Handbook which stated that a reduction from the default value of 0.001 m/yr was appropriate for arid environments. Increasing the erosion rate to 0.15 meters per 1,000 years provides no significant increase to post-closure dose from disposal of Hematite material.

10. **Comment:** Justification is needed for the use of RESRAD for modeling the groundwater pathway and the parameters used in this model.

Basis: The dose assessment submitted by the licensee determined that the peak dose from the disposal of the Hematite waste at U.S. Ecology Idaho would be from Tc-99 through the groundwater pathway, making this pathway risk-significant. The RESRAD code was used to calculate this dose. However, justification was not provided for whether the conceptual model in the RESRAD code is appropriate for the conditions at the U.S. Ecology Idaho site. While RESRAD has been widely accepted and has a large user base among NRC staff and licensees, it may not be appropriate for all sites (i.e., sites with complex groundwater systems or geological conditions). Additional information is needed about whether the modeling done with the RESRAD code appropriately models or bounds the potential dose from the groundwater pathway at the U.S. Ecology site.

Additionally, the basis for the parameters used to model the groundwater pathway was not provided. Required bases includes the parameters entered for the contaminated zone and cover and contaminated zone hydrological data and the unsaturated zone, and saturated zone portions of RESRAD. The site description of U.S. Ecology Idaho included in the submittal contains information on the subsurface at the site, but it is not clear how the parameter values included in the RESRAD run were developed based on that information.

Path Forward: Provide justification for the use of RESRAD to model the groundwater pathway at the U.S. Ecology Idaho site. Provide the basis for the parameters used for the ground water pathway, including the contaminated, unsaturated, and saturated zones, in the RESRAD modeling.

Response:

Justification for Use of RESRAD for USEI's site-specific ground water model

The RESRAD model was chosen to model post-closure dose for the Grand View site by Envirosafe Services and its consultants prior to US Ecology purchasing the Grand View facility in 2001. Upon purchasing the facility, USE health physics staff from the company's Richland, Washington LLRW facility reviewed the appropriateness of this model for future low-activity waste disposal operations. Selection criteria included a public domain code used and validated by the U.S. Department of Energy, U.S. Nuclear Regulatory Commission, familiar to the State of Idaho, and appropriate for site conditions. RESRAD met these criteria and was retained.

RESRAD's default values were used by US Ecology through 2005. These values were considered extremely conservative given superior site environmental conditions. As a result, in 2005 the company initiated an effort to compile a wide range of site environmental data collected over the previous several decades and develop site-specific parameters for a model that more accurately reflected site environmental conditions.

Selection of Site-Specific Parameters

US Ecology environmental managers compiled site environmental conditions from reports previously submitted to the IDEQ and approved by that agency. US Ecology retained consultants with specific expertise in geophysics, geology, hydrogeology, and complex environmental modeling to compile a report identifying specific environmental conditions and input parameters for a new site-specific model. This effort was led by Eric Lappala, PE, of Eagle Resources. Upon completing this effort, US Ecology reviewed the results and various modeling software to choose a model appropriate for future use at the site. RESRAD was retained since it could adequately model the new parameters while still providing a very conservative output. In addition, the model was familiar to site health physics personnel and the IDEQ, was in the public domain to facilitate transparency with interested stakeholders and was retained.

Eagle Resources then completed a report identifying the site-specific input parameters that would be used in the updated RESRAD model[1]. This included refinements to the radon gas scenario, aquatic pathway and contaminated soil, vadose, and saturated zone models to more realistically reflect actual site conditions and local construction practices. These parameters and the justification for each change to the default code are documented in Eagle Resources' report (see Attachment 5).

US Ecology subsequently submitted its justification report, model and related upgrades to the facility's environmental and occupational monitoring programs to the IDEQ in the form of a formal Class 2 Permit Modification in May 2005. After the prescribed review and public comment period the use of the site-specific model was approved by the IDEQ in July of that same year. The model has been in continuous use by US Ecology since that time. The model has been submitted to the USNRC and Agreement State programs in support of numerous other alternate disposal and exemption requests, which have been subsequently approved by such regulatory programs.

Groundwater Pathway Parameters

1. **Comment:** Figures cited in the application are not included, such as Figure E-6, Figure-14, Figure E-16, and Figure E-19. It appears that these figures are part of the Site Characterization Report written by CH2M Hill in 1986.

   Basis: N/A

   Path Forward: Provide CH2M Hill, 1986, Site Characterization Report, including all tables, figures, and appendixes.

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[1] Lappala, Eric. *Site-Specific RESRAD Water Pathway Parameters for the Contaminated Soil, Vadose Zone, and Saturated Zone at US Ecology Idaho*, Eagle Resources, April 7, 2005

Response:

The report and all major appendices are included in Enclosures 1 and 2. Oversized drawings are not included but can be provided to NRC at a later date if requested.

2. **Comment** Justification is needed for the assumption of continued rising water level at the site.

   Basis: In the section on Water Level Trends, a regression analysis, based on the assumption that water level continues rising at current rates, predicts that the water levels in the Upper Aquifer will reach the bottom of the missile silos in 36 to 53 years. This may have a potential implication on the waste disposal cell. No detailed logical augments or physical processes, however, were provided to support this continued rising water level assumption at the site. The use of the regression analysis for predicting future water levels at the site needs further support of site specific conditions and physical processes.

   Path Forward: Provide a detailed explanation why the assumption of a continued rising water level with current rates at the site is valid.

   Response:

   A report addressing this question is currently in preparation. Therefore, this response has been delayed and is expected by the end of January 2010.

Environmental Review

1. **Comment:** As part of the Environmental Assessment, NRC needs information pertaining to the affected environment at the USEI site. Among the resources being considered by NRC is onsite and local air quality. Data of interest includes any job-specific or site-wide air sampling for radionuclides, hazardous chemicals or materials of interest to the National Ambient Air Quality Standards.

   Basis: The Alternate Disposal Submittal contains no information concerning onsite and local air quality data.

   Path Forward: Provide all local, state, and Federally-required worker, public safety and environmental air monitoring program plans which are both currently active and developed by or for USEI, and at least the past 5 years of air monitoring data collected under these plans, for the USEI disposal facility.

   Response:

   USEI maintains necessary air emissions permits including detailed air emission modeling consistent with waste management methods. The air sampling program includes analysis of a wide range of organic and inorganic constituents consistent with processing of RCRA hazardous wastes as well as applicable radioactive wastes. Most recently, the IDEQ issued an air emissions permit in June 2006 (Permit No. 073-00004) after it was determined USEI's activities were in compliance with IDEQ Air Quality rules and there would be no significant impact on any National Ambient Air Quality Standards (NAAQS). The most recent application and the resulting permit consolidated the previous submittals and separate permitting documents for both sites (Grand View TSDF and RTF).

USEI's air sampling program for radionuclides includes three fixed location sampling points and two random sampling. These sampling points were determined through careful analysis and in concurrence with IDEQ.

USEI also performs semi-annual (Spring and Fall) soil sampling as part of its Radiological Environmental Monitoring Program. The semi-annual sample points are based on Wind Rose data collected from 1988 to 1992. Predominate wind direction at USEI is from the Northwest to the Southeast. Sample points are established approximately 500, 600 and 750 meters "down wind" from the active disposal Cells (i.e. Cells 14 and 15). Four (4) samples are taken for each semi-annual event and one (1) background location is sampled per year. During each semi-annual event, samples are taken from undisturbed areas, with two (2) at the sample "Post" and one sample offset approximately 50 feet North and one sample approximately 50 feet South of the sample post.

Each air and soil sample is analyzed for the following radionuclides:

- Uranium 238
- Uranium 234
- Thorium 232
- Radium 226
- Plutonium 239[2]
- Americium 241, and
- Gamma Spec (man-made gamma emitters)

Summary:

All sample reports indicate results below action levels.

USEI's Radiological Air Sampling Results from the years 2005 to present are provided as Attachment 6.

Included in USEI's 2006 permit application, an EPA approved model "CAP88PC" was used to demonstrate compliance with US EPA standards to conservatively calculate dose to the public that may result from fugitive emissions from site operations [40 CFR 61 Subpart I (IDAPA 58.01.01.020.01) National Emission Standards for Hazardous Air Pollutants- Radionuclides]. Cap88 results are also found in Attachment 6.

The specific findings of the IDEQ air emission application were as follows:

- Attainment Designation (40 CFR 81.313)- The facility is located in Owyhee County which is designated as attainment or unclassifiable for PM10, PM2.5, CO, NO2, SOX, and Ozone.
- Title V Classification (IDAPQ 58.01.01.300, 40 CFR 70)- Title C permitting program requirements do not apply to this facility. The potential emission of any

[2] To date USEI has not received any material that contains plutonium.

single criteria pollutant is less than the 100 T/yr applicability threshold. In addition, the potential to emit any single hazardous air pollutant (HAP) is less than 10 T/yr and the potential to emit any combination of HAPs is less than 25 T/yr.

- PSD Classification (40 CFR 52.21)- Prevention of Significant Deterioration (PSD) requirements do not apply to this facility. This facility is not a designated facility, and the emission of any single pollutant is less that the 250 T/yr applicability threshold.
- NSPS Applicability (40 CFR 60)- None of the New Source Performance Standards (NSPS) apply to this facility.
- NESHAP Applicability (40 CFR 61)- None of the National Emissions Standards for Hazardous Air Pollutants (NESHAP) apply to this facility.
- MACT Applicability (40 CFR 63)- None of the Maximum Achievable Control Technology requirements apply to this facility.
- CAM Applicability (40 CFR 64)- The facility is not classified as a major facility under the Title V program, therefore, CAM requirements do not apply.

Additionally, USEI conducts additional monitoring for radionuclides in air and other media as outlined in USEI's RCRA Part B Permit. Specific radiological monitoring requirements are outlined in ERMP-03. Soil sampling results are also found in Attachment 6.

2. **Comment:** On July 24, 2009, Westinghouse provided NRC an application prepared by American Geotechnics for USEI (dated June 30, 2006) for a new disposal cell. However, appendices containing figures, information on cultural resources, economic impacts, and other relevant information were excluded. Staff believes that additional information contained in the appendices may be useful in preparing sections of the environmental assessment.

   Basis: While the Alternate Disposal Submittal includes an application prepared by American Geotechnics for a new disposal cell, the information provided with the application excludes the appendices containing figures, information on cultural resources, economic impacts, and other relevant information.

   Path Forward: Provide the entirety of the June 30, 2006, "Hazardous Waste Facility Siting License Application Cell 16," prepared by American Geotechnics.

   Response:

   See Attachment 7.

3. **Comment:** The August 2005 WEC report "Environmental Report for Hematite Site Decommissioning," Section 3.11, Public and Occupational Health, contained information on historical worker-related injuries and illnesses at the Hematite Decommissioning Project (HDP). Staff requests that WEC provide the same types of data as provided in the Table below for the last 10 years for both the HDP and USEI, if available.

Table. Work-related injuries at the HDP

Year	Work Hours	Injuries	OSHA Recordable Injury/Illness	Fatalities	Injuries per 10,000 hours
2001	438,404	67	50	0	1.5
2002	115,832	11	5	0	1.0
2003	86,736	1	0	0	0.1
2004	52,208	0	0	0	----
2005	##,###	#	#	#	#
2006	##,###	#	#	#	#
2007	##,###	#	#	#	#
2008	##,###	#	#	#	#
TOTAL	###,###	#	#	#	#

Basis: Information on historical worker-related injuries and illnesses at the HDP and at USEI is not contained in the Alternate Disposal Submittal. Staff requests that WEC provide the same types of data.

Path Forward: Provide recent information (2004-2008) on occupational injuries or illnesses, and Occupational Health & Safety Administration cases and fatalities at the HDP and USEI.

Response:

The requested information is given below:

Table. Work-related injuries at the HDP

Year	Work Hours	Injuries	OSHA Recordable Injury/Illness	Fatalities	Injuries per 10,000 hours
2001	438,404	67	50	0	1.5
2002	115,832	11	5	0	1.0
2003	86,736	1	0	0	0.1
2004	52,208	0	0	0	0
2005	169,739	18	3	0	1.1
2006	144,480	26	1	0	1.8
2007	57,760	0	0	0	0
2008	114,000	0	0	0	0
2009 (1st Qtr.)	32,811	0	0	0	0
TOTAL	1,211,970	123	59	0	N/A

Table. Work-related injuries at the USEI

Year	Work Hours	Injuries	OSHA Recordable Injury/Illness	Fatalities	Injuries per 10,000 hours
2001	87,362	9	5	0	1.0
2002	81,707	8	3	0	1.0
2003	93,490	18	2	0	1.9
2004	94,872	16	3	0	1.7
2005	121,048	20	4	0	1.6
2006	158,800	22	5	0	1.4
2007	180,683	40	7	0	2.2
2008	179,072	30	3	0	1.7
2009 thru November	138,005	18	3	0	1.3
TOTAL	1,135,039	181	35	0	N/A

4. **Comment:** The Alternate Disposal Submittal provides an estimate of the amount of soil and debris that will be shipped to USEI but makes is no mention of the quantity of soil that is going to be removed.

   Basis: The Alternate Disposal Submittal does not differentiate between soil and debris.

   Path Forward: Provide an estimate of the amount of soil that will be shipped to USEI.

   Response:

   The Alternate Disposal Submittal provided an estimated waste volume of 22,809 cubic meters, or approximately 806,000 cu. ft.

   The estimated amount of soil to be shipped to USEI is 680,000 cu. ft.
   The estimated amount of debris to be shipped to USEI is 126,000 cu. ft.

5. **Comment:** The Alternate Disposal Submittal makes is no mention of the actions that will be taken to protect surrounding areas from runoff.

   Basis: The Alternate Disposal Submittal does not describe any of the environmental protective actions which will be taken when excavating the soil.

   Path Forward: Provide the actions that will be taken to protect the surrounding areas from runoff.

   Response:

   The HDP will generate water from a variety of sources, potentially containing radioactivity and/or VOCs. The primary goals of water management are to minimize the volume of potentially contaminated water and to maintain the work area in a de-watered condition. Water management practices during decommissioning will ensure liquid discharges meet the effluent standards defined by the NRC License, the NPDES Permit (MO-0000761), and ARAR waiver MO-ARAR013.

The site arrangement and remedial execution strategy provides adequate facilities for waste segregation, stockpiling, and treatment lay-down areas, while minimizing the impact to ongoing excavation and removal activities. Water management activities within these areas during the remediation activities include:

- Directing infiltrated water from shallow ground water recharge or perched water sources to locations within the excavation that do not impede work activities,
- Collecting precipitation that comes into contact with contaminated materials within open excavations,
- Installing barriers to prevent uncontaminated water or soil from becoming contaminated,
- Diverting surface and precipitation to prevent intrusion into open excavations,
- Collecting water originating from precipitation and the pore volume within stockpiled materials,
- Performing an evaluation, including sampling and laboratory analysis, to determine the suitability for discharge and/or any requirements for water processing.

ATTACHMENT 2

Dust Study Information

Dust Study Information

Exhibit 1

General Sampling Procedures

Select the employee to be sampled and discuss the purpose of the sampling. Inform the employee when and where the equipment will be removed. Stress the importance of not removing or tampering with the sampling equipment. Turn off or remove sampling pumps before an employee leaves a potentially contaminated area (such as when he/she goes to lunch or on a break).

Instruct the employee to notify the supervisor or the sampler if the sample requires temporary removal.

Place the sampling equipment on the employee so that it does not interfere with work performance.

Prepare the sampling media for collection. Remove the end plugs (nibs) and/or break off both ends of the sorbent tube(s).

Attach the collection device (filter cassette, tube, etc.) to the shirt collar or as close as practical to the nose and mouth of the employee, i.e., in a hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.

The inlet should always be in a downward vertical position to avoid gross contamination. Position the excess tubing so that it does not interfere with the work of the employee. Be sure to use the tube covers (whenever possible) to protect the employee from the open ends of the glass tubes. Tube covers cannot be used when a prefilter must be used, or when sampling a "train" of multiple tubes and/or filters in series.

Turn on the pump and record the starting time and initial flow rate (using the lab-calibrated field rotameter provided, or your own flow-meter) in your field notes as you normally would. If you prefer, you can enter these notes on the "Field Pump Data Sheet" (on the back of our sheet marked "Laboratory Pump Calibration Data").

Observe the pump operation for a short time after starting to make sure it is operating correctly.

Check pump every two hours. More frequent checks may be necessary with heavy filter loading. Ensure that the sampler is still assembled properly and that the hose has not become pinched or detached from the media or the pump. For filters, observe for symmetrical deposition, fingerprints or large particles, etc. Check and record the flow rate.

Periodically monitor the employee throughout the workday to ensure that sample integrity is maintained and cyclical activities and work practices are identified.

Take photographs (as appropriate) and detailed notes concerning visible airborne contaminants, work practices, potential interferences, movements, and other conditions to assist in determining appropriate engineering controls.

Prepare blank(s) during the sample period for each type of sample collected. One blank will suffice for up to 20 samples for any given analysis except asbestos, which requires a minimum of two field blanks. These blanks may include opened but unused charcoal tubes.

Before removing the pump at the end of the sample period, check the flow rate using the lab-calibrated field rotameter. Be sure the sample has a clear, visible identification.

Turn off the pump and record the ending time. Remove the sample from the pump and seal it for shipping. Note any damage to or problems encountered with the sample collection equipment to be reported to the receiving personnel at Galson Labs.

Instructions for using the Field Rotameter

A field rotameter (rectangular graduated block of plastic) is used to determine the flow rate of the pumps in the field.

To determine the flow rate of a pump, you need an extra piece of media like the type onto which the samples will be collected. The pump flow rate can only be determined by using the proper media in-line with the rotameter.

Attach the media as per the sample collection instructions (NIOSH, OSHA or other method(s) used). The tubing from the top (highest calibrated end) of the rotameter is attached to the open end of the tube, filter, etc. Turn on the pump. The ball in the rotameter will be drawn up and show the current flow rate of the pump. Use the center of the ball as the marking point for the flow rate. In order to increase or decrease the flow rate, locate the set screw on the pump. It will be labeled as "flow controller" or "flow adjuster". On SKC AirChek 50 series pumps, the screw and the on/off switch are located on top of the pump, under a semi-transparent, flip-up cover plate. With a small screwdriver, turn the set screw to the desired flow rate as shown on the rotameter. It is important to note that when adjusting these pumps in the field it is a good idea to take very detailed notes. Also, be sure not to adjust the set screw beyond its maximum limit. This will damage the mechanism.

Record this flow rate. FOR VALID RESULTS this *MUST* be done at the start of every sampling event and checked at the end of the sampling event. The average of the two flow rates multiplied by the total time the pump was on will be used to determine the total air volume collected.

Field rotameters have been calibrated against a primary bubble meter standard or a Bios Dry-Cal DC-Lite unit. The formula is on the side of the rotameter and can be used to determine the exact flow rate of the pump. If the flow rate differs at the end of the sampling event from the start, you must average these rates and use this average as the flow rate in your calculations. The units labeled on the side of the rotameter are listed with the exact reading from the primary standard. These readings were fed into a spreadsheet program and the formula was derived from these readings. If you use this formula to check our actual primary standard readings, the result you get will probably not match. The formula creates an average of the readings and represents a straight line based on those readings. This is a "best-fit" scenario.

Instructions for Sampling Filters

Filters are often used to sample for many inorganic compounds and some organic compounds. These filters are placed in shrink-wrapped cassettes. There is an outlet (with a "spoke-wheel" pattern, where you would attach the tygon tubing from the pump) and an inlet where the air enters (sometimes has the word "inlet" molded into the plastic). Colored nibs that must be removed prior to sampling protect these openings. It is important that you do not push the plastic adapter too far into the cassette. This would cause the adapter to contact the backup pad, disrupting the flow of air, causing the pump to "fault out".

Remove the nibs and attach the tygon tubing to a fully charged and calibrated pump.

The pump is attached to the workers' belt and the end of the tubing with the cassette is clipped to the collar of the person to be sampled. The cassette should be in the breathing zone. Turn on the pump and record the start time and the flow rate. Whenever the pump is turned off, record the time.

Total Dust and Metal Fume

Collect total dust on a preweighed, low-ash polyvinyl chloride (PVC) filter at a flow rate of about 2 liters per minute (LPM or L/min), depending on the rate required to prevent overloading.

Collect metal fumes on a 0.8-micron mixed cellulose ester (MCE) filter at a flow rate of approximately 1.5 LPM, not to exceed 2.0 LPM. When the gravimetric weight needs to be determined for welding fumes, collect those fumes on a low-ash PVC filter.
Take care to avoid overloading the filter, as evidenced by any loose particulate.

Calibrate personal sampling pumps before and after each day of sampling, using a bubble meter method or the precision rotameter method (that has been calibrated against a bubble meter).

Respirable Dust

Collect respirable dust using a clean cyclone equipped with a preweighed low-ash PVC filter at a flow rate of 2.5 LPM.

Collect silica only as a respirable dust.
All filters used should be preweighed and postweighed.

Asbestos

Collect asbestos on a special 0.8 micrometer pore size, 25 mm diameter MCE filter with a back-up pad.
Use a fully conductive extension cowl.
Sample open face in workers' breathing zone.

Ensure that the bottom joint (between the extension and the conical black piece) of the cassette is sealed tightly with a shrink band or electrical tape. Point the open face of the cassette down to minimize contamination.

Use a flow rate in the range of 0.5 to 5 LPM. One liter per minute is suggested for general sampling. Office environments allow flow rates of up to 5 LPM. Calibrate pump before and check flow rate again after sampling.

Instruct the employee to avoid knocking the cassette and to avoid using a compressed-air source that might dislodge the sample while sampling.

Submit 10% blanks, with a minimum in all cases of two blanks.

Instructions for Sampling with Sorbent Tubes

Sealed glass tubes are often used to sample for many organic compounds and some inorganic compounds. These tubes have (in general) two sections of media divided by a small foam rubber spacer. One section has approximately twice the collection media than the other section. This larger section is called the front and the smaller section is called the back. The air to be sampled should always pass through the front section before the back section. Some tubes have an arrow on them indicating the direction of air flow. Since the pump is pulling air, the smaller back-up section of the tube should be attached to the tygon tubing leaving the larger, front section open to the air. The air is not to be passed through any hose or tubing before entering the tube, with the exception of those methods that call for the use of a prefilter to capture particulate.

Immediately before sampling, break off the ends of the flame-sealed tube so as to provide an opening approximately half the internal diameter of the tube. Use sorbent tube breaker for this purpose (see the section "Using Sample Tube Breaker"). Do not use the charging inlet, hose connector or exhaust port of the pump to break the ends of the tubes. Wear eye protection when breaking ends. Use tube holders, if available, to minimize the hazards of broken glass and attach the end of the tygon tubing to a fully charged and calibrated pump. The pump is attached to the workers' belt and the tube is clipped to the collar of the person to be sampled. The tube should be in the breathing zone. Whenever possible, use tube cover(s) provided. Turn on the pump and record the start time and check the flow rate. If any flow rate adjustment (fine tuning of the pump) is necessary, be sure to use the in-line adjustment screw rather than the one on the top of the pump. Whenever the pump is turned off, record the time.

The tube shall be held or attached in an approximately vertical position with the inlet either up or down during sampling.

Note: If two tubes are used in series, attach the tubes so that the larger sorbent sections of both tubes allow air to pass through them before the air passes through to the back section. Use a small piece of tygon tubing to connect the tubes. Also, be sure the "front" tube is exposed (at the beginning of the sample train) and the "back" tube is attached closest to the pump.

Note: Some samples can also be collected side-by-side. Galson Labs has available dual splitters for sampling on two tubes with the same pump, at the same time (even if the flow rates are slightly different) and triple splitters for three tubes at once, as above. It is important to note that not all tubes and sampling methods can be combined on a splitter. It may not be possible to set a dual splitter to 0.1 LPM with one tube on one side and 0.4 LPM on the other with a different tube. When pumps are sent with these splitters refer to the label(s) on the tubing and/or the Laboratory Pump Calibration Data Sheet for the exact calibration details. It is best not to adjust the flow rates on these splitters in the field because they are carefully set in the lab to ensure a proper "balance" within each splitter. Changing one side of a splitter will likely affect the remaining side(s). Check the flow rates and calculate your air volumes without adjusting the set screws, if possible.

Organic vapors and gases may be collected on activated charcoal, silica gel or other adsorption tubes using low-flow pumps.

Pump Charging Procedure: AirChek 52 Pumps

NOTE: It is VERY important to be sure pumps are fully charged prior to sampling. All pumps leave Galson Laboratories in a fully charged condition. However, if the pumps have been in transit, or sitting idle for longer than 48 hours, they should be refreshed before use. Otherwise, you run the risk of battery failure in the middle of your sample collection. Keep in mind, if the battery is allowed to run down too long, it may take up to 6 hours or so for a full recharge. Batteries can be charged the night before the pumps are to be used. The chargers we send you either have a button to push for slow (trickle) charge, or will switch over to trickle automatically as soon as the charge cycle is complete.

1. Pump Charge Precautions

   Do not overcharge the batteries! Batteries should not be charged at high (standard) rates for more than 24 hours. Continuous charging will eventually lead to deterioration in the performance level of the battery pack. If you must have the batteries on charge for more than 24 hours it is recommended that you switch the charger to low (trickle) rate. However, many of the SKC chargers we currently use switch to trickle automatically. But if you have an older-style unit, heed the warnings above.

2. Day To Day Charging
   a. Using a single or multi-station charger, connect the charging connector to the pump's external charge jack and charge the battery for 16 hours prior to operation. NOTE: Unless you are otherwise informed, all pumps shipped from Galson Laboratories are fully charged, so you should not need to charge the pumps when they are first received.
   b. Remove the sample pump from the charger and operate the pumps until shutdown on low battery. If the pump has a liquid crystal display (LCD) there will be a symbol that resembles a standard household (D-cell) battery when the battery's energy level has passed it's minimum point. This is called a "battery fault indicator". When this symbol appears, the pump will not run for more than a few minutes if it is restarted.
   c. Recharge the batteries for 16 hours or overnight for next use.

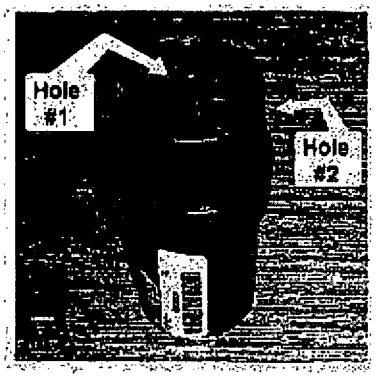
3. Long Term Charging & Storage

   The long-term storage of pumps will require some special handling. If pumps are not scheduled to be used for long periods of time (more than 2 months), it is recommended they be returned to Galson Labs. There the batteries will be properly reconditioned.

   Additional note: It is impossible for anyone to determine exactly how much power (run time) is available in any of these batteries. If you suspect a battery has aged to the point where it will not take a charge that will last long enough to run for a standard 8-hour work shift, please let us know so we can attempt to recondition and then test the unit's "Load Capacity". If all clients would do this, we would have less failure in the field. You, the clients, use these batteries. We only recharge them and check the initial Voltage Output prior to attaching them to a pump. We don't have them in-house long enough to run each one 8 hours in between jobs.

Using Sample Tube Breaker

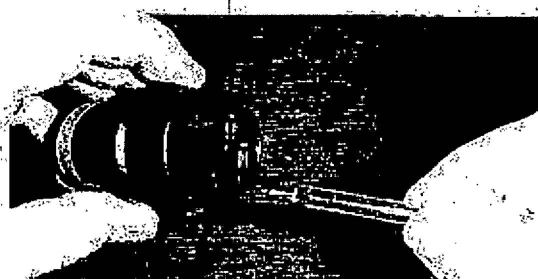
The Drager brand tube scorer/breker is used (as the name implies) to score and break the flame-sealed ends off glass sample collection tubes. Most SKC and Supelco brand tubes fit into the openings on the Tube Breaker unit without any trouble. The unit is a black plastic cylindrical unit, approximately three inches in height with two openings on top.



To use the Tube Breaker, follow these steps. Be sure to use caution as you normally would when handling glass. Safety glasses are recommended, although the broken ends will be captured within the unit.

Step one: insert one side of the sample collection tube as far as it will go into the center hole (labeled with the number "1"). Turn the tube once or twice. The glass will be scratched by the cutting stone.

Step two: remove the tube and insert it into the outer hole (labeled with the number "2"). Press the tube in. With gentle pressure the tip of the tube will break off and fall into the container.



Step three: turn the tube around and repeat for the other end.

Your tube is now ready to collect an air sample. Please be sure to seal the tube with the red end caps as soon as you have finished sampling.

Also, be sure to open and empty the tube breaker prior to returning it to Galson Labs. This is to prevent injury to anyone handling the equipment during or after shipping. If the tube breaker should open in transit, it could be a hazard to anyone that would come into contact with the glass fragments and/or dust.

Instructions for SKC Aluminum Cyclone Use

The aluminum cyclone is shipped held in place in its holder by a small piece of foam packing material. Remove the packing material and save it to replace when shipping cyclones back to the laboratory.

The cyclone should be snug in its holder by aligning the notch in the holder with the knob on the cyclone. The filter is a preweighed 5.0um pore size PVC filter in a 3-piece cassette. It is banded red from the bottom to just before the top of the center ring. To place the cassette into the cyclone, you must first remove the whole top section. This is done by using a screwdriver or other flat tool. Place it into the groove on the cassette just above the top of the red gelband and work the top section off by prying around the cassette. It may be easier to first remove the nib from the bottom of the cassette (the side with the "spoke-wheel" pattern). The cassette is now "open-faced". Turn the cassette over and place the open part of the cassette onto the top of the cyclone in its holder. It should be a snug fit with the rubber ring gasket from the cyclone. The outlet of the cassette should be in line with the round opening of the flat, spring-loaded cassette holder. Remove the colored nib from the outlet port of the cassette (unless you've already done so prior to removing the top of the cassette) and insert the metal connector that is at the end of the black hose. Attach the open end of the tygon tubing to a personal sampling pump. Clip the cyclone, holder and cassette to the collar of the employee to be monitored, as close as possible to the breathing zone. Attach and turn on the pump. The flow rate should be 2.5 liters per minute (LPM). The whole unit should be in a vertical position with the cyclone pointing down. Do not remove the red cap at the bottom of the cyclone until the sampling event is completed.

When you are done sampling, be careful when removing the cassette from the cyclone and its holder. Do not turn the unit upside-down. If you do, the material collected in the cyclone and its "grit pot" (red cap) will fall into the filter. Once you remove the cassette from the cyclone, replace the top piece of the cassette and the nib from the bottom. The cassette is now ready for shipping.

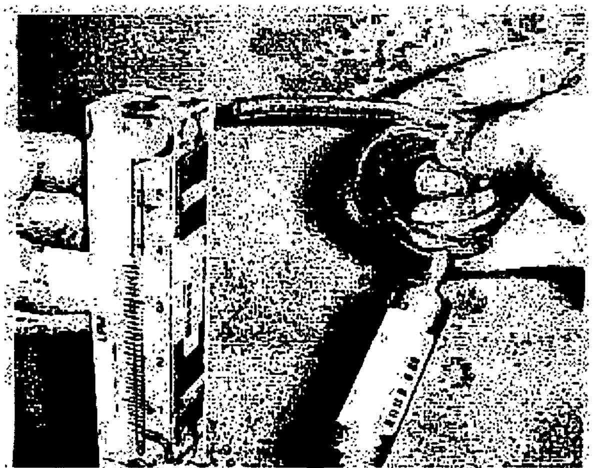
Remove the red cap ("grit pot") on the end of the cyclone and tap to remove the grit/debris that was collected. This material can be discarded. Wipe off any surface dust, replace the red cap and put the foam packing back in place. The cyclone and holders are now ready for shipping.

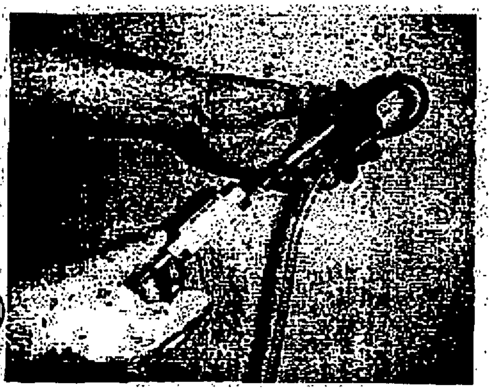
Instructions for SKC Aluminum Calibration Chamber

The SKC calibration chamber is for monitoring the flow of air through a filter/cyclone.

Assemble the filter/cyclone in the normal way (as described in the section "Instructions for SKC Aluminum Cyclone Use") and connect to the sample pump.

Attach the supplied tubing on the Calibration Chamber to the top (outlet) of the field rotameter (or other suitable primary flow meter).

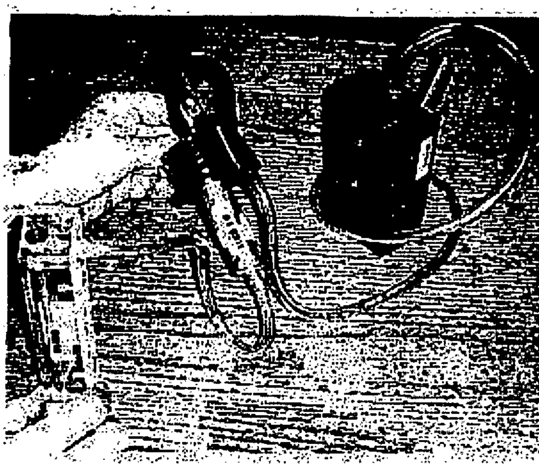




Moisten the o-ring inside the large open end of the chamber and slide it over the bottom portion of the Cyclone (where the red "grit pot" is located). Push it all the way until it seals at the bottom of the cyclone.

Your setup should now resemble the photo to the right of this paragraph. The air flows as follows: it enters the bottom of the field rotameter (or inlet of primary calibrator unit), exits through the outlet, enters the calibration chamber, SKC cyclone, through the sample filter, out the "outlet" (spoke-wheel-patterned side), through the black tubing, into the clear Tygon tubing to the sample collection pump. If this does not match what you have, please recheck these steps.

ALSO, it is important that you do NOT turn the Cyclone assembly upside-down while a sample filter is in place. You should also be sure the calibration chamber is not attached during sample collection. Finally, be sure to keep the red "grit pot" attached during sample collection. Removing this unit will change the way the air flows through the cyclone, defeating the purpose of the cyclone.



Instructions for Gilian Cyclone Use

The Gilian (Sensidyne) cyclone, also known as "Dorr-Oliver Cyclone", is used for collecting air samples to be analyzed for Respirable Dust and silica.

It is not necessary to remove any part of the filter cassette when using the Gilian Cyclone, except for the end nibs. The Gilian Cyclone can be used with either two- or three-piece cassettes.

The concept of the cyclone is to separate Respirable dust from particulate matter of 10 microns or more. With an air sampling pump set at 1.7 liters per minute (LPM), the cyclone inlet draws in the air and creates a spiral action, which separates the larger particles from the lighter ones. The cyclone's grit pot accepts the heavier particles while the lighter particles (less than 10 microns) are drawn up and trapped into the filter cassette.

Installation

1. Remove the colored end nibs from a cassette and spread the upper and lower holding plates of the holder assembly and seat the cassette with the inlet side down. You should now have the "spoke-wheel" patterned side of the cassette facing up. From this point on, DO NOT turn the unit upside down. Doing so would cause unwanted particles from the grit pot to collect on the filter within the cassette.
2. Allow the holding assembly to close and secure the cassette into position. Attach the metal leur taper adapter to the outlet port on the bottom of the cassette.
3. Turn on the pump and note the starting time of the sampling event.
4. At the end of the sampling event, turn off the pump, note the end time and carefully remove the cassette from the cyclone assembly. Remember, DO NOT turn the cassette and cyclone assembly upside down!
5. Replace the nibs into the cassette. It is now ready for shipping.
6. Remove the grit pot by simply unscrewing it, tap out the debris from the pot and the cyclone's body and reattach the grit pot. The cyclone is now ready for shipping.

If a cyclone is to be used to collect another sample, it is advised that you clean out the cyclone carefully between samples, and NEVER turn over a cyclone when a sample cassette is installed.

Instructions for Using SKC Series 222 Personal Air Monitors

SKC 222 Series Low Flow Pumps are miniature diaphragm-type pumps for personal or area sampling of gases and vapors in air. Unlike the AirChek 50 and 52 pumps we use a majority of the time, these pumps use a stroke counter. The stroke counter indicates the number of times the pump's diaphragm has pulsed (or stroked) during the sampling period. By subtracting the starting reading from the ending reading and multiplying by the pump factor, an acurate measurment of air sampled can be obtained.

These pumps leave Galson preset to the flow rate required for the method to be used, or as close as possible. They are set using a DC Lite Dry-Cal calibration unit. DO NOT make any flow adjustments to these units.

It is impossible to use a standard field rotameter, due to the fact these pumps do not have pulsation compensators. The ball in the rotameter would rise and fall with each pulse. These calibrations are only approximate, however, and the stroke counter technique should be used for actual air volume figures.

To use these pumps follow these steps:

1. Record the initial stroke counter reading.
2. Attach the sample media. Be sure the media is facing the correct direction. The air should flow into the media, through the tygon tubing and into the pump via the port labeled "in".
3. Set up tubing so the media is in the breathing zone of the worker to be sampled.
4. Turn on the pump. The on/off switch is located next to the stroke counter. A small screwdriver or the tip of a pen or pencil is all you need to turn it on. DO NOT unscrew the silver cover plate. There is no reason to open this cover. Underneath it is the flow adjuster set screw. This screw is to be adjusted only by Galson Labs personnel.
5. Sample for the desired time period.
6. When finished sampling, turn the pump off.
7. Disconnect and seal the sample tube. Also, be sure to put some type of identifier on the tube for your records.
8. Record the final stroke counter reading and calculate the total air volume collected. Use the following formula:

   Air Volume = (Final Counter Reading – Initial Counter Reading) x Pump Factor

   So, if the initial counter reading was 322563, and we set the pump to 0.05 LPM. The pump was running for exactly 8 hours (which is 480 minutes), the final counter reading is 37008, and the pump factor (shown on the label on the front of the pump) is 0.523 mLs/count, here's how you would do the math:

   370083 – 322563 = 47520 (total number of strokes)
   47520 x 0.523 = 24852.96 mLs. Of air collected (or 24.85296 Liters)

Equipment Failure Questionnaire:

If you experience any type of failure while using any equipment provided by Galson Laboratories, please complete the following questionnaire and affix the provided equipment failure sticker to the applicable equipment. This will assist us in maintaining a fully operational inventory and aid us in providing superior customer service to all our clients. Thank you, in advance, for participating in our quality improvement process.

1. Please list equipment (using Galson barcoded item number) and type of failure.
(ie. Pump P123, Battery B456, Charger C789, shut off after two hours of sampling)

Pump	Battery	Charger	Other	Failure

2. The pump(s) was used for what type of sar Personal____________ Area____________

3. Is it possible that the tubing was kinked or restricted at any time during the sampling event, please explain?

____
____
____

4. What type of environment were the pumps exposed to?

Clean____ Somewhat Clean____ Dusty____ Somewhat Dusty____ Extremely Dusty____

5. Were the pumps fully charged immediately prior to the sampling event, as indicated by a blinking light on the charger?

Yes____ No____

Equipment Failure Questionnaire: Con't.

6. Please list the following times and dates associated with the charging and sampling process:

Time/Date pumps were removed from charger: ______________________________

Time/Date sampling event began: ______________________________

Time/Date sampling event ended: ______________________________

7. Was light on charger flashing when disconnected from pump? Yes____ No____

8. Were pumps pre-calibrated by anyone other than Galson Laboratories prior to use?

Yes____ No____

If yes, what media was used?___ What calibrator was used?__________ What flow rate was set?____________

PowerFlex Battery Charging System

Small and lightweight, the SKC PowerFlex® is an advanced charging system designed for optimal charging for NiCad and NiMH battery packs for SKC personal air sampling pumps. Batteries for up to five different pump models (excluding EX and ATEX models and models with lithium-ion [Li-Ion] batteries) can be charged simultaneously on the five-station PowerFlex.

Pump-specific cables are used to connect battery packs to the PowerFlex so that only one charger is needed for any SKC personal sample pump. PowerFlex fully charges most battery packs in less than six hours, and then automatically switches to a safe pulse trickle charge. Each attached battery pack runs through an independent cycle. An LED at each port indicates battery charge status. Battery packs can be charged attached to or detached from the pump. A red light indicates charging, a green light indicates maintenance trickle charge.

Operation

! Caution !

- PowerFlex line source is UL Listed for electrical safety, but the low voltage charger unit is not. Do not use PowerFlex in hazardous atmospheres, in rain, or in standing water. For indoor use only.
- **Remove pump-specific cables from the charger when they are not in use to avoid shorting.**
- Do not obstruct the cooling fan vent.

1. Ensure the sample pump is off.
   Pocket Pump Note: The Pocket Pump will turn itself on when plugged into the charger.
2. Plug the power supply into the power jack on the back of the PowerFlex.
3. Plug the adapter end of the power cord into the plug on the power supply.
   Plug the free end of the power cord into a wall outlet (100 to 240V).
4. Select the appropriate pump-specific cable.
5. Insert the RJ-45 connector into a charging port on the PowerFlex. The connector should slide easily into the port.
6. Insert the charging plug end of the cable into the charging jack on the appropriate sample pump. The LED at the port will light red to indicate that a charge sequence has been initiated. *Batteries for up to five different pump models can be charged simultaneously on the five-station PowerFlex.*

AirChek 52 Note: PowerFlex may be used with the external or internal charging jack. *See AirChek 52 Operating Instructions.*

222 Pump Note: Push the cable plug into the charging jack on the pump until it clicks. This may require some force.

7. Once the battery pack is fully charged, the LED at the port will change to green to indicate that PowerFlex has switched to a trickle charge to keep the battery at full charge. The battery can be removed at any time after the LED turns green. Detach the battery from the cable and remove the cable from the charger.

Attention Pocket Pump Users!
The PowerFlex LED will remain red throughout the entire charging process when used to charge a Pocket Pump battery pack. Pocket Pump contains circuitry that controls the charging process instead of PowerFlex controlling it.

Charging with battery attached to Pocket Pump: Charge duration is 6 hours. Pocket Pump will indicate end of charge on its LCD and switch to trickle charge. *The PowerFlex LED will remain red throughout the entire charge process.*

Charging with battery detached from Pocket Pump: Charge duration is 16 hours. The battery will only accept slow charge when detached from the pump. *The PowerFlex LED will remain red during the entire charging process.*

Exhibit 2

EXHIBIT 2

TOTAL DUST								
Sample No.	Department/Area	Activity	Date	Time	Volume (L)	Substance	Results (mg/m³)	OSHA PEL (mg/m³)
424513	RTF - Supervisor	Supervisor	8/22/2008	6:33-9:11	316	Total Dust	0.41	15
424511	RTF - West	Washing/Cleaning Gondolas	8/25/2008	9:20-12:30	382	Total Dust	1.00	15
424514	RTF - West	Washing/Cleaning Gondolas	8/25/2008	9:22-12:30	382	Total Dust	1.50	15
424515	RTF - West	Excavator Operation	8/26/2008	9:44-1:13	420	Total Dust	0.41	15
424516	RTF-East	Sweeping/Shoveling Gondolas	8/26/2008	9:42-1:08	399.8	Total Dust	0.53	15
424507	RTF-East	Sweeping/Shoveling Gondolas	8/20/2008	8:30-12:28	459.9	Total Dust	0.83	15
424508	RTF-East	Excavator Operation	8/20/2008	8:30-12:25	459.5	Total Dust	0.41	15
424509	RTF-East	Field Technician	8/21/2008	6:50-10:10	400	Total Dust	0.49	15
424510	RTF-East	Excavator Operation	8/21/2008	6:50-10:13	406	Total Dust	0.29	15
424512	RTF-East	Sweeping/Shoveling Gondolas	8/22/2008	6:45-10:02	386.1	Total Dust	0.41	15
424648	BLANK	N/A	8/26/2008	N/A	N/A	Total Dust	0.00	15

RESPIRABLE DUST								
Sample No.	Department/Area	Activity	Date	Time	Volume (L)	Substance	Results (mg/m³)	OSHA PEL (mg/m³)
424639	RTF - East	Sweeping/Shoveling Gondolas	8/20/2008	8:24-12:26	585.6	Respirable Fraction Dust	0.17	5
424638	RTF - East	Sweeping/Shoveling Gondolas	8/20/2008	8:22-12:30	607.6	Respirable Fraction Dust	0.17	5
424641	RTF - East	Sweeping/Shoveling Gondolas	8/21/2008	6:50-10:13	491.2	Respirable Fraction Dust	0.20	5
424640	Supervisor	Supervisor	8/21/2008	6:35-9:27	430	Respirable Fraction Dust	0.23	5
424647	RTF - East	Excavator Operation	8/22/2008	6:20-10:00	532.4	Respirable Fraction Dust	0.19	5
424645	RTF - East	Field Tech and Sweep/Shoveling	8/22/2008	6:40-9:59	477.6	Respirable Fraction Dust	0.21	5
424642	RTF - West	Sweeping/Shoveling Gondolas	8/25/2008	9:15-12:30	469.4	Respirable Fraction Dust	0.23	5
424643	RTF - East	Sweeping/Shoveling Gondolas	8/25/2008	9:11-12:30	492.5	Respirable Fraction Dust	0.20	5
424646	RTF - East	Field Tech and Sweep/Shoveling	8/26/2008	9:40-1:09	505.7	Respirable Fraction Dust	0.20	5
424644	RTF - East	Field Technician	8/26/2008	9:38-1:08	503.3	Respirable Fraction Dust	0.20	5
424649	BLANK	BLANK	8/26/2008	N/A	N/A	Respirable Fraction Dust	0.00	5

Exhibit 3

Mr. Terry Geis
US Ecology Idaho
P.O. Box 400
Grand View, ID 83624

September 08, 2008

DOH ELAP# 11626 Account# 15113 Login# L179489

Dear Mr. Geis:

Enclosed are the analytical results for the samples received by our laboratory on August 30, 2008. All test results meet the quality control requirements of AIHA and NELAC unless otherwise stated in this report. All samples on the chain of custody were received in good condition unless otherwise noted.

Results in this report are based on the sampling data provided by the client and refer only to the samples as they were received at the laboratory. Unless otherwise requested, all samples will be discarded 14 days from the date of this report.

Please contact Caroline Hudson at (877) 386-0035, if you would like any additional information regarding this report.

Thank you for using Galson Laboratories.

Sincerely,

Galson Laboratories

F Joseph Unangst

F. Joseph Unangst
Laboratory Director

Enclosure(s)

LABORATORY ANALYSIS REPORT

GALSON LABORATORIES
6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.galsonlabs.com

Client : US Ecology Idaho
Site : US Ecology-RTF

Date Sampled : 20-AUG-08 - 26-AUG-08
Date Received : 30-AUG-08
Date Analyzed : 05-SEP-08
Report ID : 586984

Account No.: 15113
Login No. : L179489

Respirable Dust

Sample ID	Lab ID	Air Vol liter	Total mg	Conc mg/m3
424639	L179489-1	585.6	<0.10	<0.17
424638	L179489-2	607.6	0.10	0.17
424641	L179489-3	491.2	<0.10	<0.20
424640	L179489-4	430	<0.10	<0.23
424647	L179489-5	532.4	<0.10	<0.19
424645	L179489-6	477.6	<0.10	<0.21
424642	L179489-7	469.4	0.11	0.23
424643	L179489-8	492.5	<0.10	<0.20
424646	L179489-9	505.7	<0.10	<0.20
424644	L179489-10	503.3	<0.10	<0.20
424649 BLANK	L179489-11	NA	<0.10	NA

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Level of quantitation: 0.10 mg
Analytical Method : NIOSH 0600; GRAV
OSHA PEL (TWA) : PNOR 5 mg/m3
Collection Media : PVC PW

Submitted by: LRS
Approved by : KRK
Date : 05-SEP-08 NYS DOH # : 11626
QC by: Tony D'Amico

< -Less Than
> -Greater Than
NA -Not Applicable
mg -Milligrams
ug -Micrograms
ND -Not Detected
m3 -Cubic Meters
l -Liters
ppm -Parts per Million
kg -Kilograms
NS -Not Specified

LABORATORY ANALYSIS REPORT

GALSON LABORATORIES
6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.galsonlabs.com

Client : US Ecology Idaho
Site : US Ecology-RTF

Date Sampled : 20-AUG-08 - 26-AUG-08
Date Received : 30-AUG-08
Date Analyzed : 05-SEP-08 - 08-SEP-08
Report ID : 536985

Account No.: 15113
Login No. : L179489

Total Dust

Sample ID	Lab ID	Air Vol liter	Total mg	Conc mg/m3
424513	L179489-12	316	0.13	0.41
424511	L179489-13	382	0.39	1.0
424514	L179489-14	382	0.56	1.5
424515	L179489-15	420	0.17	0.41
424516	L179489-16	399.8	0.21	0.53
424507	L179489-17	459.9	0.38	0.83
424508	L179489-18	459.5	0.19	0.41
424509	L179489-19	400	0.20	0.49
424510	L179489-20	406	0.12	0.29
424512	L179489-21	386.1	0.16	0.41
424648	L179489-22	NA	<0.10	NA

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Level of quantitation: 0.10 mg
Analytical Method : NIOSH 0500; GRAV
OSHA PEL (TWA) : PNOR 15 mg/m3
Collection Media : PVC PW

Submitted by: LRS,KMP
Approved by : KRK
Date : 08-SEP-08 NYS DOH # : 11626
QC by: Tony D'Amico

< -Less Than
> -Greater Than
NA -Not Applicable
mg -Milligrams
ug -Micrograms
ND -Not Detected
m3 -Cubic Meters
l -Liters
ppm -Parts per Million
kg -Kilograms
NS -Not Specified

GALSON LABORATORIES

LABORATORY FOOTNOTE REPORT

6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.galsonlabs.com

Client Name : US Ecology Idaho
Site : US Ecology-RTS

Date Sampled : 20-AUG-08 - 26-AUG-08
Date Received : 30-AUG-08
Date Analyzed : 05-SEP-08 - 08-SEP-08

Account No.: 15113
Login No. : L179489

Unless otherwise noted below, all quality control results associated with the samples were within established control limits.

Unrounded results are carried through the calculations that yield the final result and the final result is rounded to the number of significant figures appropriate to the accuracy of the analytical method. Please note that results appearing in the columns preceding the final result column may have been rounded in order to fit the report format and therefore, if carried through the calculations, may not yield an identical final result to the one reported.

The stated LOQs for each analyte represent the demonstrated LOQ concentrations prior to correction for desorption efficiency (if applicable).

L179489 (Report ID: 586984) : PNOR - Particulates Not Otherwise Regulated:
SOPs: lo-dust(4)
There is an average weight loss of 0.028 mg +/- 0.050 mg (95% confidence level) per PVC sample filter. The sample results have not been corrected for the average loss.

L179489 (Report ID: 586985) : PNOR - Particulates Not Otherwise Regulated:
SOPs: lo-dust(4)
There is an average weight loss of [illegible] mg +/- 0.050 mg (95% confidence level) per PVC sample filter. The sample results have not been corrected for the average loss.

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms
> -Greater Than	ug -Micrograms	L -Liters	NS -Not Specified
NA -Not Applicable	ND -Not Detected	ppm -Parts per Million	

73

GALSON LABORATORIES
6601 Kirkville Rd
East Syracuse, NY 13057
Tel: (315) 432-5227
888-432-LABS (5227)
Fax: (315) 437-0571
www.galsonlabs.com

☐ Check if change of address

New Client ? ☐ yes ☑ no

Report To: TERRI GEIS / Jim Hancock
P.O. Box 400
Grand View Idaho 83647
Phone No: 800/274-1516 x 318
Fax No: 208/834-2919

Invoice To: Jim Hancock
P.O. Box 400
Grand View, ID 83647
Phone No: 800/274-1516 x 318
Fax No: 208/834-2919

Site Name: US Ecology - RTF
Project:
Sampled By: PARKER Hancock

Need Results By:	(surcharge)
☑ 5 Business Days	0%
☐ 4 Business Days	35%
☐ 3 Business Days	50%
☐ 2 Business Days	75%
☐ Next Day by 6pm	100%
☐ Next Day by Noon	150%
☐ Same day	200%

☒ Samples submitted using the FreePumpLoan™ Program.
☐ Samples submitted using the FreeSamplingBadges™ Program.

Client Account No: 11513
Purchase Order No:
Credit Card No:
Card Holder Name:
Exp:
Email / Fax Results To:
Email Address:
Fax No:

Page 5 of 6 Report Reference

Sample Identification	Date Sampled	Collection Medium	*Air Volume (Liters)	Passive Monitors (Min)	Analysis Requested	Method Reference	Specific DL Needed
424639	8/20-08	3P PVC	585.6		NIOSH 0600	RESP DUST	
424638	8/20-08	3P	607.6				
424641	8/21-08	3P	491.2				
424640	8/21-08	3P	430.0				
424647	8/22-08	3P	532.4				
424645	8/22-08	3P	477.6				
424642	8/25-08	3P	469.4				
424643	8/25-08	3P	492.5				
~~424647~~ 424646	8/26-08	3P	505.7				
424644	8/26-08	3P	503.3				
424649-Blank			0				

☐ Yes ☐ No We normally add a laboratory blank for each analyte. We will charge you for this at our normal rate. If you agree please check "Yes" otherwise check "No".

List description of industry or process / interference's present in sampling area:

Comments:

Chain of Custody	Print Name	Signature	Date/Time
Relinquished by:	James L. Hancock	[signature]	8/29-08 / 1200
Received by LAB:	BRIAN CANNS	Brian Cannes	8/30/08 1000

Login #:

Samples received after 3pm will be considered as next day's business.

* sample collection time X LPM = Air Vol.

LAB ORIGINAL

GALSON LABORATORIES
6601 Kirkville Rd
East Syracuse, NY 13057
Tel: (315) 432-5227
888-432-LABS (5227)
Fax: (315) 437-0571
www.galsonlabs.com

☐ Check if change of address

New Client? ☐ yes ☑ no

Report To: Terry Geis TGEIS@americanecology.com
Jhancock@USEcology.com
T. Geis/Jim Hancock
P.O. 400 Grand View, ID 83647
Phone No: 800/274-1516 X318
Fax No: 208/834-2919

Invoice To: Jim Hancock
USEcology-Idaho
PO Box 400
Grand View, ID 83647
Phone No: 800/274-1516 X318
Fax No: 208/834-2919

Site Name: US Ecology-RTF   Project: Sampled By: Parker/Hancock

Need Results By:	(surcharge)
☑ 5 Business Days	0%
☐ 4 Business Days	35%
☐ 3 Business Days	50%
☐ 2 Business Days	75%
☐ Next Day by 6pm	100%
☐ Next Day by Noon	150%
☐ Same day	200%

☑ Samples submitted using the FreePumpLoan™ Program.
☐ Samples submitted using the FreeSamplingBadges™ Program.

Client Account No.: 11513
Purchase Order No.:
Credit Card No.:
Card Holder Name: Exp:

Email / Fax Results To: TGEIS@americanecology.com
Email Address: Jhancock@USEcology.com   Fax No: 208/834-2919

Sample Identification	Date Sampled	Collection Medium	Air Volume (Liters)	Passive Monitors (Min)	Analysis Requested	Method Reference	Specific DL Needed
		2pc					
1. 424513	8/22-08	5µ PVC	316.0		NIOSH 0500	Total Dust	
2. 424511	8/25-08	5µ PVC	382.0		↓	↓	
3. 424514	8/25-08	5µ PVC	382.0				
4. 424515	8/26-08	5µ PVC	420.0				
5. 424516	8/26-08	5µ PVC	399.8				
6. 424507	8/20-08	5µ PVC	459.9				
7. ~~424639~~ 424508	8/20-08	5µ PVC	459.5				
8. 424509	8/21-08	5µ PVC	400.0				
9. 424510	8/21-08	5µ PVC	406.0				
10. 424572 - [illegible]	8/22-08	5µ PVC	386.1				
11. 424649 - Blank		3pc	0				

☑ Yes ☐ No We normally add a laboratory blank for each analyte. We will charge you for this at our normal rate. If you agree please check "Yes" otherwise check "No".

List description of industry or process / interference's present in sampling area:

Comments:

Chain of Custody	Print Name	Signature	Date/Time
Relinquished by:	James L. Hancock	[signature]	8/29-08 / 1200
Received by LAB:	BRIAN CARUSO	[signature]	8/30/08 1000

Samples received after 3pm will be considered as next day's business.   * sample collection time X LPM = Air Vol.

LAB ORIGINAL

Page 6 of 6 Report Reference

ATTACHMENT 3

RESRAD, Summary: EGL Vadose Zone Analysis

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: FGR 12)	4.951E-04	4.951E-04	DCF1(1)
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(2)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(3)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(4)
A-1	Bi-211 (Source: FGR 12)	2.559E-01	2.559E-01	DCF1(5)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(6)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(7)
A-1	Fr-223 (Source: FGR 12)	1.980E-01	1.980E-01	DCF1(8)
A-1	Pa-231 (Source: FGR 12)	1.906E-01	1.906E-01	DCF1(9)
A-1	Pa-234 (Source: FGR 12)	1.155E+01	1.155E+01	DCF1(10)
A-1	Pa-234m (Source: FGR 12)	8.967E-02	8.967E-02	DCF1(11)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(12)
A-1	Pb-211 (Source: FGR 12)	3.064E-01	3.064E-01	DCF1(13)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(14)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(15)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(16)
A-1	Po-211 (Source: FGR 12)	4.764E-02	4.764E-02	DCF1(17)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(18)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(19)
A-1	Po-215 (Source: FGR 12)	1.016E-03	1.016E-03	DCF1(20)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(21)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(22)
A-1	Ra-223 (Source: FGR 12)	6.034E-01	6.034E-01	DCF1(23)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(24)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(25)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(26)
A-1	Rn-219 (Source: FGR 12)	3.083E-01	3.083E-01	DCF1(27)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(28)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(29)
A-1	Tc-99 (Source: FGR 12)	1.255E-04	1.255E-04	DCF1(30)
A-1	Th-227 (Source: FGR 12)	5.212E-01	5.212E-01	DCF1(31)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(32)
A-1	Th-230 (Source: FGR 12)	1.209E-03	1.209E-03	DCF1(33)
A-1	Th-231 (Source: FGR 12)	3.643E-02	3.643E-02	DCF1(34)
A-1	Th-232 (Source: FGR 12)	5.212E-04	5.212E-04	DCF1(35)
A-1	Th-234 (Source: FGR 12)	2.410E-02	2.410E-02	DCF1(36)
A-1	Tl-207 (Source: FGR 12)	1.980E-02	1.980E-02	DCF1(37)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(38)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(39)
A-1	U-234 (Source: FGR 12)	4.017E-04	4.017E-04	DCF1(40)
A-1	U-235 (Source: FGR 12)	7.211E-01	7.211E-01	DCF1(41)
A-1	U-238 (Source: FGR 12)	1.031E-04	1.031E-04	DCF1(42)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.724E+00	6.700E+00	DCF2(1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(2)
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(3)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(4)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(5)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
B-1	Tc-99	8.320E-06	8.320E-06	DCF2(6)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(7)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(8)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(9)
B-1	U-234	1.320E-01	1.320E-01	DCF2(10)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(11)
B-1	U-238	1.180E-01	1.180E-01	DCF2(12)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(13)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.410E-02	DCF3(1)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(2)
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(3)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(4)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(5)
D-1	Tc-99	1.460E-06	1.460E-06	DCF3(6)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(7)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(8)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(9)
D-1	U-234	2.830E-04	2.830E-04	DCF3(10)
D-1	U-235+D	2.673E-04	2.660E-04	DCF3(11)
D-1	U-238	2.550E-04	2.550E-04	DCF3(12)
D-1	U-238+D	2.687E-04	2.550E-04	DCF3(13)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(5,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,3)
D-34				
D-34	Tc-99 , plant/soil concentration ratio, dimensionless	5.000E+00	5.000E+00	RTF(6,1)
D-34	Tc-99 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Tc-99 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(6,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(8,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(9,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(10,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(13,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(13,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(5,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(5,2)
D-5				
D-5	Tc-99 , fish	2.000E+01	2.000E+01	BIOFAC(6,1)
D-5	Tc-99 , crustacea and mollusks	5.000E+00	5.000E+00	BIOFAC(6,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(7,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(7,2)
D-5				

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(8,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(9,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(9,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(10,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(10,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(11,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(11,2)
D-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(12,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(13,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	8.094E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.360E+01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	5.820E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-226	2.500E-02	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Tc-99	6.750E-01	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Th-232	3.000E-02	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): U-234	2.825E+00	0.000E+00	---	S1(10)
R012	Initial principal radionuclide (pCi/g): U-235	8.250E-02	0.000E+00	---	S1(11)
R012	Initial principal radionuclide (pCi/g): U-238	4.500E-01	0.000E+00	---	S1(12)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Tc-99	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(10)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(11)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(12)
R013	Cover depth (m)	3.600E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.780E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-04	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	7.500E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.840E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.300E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	4.000E-01	2.000E-01	---	EPSZ

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Saturated zone field capacity	4.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	2.500E+01	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.000E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	5	1	---	NS
R015	Unsat. zone 1, thickness (m)	1.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.630E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	5.200E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	1.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	4.500E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	1.100E+01	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.500E-02	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	4.600E+00	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.690E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	3.400E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	3.300E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, field capacity	7.000E-02	2.000E-01	---	FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	2.000E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	2.200E+03	1.000E+01	---	HCUZ(2)
R015	Unsat. zone 3, thickness (m)	2.130E+01	0.000E+00	---	H(3)
R015	Unsat. zone 3, soil density (g/cm**3)	1.300E+00	1.500E+00	---	DENSUZ(3)
R015	Unsat. zone 3, total porosity	5.200E-01	4.000E-01	---	TPUZ(3)
R015	Unsat. zone 3, effective porosity	4.000E-01	2.000E-01	---	EPUZ(3)
R015	Unsat. zone 3, field capacity	4.900E-01	2.000E-01	---	FCUZ(3)
R015	Unsat. zone 3, soil-specific b parameter	3.000E+00	5.300E+00	---	BUZ(3)
R015	Unsat. zone 3, hydraulic conductivity (m/yr)	9.000E+02	1.000E+01	---	HCUZ(3)
R015	Unsat. zone 4, thickness (m)	1.680E+01	0.000E+00	---	H(4)
R015	Unsat. zone 4, soil density (g/cm**3)	1.310E+00	1.500E+00	---	DENSUZ(4)
R015	Unsat. zone 4, total porosity	4.900E-01	4.000E-01	---	TPUZ(4)
R015	Unsat. zone 4, effective porosity	4.300E-01	2.000E-01	---	EPUZ(4)
R015	Unsat. zone 4, field capacity	4.800E-01	2.000E-01	---	FCUZ(4)
R015	Unsat. zone 4, soil-specific b parameter	5.000E+00	5.300E+00	---	BUZ(4)
R015	Unsat. zone 4, hydraulic conductivity (m/yr)	6.000E+01	1.000E+01	---	HCUZ(4)
R015	Unsat. zone 5, thickness (m)	1.220E+01	0.000E+00	---	H(5)
R015	Unsat. zone 5, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(5)
R015	Unsat. zone 5, total porosity	5.200E-01	4.000E-01	---	TPUZ(5)
R015	Unsat. zone 5, effective porosity	1.500E-01	2.000E-01	---	EPUZ(5)
R015	Unsat. zone 5, field capacity	3.200E-01	2.000E-01	---	FCUZ(5)
R015	Unsat. zone 5, soil-specific b parameter	8.000E+00	5.300E+00	---	BUZ(5)
R015	Unsat. zone 5, hydraulic conductivity (m/yr)	1.000E-01	1.000E+01	---	HCUZ(5)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,2)
R016	Unsaturated zone 3 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,3)
R016	Unsaturated zone 4 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,4)
R016	Unsaturated zone 5 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,5)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.454E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for Tc-99				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(6,1)
R016	Unsaturated zone 2 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(6,2)
R016	Unsaturated zone 3 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(6,3)
R016	Unsaturated zone 4 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(6,4)
R016	Unsaturated zone 5 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(6,5)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.031E-02	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU(9,1)
R016	Unsaturated zone 2 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(9,2)
R016	Unsaturated zone 3 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(9,3)
R016	Unsaturated zone 4 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(9,4)
R016	Unsaturated zone 5 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(9,5)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.382E-07	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(10,1)
R016	Unsaturated zone 2 (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCU(10,2)
R016	Unsaturated zone 3 (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCU(10,3)
R016	Unsaturated zone 4 (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCU(10,4)
R016	Unsaturated zone 5 (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCU(10,5)
R016	Saturated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.897E-05	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(11,1)
R016	Unsaturated zone 2 (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCU(11,2)
R016	Unsaturated zone 3 (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCU(11,3)
R016	Unsaturated zone 4 (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCU(11,4)
R016	Unsaturated zone 5 (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCU(11,5)
R016	Saturated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.897E-05	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(12,1)
R016	Unsaturated zone 2 (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCU(12,2)
R016	Unsaturated zone 3 (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCU(12,3)
R016	Unsaturated zone 4 (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCU(12,4)
R016	Unsaturated zone 5 (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCU(12,5)
R016	Saturated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.897E-05	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,2)
R016	Unsaturated zone 3 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,3)
R016	Unsaturated zone 4 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,4)
R016	Unsaturated zone 5 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,5)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.540E-05	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,2)
R016	Unsaturated zone 3 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,3)
R016	Unsaturated zone 4 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,4)
R016	Unsaturated zone 5 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,5)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.433E-05	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,2)
R016	Unsaturated zone 3 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,3)
R016	Unsaturated zone 4 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,4)
R016	Unsaturated zone 5 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,5)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.719E-05	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(5,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(5,2)
R016	Unsaturated zone 3 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(5,3)
R016	Unsaturated zone 4 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(5,4)
R016	Unsaturated zone 5 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(5,5)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.454E-05	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(7,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(7,2)
R016	Unsaturated zone 3 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(7,3)
R016	Unsaturated zone 4 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(7,4)
R016	Unsaturated zone 5 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(7,5)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.870E-08	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(8,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(8,2)
R016	Unsaturated zone 3 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(8,3)
R016	Unsaturated zone 4 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(8,4)
R016	Unsaturated zone 5 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(8,5)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.870E-08	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R017	Inhalation rate (m**3/yr)	8.400E-03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.100E+01	FMEAT
R018	Contamination fraction of milk	-1	-1	0.100E+01	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	1.000E+00	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.500E-01	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	2.400E+00	---	DENSFL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Total porosity of the cover material	4.130E-01	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	2.650E-02	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	3.000E-02	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	7.233E-07	2.000E-06	---	DIFCV
R021	in foundation material	3.000E-07	3.000E-07	---	DIFFL
R021	in contaminated zone soil	3.000E-07	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	1.500E+00	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	1.000E+00	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	0.000E+00	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.500E-01	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	512	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	1	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	suppressed
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	active
Find peak pathway doses	active

Summary : EGL Vadose Zone Analysis
File : C:\RESRAD_FAMILY\RESRAD\WEC RAI 2YR 2MT.RAD

Contaminated Zone Dimensions

Area:	80936.00 square meters
Thickness:	33.60 meters
Cover Depth:	3.60 meters

Initial Soil Concentrations, pCi/g

Ra-226	2.500E-02
Tc-99	6.750E-01
Th-232	3.000E-02
U-234	2.825E+00
U-235	8.250E-02
U-238	4.500E-01

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	4.821E-04	4.820E-04	4.817E-04	4.808E-04	4.781E-04	4.695E-04	1.704E+00	1.761E-03
M(t):	1.928E-05	1.928E-05	1.927E-05	1.923E-05	1.912E-05	1.878E-05	6.818E-02	7.046E-05

Maximum TDOSE(t): 2.931E+00 mrem/yr at t = 246.9 ± 0.5 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.469E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	2.240E-22	0.0000	0.000E+00	0.0000	4.490E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	5.199E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	3.243E-24	0.0000	0.000E+00	0.0000	6.501E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.956E-31	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	6.098E-27	0.0000	0.000E+00	0.0000	2.439E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.202E-19	0.0000	0.000E+00	0.0000	4.555E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.469E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.490E-04	0.0002
Tc-99	2.384E+00	0.8136	0.000E+00	0.0000	0.000E+00	0.0000	4.223E-01	0.1441	5.636E-03	0.0019	1.180E-01	0.0403	2.930E+00	0.9998
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.199E-19	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.501E-06	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.956E-31	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.439E-10	0.0000
Total	2.384E+00	0.8136	0.000E+00	0.0000	0.000E+00	0.0000	4.223E-01	0.1441	5.636E-03	0.0019	1.180E-01	0.0403	2.931E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Ra-226	1.804E-22	0.0000	0.000E+00	0.0000	4.821E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.550E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.325E-29	0.0000	0.000E+00	0.0000	3.542E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.095E-27	0.0000	0.000E+00	0.0000	3.998E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.731E-21	0.0000	0.000E+00	0.0000	4.821E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.821E-04	1.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.550E-21	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.542E-11	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.998E-18	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.821E-04	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.805E-22	0.0000	0.000E+00	0.0000	4.820E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.566E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	9.286E-29	0.0000	0.000E+00	0.0000	2.479E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.101E-27	0.0000	0.000E+00	0.0000	5.997E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.584E-20	0.0000	0.000E+00	0.0000	4.820E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.820E-04	1.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.566E-20	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.479E-10	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.997E-17	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.820E-04	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.808E-22	0.0000	0.000E+00	0.0000	4.817E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	6.239E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	4.919E-28	0.0000	0.000E+00	0.0000	1.310E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.114E-27	0.0000	0.000E+00	0.0000	6.997E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.257E-20	0.0000	0.000E+00	0.0000	4.817E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.817E-04	1.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.239E-20	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.310E-09	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.997E-16	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.817E-04	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.819E-22	0.0000	0.000E+00	0.0000	4.807E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.346E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	4.437E-27	0.0000	0.000E+00	0.0000	1.172E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.158E-27	0.0000	0.000E+00	0.0000	1.856E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.347E-19	0.0000	0.000E+00	0.0000	4.808E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.807E-04	1.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.346E-19	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.172E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.856E-14	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.808E-04	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.852E-22	0.0000	0.000E+00	0.0000	4.780E-04	0.9998	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	3.923E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	3.829E-26	0.0000	0.000E+00	0.0000	9.883E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.287E-27	0.0000	0.000E+00	0.0000	4.542E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	3.925E-19	0.0000	0.000E+00	0.0000	4.781E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.780E-04	0.9998
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.923E-19	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.883E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.542E-13	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.781E-04	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.969E-22	0.0000	0.000E+00	0.0000	4.685E-04	0.9977	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	4.410E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	4.509E-25	0.0000	0.000E+00	0.0000	1.073E-06	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.779E-27	0.0000	0.000E+00	0.0000	1.628E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.412E-19	0.0000	0.000E+00	0.0000	4.695E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.685E-04	0.9977
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.410E-19	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.073E-06	0.0023
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.628E-11	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.695E-04	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	2.347E-22	0.0000	0.000E+00	0.0000	4.422E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	5.518E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	5.089E-24	0.0000	0.000E+00	0.0000	9.590E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.660E-31	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	6.714E-27	0.0000	0.000E+00	0.0000	4.377E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.521E-19	0.0000	0.000E+00	0.0000	4.518E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.422E-04	0.0003
Tc-99	1.386E+00	0.8134	0.000E+00	0.0000	0.000E+00	0.0000	2.456E-01	0.1441	3.284E-03	0.0019	6.867E-02	0.0403	1.704E+00	0.9997
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.518E-19	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.590E-06	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.660E-31	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.377E-10	0.0000
Total	1.386E+00	0.8134	0.000E+00	0.0000	0.000E+00	0.0000	2.456E-01	0.1441	3.284E-03	0.0019	6.867E-02	0.0403	1.704E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	4.336E-22	0.0000	0.000E+00	0.0000	3.636E-04	0.2064	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.209E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.278E-22	0.0000	0.000E+00	0.0000	1.072E-04	0.0609	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	3.052E-30	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	3.876E-26	0.0000	0.000E+00	0.0000	1.662E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.210E-18	0.0000	0.000E+00	0.0000	4.708E-04	0.2673	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.636E-04	0.2064
Tc-99	1.050E-03	0.5961	0.000E+00	0.0000	0.000E+00	0.0000	1.860E-04	0.1056	2.487E-06	0.0014	5.201E-05	0.0295	1.291E-03	0.7327
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.209E-18	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.072E-04	0.0609
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.052E-30	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.662E-08	0.0000
Total	1.050E-03	0.5961	0.000E+00	0.0000	0.000E+00	0.0000	1.860E-04	0.1056	2.487E-06	0.0014	5.201E-05	0.0295	1.761E-03	1.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226+D	Ra-226+D	1.000E+00	1.928E-02	1.928E-02	1.927E-02	1.923E-02	1.912E-02	1.874E-02	1.769E-02	1.454E-02
Ra-226+D	Pb-210+D	1.000E+00	4.023E-32	1.192E-31	2.706E-31	7.380E-31	1.667E-30	2.837E-30	3.738E-30	8.329E-30
Ra-226+D	∑DSR(j)		1.928E-02	1.928E-02	1.927E-02	1.923E-02	1.912E-02	1.874E-02	1.769E-02	1.454E-02
Tc-99	Tc-99	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.524E+00	1.912E-03
Th-232	Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	Ra-228+D	1.000E+00	1.508E-24	4.300E-24	8.990E-24	1.896E-23	2.652E-23	3.017E-23	4.054E-23	1.140E-22
Th-232	Th-228+D	1.000E+00	8.501E-20	5.221E-19	2.080E-18	7.819E-18	1.308E-17	1.470E-17	1.839E-17	4.031E-17
Th-232	∑DSR(j)		8.501E-20	5.221E-19	2.080E-18	7.819E-18	1.308E-17	1.470E-17	1.839E-17	4.031E-17
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Ra-226+D	1.000E+00	1.254E-11	8.775E-11	4.638E-10	4.149E-09	3.498E-08	3.798E-07	3.395E-06	3.794E-05
U-234	Pb-210+D	1.000E+00	1.313E-41	1.959E-40	2.259E-39	5.744E-38	1.256E-36	3.310E-35	5.743E-34	2.017E-32
U-234	∑DSR(j)		1.254E-11	8.775E-11	4.638E-10	4.149E-09	3.498E-08	3.798E-07	3.395E-06	3.794E-05
U-235+D	U-235+D	1.000E+00	1.591E-39	1.595E-39	1.603E-39	1.630E-39	1.710E-39	2.024E-39	3.276E-39	1.767E-38
U-235+D	Pa-231	1.000E+00	5.881E-39	1.768E-38	4.141E-38	1.260E-37	3.810E-37	1.445E-36	6.463E-36	8.803E-35
U-235+D	Ac-227+D	1.000E+00	3.844E-35	2.670E-34	1.387E-33	1.169E-32	8.424E-32	6.057E-31	3.224E-30	3.699E-29
U-235+D	∑DSR(j)		3.845E-35	2.670E-34	1.388E-33	1.169E-32	8.424E-32	6.057E-31	3.224E-30	3.699E-29
U-238	U-238	5.400E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238+D	U-238+D	9.999E-01	9.099E-27	9.113E-27	9.141E-27	9.240E-27	9.527E-27	1.060E-26	1.440E-26	4.208E-26
U-238+D	U-234	9.999E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238+D	Th-230	9.999E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238+D	Ra-226+D	9.999E-01	8.885E-18	1.333E-16	1.555E-15	4.125E-14	1.009E-12	3.618E-11	9.728E-10	3.694E-08
U-238+D	Pb-210+D	9.999E-01	0.000E+00	0.000E+00	5.605E-45	4.358E-43	2.836E-41	2.644E-39	1.505E-37	1.903E-35
U-238+D	∑DSR(j)		8.885E-18	1.333E-16	1.555E-15	4.125E-14	1.009E-12	3.618E-11	9.728E-10	3.694E-08

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	1.296E+03	1.297E+03	1.298E+03	1.300E+03	1.308E+03	1.334E+03	1.413E+03	1.719E+03
Tc-99	*1.697E+10	*1.697E+10	*1.697E+10	*1.697E+10	*1.697E+10	*1.697E+10	9.903E+00	1.308E+04
Th-232	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05
U-234	*6.247E+09	*6.247E+09	*6.247E+09	6.025E+09	7.146E+08	6.583E+07	7.365E+06	6.589E+05
U-235	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06
U-238	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 246.9 ± 0.5 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-226	2.500E-02	0.000E+00	1.928E-02	1.296E+03	1.796E-02	1.392E+03
Tc-99	6.750E-01	246.9 ± 0.5	4.341E+00	5.759E+00	4.341E+00	5.759E+00
Th-232	3.000E-02	1.000E+03	4.031E-17	*1.097E+05	1.733E-17	*1.097E+05
U-234	2.825E+00	1.000E+03	3.794E-05	6.589E+05	2.301E-06	1.086E+07
U-235	8.250E-02	1.000E+03	3.699E-29	*2.161E+06	2.371E-30	*2.161E+06
U-238	4.500E-01	1.000E+03	3.694E-08	*3.361E+05	5.421E-10	*3.361E+05

*At specific activity limit

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	Ra-226	1.000E+00	4.821E-04	4.820E-04	4.817E-04	4.807E-04	4.780E-04	4.685E-04	4.422E-04	3.636E-04
Ra-226	U-234	1.000E+00	3.542E-11	2.479E-10	1.310E-09	1.172E-08	9.883E-08	1.073E-06	9.590E-06	1.072E-04
Ra-226	U-238	9.999E-01	3.998E-18	5.997E-17	6.997E-16	1.856E-14	4.542E-13	1.628E-11	4.377E-10	1.662E-08
Ra-226	∑DOSE(j)		4.821E-04	4.820E-04	4.817E-04	4.808E-04	4.781E-04	4.695E-04	4.518E-04	4.708E-04
Pb-210	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.167E-32	7.093E-32	9.346E-32	2.082E-31
Pb-210	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	U-238	9.999E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	∑DOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.167E-32	7.093E-32	9.346E-32	2.082E-31
Tc-99	Tc-99	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.704E+00	1.291E-03
Th-232	Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-228	Th-232	1.000E+00	4.525E-26	1.290E-25	2.697E-25	5.689E-25	7.955E-25	9.051E-25	1.216E-24	3.419E-24
Th-228	Th-232	1.000E+00	2.550E-21	1.566E-20	6.239E-20	2.346E-19	3.923E-19	4.410E-19	5.518E-19	1.209E-18
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	U-238	9.999E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	∑DOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	U-238	9.999E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	∑DOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ac-227	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.660E-31	3.052E-30
U-238	U-238	5.400E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	9.999E-01	4.095E-27	4.101E-27	4.114E-27	4.158E-27	4.287E-27	4.772E-27	6.482E-27	1.894E-26
U-238	∑DOSE(j)		4.095E-27	4.101E-27	4.114E-27	4.158E-27	4.287E-27	4.772E-27	6.482E-27	1.894E-26

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	Ra-226	1.000E+00	2.500E-02	2.499E-02	2.497E-02	2.489E-02	2.466E-02	2.388E-02	2.179E-02	1.582E-02
Ra-226	U-234	1.000E+00	0.000E+00	5.507E-09	4.955E-08	5.499E-07	4.932E-06	5.414E-05	4.709E-04	4.657E-03
Ra-226	U-238	9.999E-01	0.000E+00	6.290E-16	2.238E-14	6.280E-13	2.229E-11	8.175E-10	2.146E-08	7.218E-07
Ra-226	∑S(j):		2.500E-02	2.499E-02	2.497E-02	2.489E-02	2.466E-02	2.394E-02	2.226E-02	2.048E-02
Pb-210	Ra-226	1.000E+00	0.000E+00	7.649E-04	2.224E-03	6.662E-03	1.504E-02	2.309E-02	2.210E-02	1.604E-02
Pb-210	U-234	1.000E+00	0.000E+00	5.662E-11	1.505E-09	5.283E-08	1.234E-06	3.009E-05	3.822E-04	4.387E-03
Pb-210	U-238	9.999E-01	0.000E+00	6.402E-18	5.121E-16	6.055E-14	4.363E-12	3.808E-10	1.592E-08	6.588E-07
Pb-210	∑S(j):		0.000E+00	7.649E-04	2.224E-03	6.662E-03	1.504E-02	2.312E-02	2.249E-02	2.043E-02
Tc-99	Tc-99	1.000E+00	6.750E-01	6.681E-01	6.544E-01	6.089E-01	4.954E-01	2.408E-01	3.063E-02	2.249E-05
Th-232	Th-232	1.000E+00	3.000E-02	3.000E-02	3.000E-02	3.000E-02	3.000E-02	3.000E-02	3.000E-02	2.998E-02
Ra-228	Th-232	1.000E+00	0.000E+00	3.407E-03	9.104E-03	2.101E-02	2.919E-02	2.999E-02	2.999E-02	2.998E-02
Th-228	Th-232	1.000E+00	0.000E+00	5.593E-04	3.730E-03	1.693E-02	2.879E-02	2.999E-02	2.999E-02	2.998E-02
U-234	U-234	1.000E+00	2.825E+00	2.825E+00	2.825E+00	2.824E+00	2.821E+00	2.810E+00	2.781E+00	2.682E+00
U-234	U-238	9.999E-01	0.000E+00	1.276E-06	3.826E-06	1.275E-05	3.821E-05	1.269E-04	3.770E-04	1.213E-03
U-234	∑S(j):		2.825E+00	2.825E+00	2.825E+00	2.824E+00	2.821E+00	2.811E+00	2.782E+00	2.684E+00
Th-230	U-234	1.000E+00	0.000E+00	2.543E-05	7.628E-05	2.542E-04	7.622E-04	2.535E-03	7.560E-03	2.467E-02
Th-230	U-238	9.999E-01	0.000E+00	5.741E-12	5.167E-11	5.740E-10	5.162E-09	5.721E-08	5.111E-07	5.536E-06
Th-230	∑S(j):		0.000E+00	2.543E-05	7.628E-05	2.542E-04	7.622E-04	2.535E-03	7.560E-03	2.468E-02
U-235	U-235	1.000E+00	8.250E-02	8.250E-02	8.249E-02	8.246E-02	8.238E-02	8.210E-02	8.130E-02	7.856E-02
Pa-231	U-235	1.000E+00	0.000E+00	1.745E-06	5.236E-06	1.745E-05	5.228E-05	1.736E-04	5.155E-04	1.657E-03
Ac-227	U-235	1.000E+00	0.000E+00	2.749E-08	2.422E-07	2.504E-06	1.860E-05	1.213E-04	4.611E-04	1.603E-03
U-238	U-238	5.400E-05	2.430E-05	2.430E-05	2.430E-05	2.429E-05	2.426E-05	2.418E-05	2.395E-05	2.314E-05
U-238	U-238	9.999E-01	4.500E-01	4.500E-01	4.499E-01	4.498E-01	4.493E-01	4.478E-01	4.434E-01	4.285E-01
U-238	∑S(j):		4.500E-01	4.500E-01	4.499E-01	4.498E-01	4.493E-01	4.478E-01	4.434E-01	4.285E-01

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 10.50 seconds

ATTACHMENT 4

Intruder Zone Estimator Worksheet

Construction Scenario
Dose to inadvertent Intruder

Intruder Zone Estimator Worksheet

Contributions to Dose from Individual Radionuclides in Each Pathway									
Air	Radionuclide	Concentration (Ci/m³)	f_o	f_d	f_w	f_s	Pathway Dose Conversion FactorTotal Body (mrem/yr/Ci/m³)	Fraction of year for Exposure	Dose to worker per isotope per path-way
	Ra-226	1.69E-06	1	0.5	1	2.84E-10	4.30E+10	0.057	5.88E-07
	Th-232	2.03E-06	1	0.5	1	2.84E-10	1.15E+12	0.057	1.89E-05
	Tc-99	4.56E-05	1	0.5	1	2.84E-10	5.61E+09	0.057	2.07E-06
	U-234	1.91E-04	1	0.5	1	2.84E-10	1.40E+11	0.057	2.16E-04
	U-235	9.30E-06	1	0.5	1	2.84E-10	5.15E+12	0.057	3.88E-04
	U-238	3.04E-05	1	0.5	1	2.84E-10	4.77E+12	0.057	1.17E-03
Direct Gamma									
	Ra-226	1.69E-06	1	0.5	1	0.057	7.70E+05	N/A	3.71E-02
	Th-232	2.03E-06	1	0.5	1	0.057	6.40E+04	N/A	3.70E-03
	Tc-99	4.56E-05	1	0.5	1	0.057	0	N/A	0
	U-234	1.91E-04	1	0.5	1	0.057	8.80E+04	N/A	4.79E-01
	U-235	9.30E-06	1	0.5	1	0.057	1.50E+05	N/A	3.98E-02
	U-238	3.04E-05	1	0.5	1	0.057	5.16E-03	N/A	4.47E-09

$$H=\sum_n (f_o f_d f_w f_s)_{air} C_w \, PDCF\text{-}3+\sum_n (f_o f_d f_w f_s)_{DG} C_w \, PDCF\text{-}5=$$ **5.61E-01 mrem**

Source Document NUREG-0782, p. G-57, construction scenario.

Use of Table for PDCF-3 instead of PDCF-2 for air in Intruder-Construction Dose formula- although the dose formula in section 3.4.1 includes PDCF-2, the table in the section discussing the PDCF tables (Figure G-4, p. G-29) indicates that PDCF table 3 should be used in the construction scenario, and PDCF-2 should be used in the accident scenario.

Source of PDCF's not listed in NUREG-0782

1. FGR 11- "Inhalation Doses (Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion and Inhalation). Slowest transport class used.
2. FGR 12- "External Exposure to Radionuclides in Air, Water and Soil". Doses for submersion and from a plane source of infinite depth were summed to obtain the total direct gamma dose.

Derivation of "f" values.

f_o- All radionculides have very long half-lives-used 1 for this multiplier.

f_d- Although a small amount of debris is present most of waste is soil and soil-like material and will be uncontainerized, therefore a multiplier of 0.5 is used.

f_w- No credit is taken for waste form or solidification, therefore, the multiplier used is 1.

f_s- The soil-to-air transfer factor is calculated below. Also, 0.057 is used as the fraction of a working year for time of exposure.

Derivation of the soil-to-air transfer factor (T_{sa})

"v" is assigned a value of 4.47 m/sec, taken from Boise, ID airport as annual average wind speed.
"s" is assigned a value of 50 % as a suitable default value for silt content, there are local clay deposits on site.
The reference site value is used for PE as a default.

Calculation of T_{sa}.

$$T_{sa}=2.53E\text{-}10\otimes\frac{10}{4.47}\otimes\frac{50}{30}\otimes\left(\frac{50}{91}\right)^2=2.84E\text{-}10$$

Conversion Factors used

pCi/g waste to Ci/m³- $1.69E-6 \frac{Ci/m^3}{pCi/g}$

Sv/Bq-sec/m³ to mrem/Ci-yr/m³- multiply Sv/Bq-sec/m³ by 1.168E+23

Sv/Bq to mrem/Ci- $3.7E+15 \frac{mrem/Ci}{Sv/Bq}$

ATTACHMENT 5

Eagle Resources, April 7, 2005, Site-Specific RESRAD Water Pathway Parameters for the Contaminated Soil, Vadose Zone, and Saturated Zone

Site-Specific RESRAD Water Pathway Parameters for the Contaminated Soil, Vadose Zone, and Saturated Zone

US Ecology
Grand View, Idaho

April 7, 2005

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Executive Summary

This report documents the site-specific hydrogeologic, waste-cell properties and conditions that are required in the RESRAD model to assess the reasonably conservative estimate of the expected dose from radiation exposure to hypothetical individuals from soil contamination. The soil contamination used in these analyses is the reasonably anticipated wastes containing exempt radioactive waste that will be disposed at the existing US Ecology Idaho (USEI) facility near Grand View Idaho. These wastes will be co-disposed with other, non-radioactive waste at the USEI facility in disposal cells that extend approximately 15 meters below grade, and which contain synthetic membrane liners emplaced over a one-meter thick layer of low-permeability compacted clay.

The site-specific hydrogeologic properties and conditions used in the RESRAD analysis were determined using the extensive site-specific information available from numerous characterization reports previously submitted to the Idaho Department of Environmental Quality (IDEQ). This is the same information used to support the existing approved RCRA permit for the USEI facility. Specifically, hydrogeologic conditions in both the vadose and saturated zones from these reports were used to develop the necessary input parameters for RESRAD.

Site-specific conditions in the waste disposal cell needed for the RESRAD analysis were determined using information provided by USEI on the anticipated wastes regarding waste forms, volumes, concentrations of radionuclides, co-disposed waste forms and volumes, waste emplacement and stabilization methods, and waste cover operations.

A reference case RESRAD analysis was performed using the site specific vadose zone, saturated zone, and waste cell conditions. Additionally, a sensitivity analyses was performed to determine the parameters to which the estimated dose was the most sensitive. These parameters were the distribution coefficients (K_D) for ^{14}C, ^{129}I, and ^{99}Tc the hydraulic conductivity of the contaminated zone, and the hydraulic conductivity of the saturated zone.

The results of the reference case show that the maximum reasonably conservative expected dose within the 1000-year analysis period was always less than 9.6 mrem/yr from all pathways, and was always less than 7.3 mrem/yr from the water-born pathways. The results of sensitivity analyses show that the maximum reasonably conservative expected dose allowing for uncertainties in K_D values in the contaminated zone, the hydraulic conductivity of the saturated zone, and the hydraulic conductivity of the contaminated zone was always less than 11.9 mrem/yr from all pathways, and always less than 9.6 mrem/yr from the water-born pathways. Essentially, the entire simulated dose from the non-waterborne pathway computed with RESRAD is from radon. RESRAD radon pathway variables and conditions are discussed elsewhere in this submittal.

1. Introduction

With this submittal, USEI proposes to use the same RESRAD model with more realistic and site specific parameters into its permit. USEI believes that these improvements, based on site-specific hydrogeologic information better represent the site's behavior and factors that better represent potential exposure scenarios. This use of site-specific information and more realistic exposure scenarios is encouraged in the RESRAD Version 6 documentation.

1.1. Purpose

This report documents the site-specific hydrogeologic and waste-cell properties and conditions that are required in the RESRAD model to assess the reasonably conservative estimate of the expected dose from radiation exposure to hypothetical individuals from soil contamination. The soil contamination used in this analysis is the reasonably anticipated wastes containing exempt radioactive waste that will be disposed at the existing US Ecology Idaho (USEI) facility near Grand View Idaho. These wastes will be co-disposed with other, non-radioactive waste at the USEI facility in disposal cells that extend approximately 15 meters below grade, and which contain synthetic membrane liners emplaced over a one-meter thick layer of low-permeability compacted clay. The synthetic membrane liner is overlain by a one-foot layer of compacted clayey soil having a slightly higher permeability than the compacted clay beneath the membranes[1].

1.2. Disclaimer

Some analyses contained in this report relied upon data and information provided by others. Eagle Resources P.A. makes no representations regarding the completeness, accuracy and reliability of that data and information.

[1]USEI Cell 15 design, construction, operation, monitoring, and closure requirements, Appendix B, Section 02288.

2. Analysis

RESRAD Pathways analyzed for this report are summarized in the following figure:

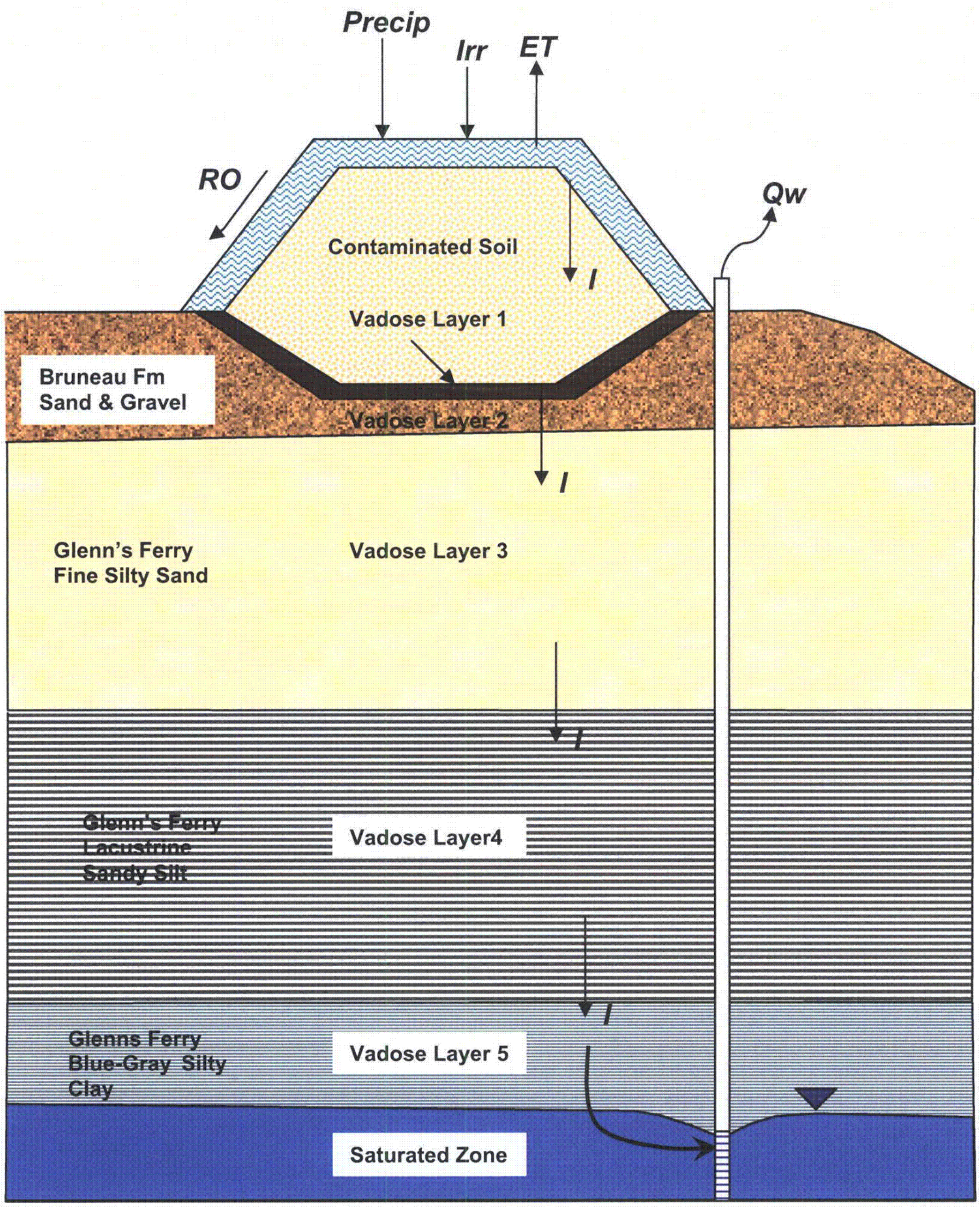

Figure 1,--RESRAD subsurface water pathways.

2.1. Approach

The findings of this report were developed using the following approach:

- Obtain the previous USEI RESRAD modeling that has been updated to include radionuclides and their respective activities in the anticipated wastes that are and will be received at the USEI facility;

- Assign additional vadose zones that correspond with the lithology and hydraulic properties documented in previous site studies;

- Review reasonableness of default values for the fate and transport parameters and conditions and assign site specific values to the parameters if a more reasonably conservative value can be developed from measurements or literature values;

- Identify waste characteristics, characteristics of co-disposed wastes, and waste stabilization and emplacement methods that will serve to reduce activities in leachate that may move out of the disposal cell into the vadose zone; and

- Use sensitivity analyses to assess the effect of reasonable variations in fate and transport parameters for the disposal cell, vadose zone, and saturated zone to which total dose from all pathways and from water pathway are sensitive.

2.1.1. Updated RESRAD Model

USEI provided an updated version of the RESRAD dataset that included the concentrations of radionuclides and their respective activities in the anticipated wastes. These radionuclides and activities as well as the other parameters reviewed for this report are shown in the RESRAD report included elsewhere in this submittal by USEI.

2.1.2. Site-Specific Vadose Zone and Saturated Zone Properties

The RESRAD Vadose zone model component was updated to include five zones that correspond to the low permeability waste disposal cell liner and four zones corresponding to lithologies identified in the CH2MHill Vadose zone Modeling Report[2, 3].

The RESRAD Saturated zone was updated using hydraulic conductivities determined as the geometric mean of values for the conductive sands from 25 aquifer tests performed in the shallowest permanent aquifer beneath the site (Upper Aquifer) [4]. The hydraulic gradient of 0.011 was also taken from the same reference table.

[2]CH2MHill, 1987. Computer modeling results for the Part B Permit Application, ESII Site B Grand View Idaho.

[3]CH2MHill, 1987. 6.CH2MHill, 1986. Vadose Zone Characteristics at ESII Site B Grand View Idaho

[4]Appendix E Groundwater Monitoring, RCRA Part B Application, Table E-2.

2.1.2.1. Hydraulic properties

The site specific RESRAD hydraulic properties assigned to the vadose zone and the saturated zone are shown in Table 1.

Table 1 . Contaminated Zone, Vadose Zone, and Saturated Zone Site-Specific Properties.

	Contaminated Zone	Vadose Zone					Saturated Zone
		USZ(1)	USZ(2)	USZ(3)	USZ(4)	USZ(5)	
Material--->	Compacted Waste	Compacted Clay	Glenns Ferry Fluvial Sand	Glenns Ferry Clayey Silt	Glenns Ferry Lacustrine Clayey Silt	Lacustrine Blue-Gray Clay	Silty Sand
Data Source--->	USEI[5]	USEI[1]	CH2MHill Soil 2[2]	CH2MHill Soil 3[2]	CH2MHill Soil 4[2]	CH2MHill[2]	4/
Thickness, M--->	33.60	1.00	4.60	21.30	16.80	12.20	N/A
Density, gm/cm^3--->	1.50	1.63	1.69	1.30	1.31	1.50	1.50
Total Porosity--->	0.40	0.52	0.51	0.52	0.51	0.52	0.40
Effective Porosity--->	N/A	0.10	0.33	0.40	0.43	0.15	0.20
Field Capacity--->	0.20	0.45	0.07	0.49	0.48	0.32	0.25
Hyd. Conductivity, M/yr	50	0.015	2200	900	60	0.1	25
Campbell b	5	11	2	3	5	8	5

The CH2MHill Vadose Modeling Report for the site[2] provides the parameters N and α of the vanGenuchten/Mualem model for the functional relationship between relative saturation and relative unsaturated hydraulic conductivity (K_R=K (R_S)/K_{SAT}). RESRAD uses the simpler Campbell model based upon the work of Clapp and Hornberger[6] that uses the single parameter, b. Because these two models use different numbers of parameters it was not possible to solve for b in terms of N and α. Consequently values of b for RESRAD have been taken from the RESRAD manual[6] for each soil type in the contaminated soil, vadose zone, and saturated zone.

The waste cell liner corresponds to vadose zone layer 1 for the RESRAD analyses. Material obtained from the USEI on-site Ketterling Clay Borrow Pit has been and is used at the USEI site to construct low permeability liner of the waste cells. The Ketterling Clay exhibits the following typical physical strength properties and characteristics shown in Table 2. Layer 1 of the RESRAD Vadose Zone is assigned a thickness of one (1) meter, and a saturated hydraulic conductivity of 0.02m/yr (6 x 10^{-8}cm/sec). The assigned hydraulic conductivity takes no additional credit for the artificial membrane liner which has a permeability of 3.2 x 10^{-4} m/yr (1.0x 10^{-9}cm/sec)[1] .

[5]Simon Bell, US Ecology Idaho, personal communication
[1]ibid.
[2]ibid Table 2.
[4]ibid
[6]C. Yu, A.J. Zielen, J.-J. Cheng, D.J. LePoire, E. Gnanapragasam, S. Kamboj, J. Arnish, A. Wallo III, W.A. Williams, and H. Peterson, July 2001. User's Manual for RESRAD Version 6 ANL/EAD-4 Environmental Assessment Division Argonne National Laboratory, 9700 South Cass Avenue, Argonne, Illinois 60439

Table 2.-- Properties of the low permeability clay used for the waste disposal cell liner [1].

Property	Value
Engineering Classification	CL, CH
PI	14.6 to 26.5
LL	37.4 to 51.7
Maximum Density by D698	97.9 to 104.5 pcf
Optimum Moisture Content by D698	20.0 to 22.8%
In situ Dry Density	93.9 to 103.4 pcf
In situ Water Content	2.8 to 3.4%
Lab K_s	1 x 10^{-7} to 2 x 10^{-8} cm/s
% Standard Proctor Achieved	95 to 105
Drained Strength: φ c	 22° 0 psf
Undrained Strength: φ c	 0° 3000 psf

This material is applied over a prepared sub-grade in lifts that are compacted to near optimal moisture content to achieve the minimum Ksat. The maximum compacted lift thickness is six (6) inches. The value of 0.02 m/yr used RESRAD analyses is equal to 6.0 x 10^{-8} cm/sec.

The low permeability liner is protected from freezing by requiring that sufficient protective fill and or waste are emplaced over the liner prior to the onset of the frost-penetration season (USEI Operating Manual, Section 2.6.C.

The compacted density of the liner for RESRAD analyses is 1.63 gm/cm^3, or 105 lb.ft^3 (pcf).

Other RESRAD parameters for the liner layer were taken from the literature for compacted clays using the material property database Envirobase™ [7].

2.1.2.2. Site-Specific Distribution Coefficients (K_Ds)

Site-specific distribution coefficients for the radionuclides shown in Attachment A were assigned for the contaminated zone, the five vadose zone layers, and the saturated zone. The following preference order was used to assign these values for each combination of material type and radionuclide:

1. Literature values based upon measured values, if available
2. Literature values based upon models (i.e. plant uptake models), if available
3. RESRAD default values

The assigned site-specific K_D values and the source used for their selection are shown in Table 3. Additional considerations used to assign the K_D values to the contaminated zone (waste disposal cell) are given in the following section.

[1] ibid.

[7] Waterloo Hydrogeologic, 2003. 10.Envirobase™ Material and Chemical Environmental Fate Database.

2.1.3. Disposal Cell (Contaminated Zone) Characteristics

The characteristics of the disposal cell that are addressed in this report that support the RESRAD analyses are:

- Past and anticipated future radioactive waste
    - Physical form
    - Anticipated daily disposal volume
    - Concentration (Activity) of the radioactive isotopes

- Co-disposed non-radioactive waste
    - Physical form
    - Anticipated daily disposal volume
    - Stabilization methods and materials

The radionuclides that contribute the largest water pathway component of total dose within the 5000 year analysis period are ^{129}I, ^{14}C, and ^{99}Tc. This section assesses the likely sorption mechanisms for these isotopes on materials and conditions expected in the waste disposal cell.

2.1.3.1. Anticipated Waste Form and Compounds Likely to Contain ^{14}C

The potential for attenuation of ^{14}C by sorption and/or chemical reaction(s) in the contaminated zone depends upon the chemical compound present in the waste that is contaminated with ^{14}C and upon the physical form of waste containing these contaminated compounds. Based upon information provided by USEI, the typical physical form of the waste will be flooring materials, concrete, rebar, roofing materials, structural steel, soils associated with digging up foundations, and concrete and/or pavement or other similar solid materials. Material sizes will range from individual sand grains to monoliths with volumes of several cubic feet. The waste will contain no free liquids or chelating agents.

2.1.3.2. Chemical Compounds Likely to Contain ^{14}C

^{14}C will most likely be present in the form of carbonates and/or bicarbonates ($^{14}CO_3^{2-}$ or $H^{14}CO_3$-) in the concrete waste from certain parts of buildings to be demolished and disposed at USEI. The mechanism for the presence of these carbonates and bicarbonates is carbonation of cement occurs when concrete is exposed to air containing CO_2 or water containing carbonates or bicarbonates[8] during the life of the facility prior to demolition. The depth of such carbonation into concrete surfaces is dependent upon the porosity of the cement, and the time of exposure[8].

Information provided by USEI, the wastes may also contain some amounts of organic compounds that contain ^{14}C-compounds from flooring (vinyl tile), adhesives, concrete floor and wall sealants, and asphalt.

[8]Campbell, D.H, R.D. Sturm, and S.H. Kosmatka, 1991. Detecting Carbonation: Concrete Technology Today, v.12, no. 1. Portland Cement Association.

2.1.3.3. Adsorption Sites or Sinks for ^{14}C-carbonate Species in Disposed Concrete Waste

Carbonation decreases the pH of the cement, and may render it more likely to leach constituents, including the carbonates deposited during the carbonation process[8]. However, the disposed wastes will in part be likely broken up, exposing concrete that has not been carbonated during the life of the facility. This should create an additional 'sink' for ^{14}C-containing carbonates leached from previously carbonated concrete and may offset the leaching and migration within the contaminated zone.

Concrete waste present in co-disposed waste that has been broken up to expose material that had not been previously carbonated should provide additional carbonation sinks for ^{14}C–containing carbonates leached from the anticipated waste. These materials should also provide additional carbonation sinks for ^{14}C leached from the organic compounds that may be present in the waste.

Native site soils and material excavated from the waste cell are assumed to be present in the contaminated zone as it is assumed that they generally are emplaced over and around the disposed waste as part of daily disposal operations. When used, these materials should provide additional sorption sites for ^{14}C-containing compounds dissolved in soil moisture within the contaminated zone. These backfill and cover materials contain sand and silt sized grains that were derived from silicic volcanic materials present in the Bruneau Formation present at the site[5]. It is assumed that quartz sand and granite are reasonable analogs to these materials for purposes of assessing the likely sorption of ^{14}C-compounds.

2.1.3.4. Adsorption Sites in Co-disposed waste

The anticipated radionuclide-containing waste will be co-disposed with other hazardous and non-hazardous waste. Information provided by USEI[5] based on historical waste receipts, shows that approximately 60% of waste receipts are NORM/TENROM, 25% are RCRA (typically requires treatment) and 15% are other non-hazardous waste. The majority (over 50%) of the RCRA material is made up of EPA waste code K061 which is "electric arc furnace, bag house dust". K061 contains heavy metals such as zinc, lead, cadmium, chromium, etc. K061 made up approximately 50,000 tons of the 381,000 total tons disposed in 2004. The treatment of K061 typically requires 5% lime (by weight) and 10% ferrous sulfate (by weight). The other 40,000 tons of material were a mix of non-RCRA and RCRA, which is also commingled and compacted with the NORM/FUSRAP wastes. RCRA wastes that excluded K061 were stabilized with an additional 3,500 tons of lime.

[8]ibid.

[9]CH2MHill, February 1986. ESII Site B Site Characterization and Groundwater Monitoring Program, Envirosafe Services of Idaho, Inc., Grand View, ID. U.S. EPA I.D. No. IDD073114654. Boise, ID.

[5]Simon Bell, 2005, Personal Communication

The lime used for stabilization adds a significant volume of additional material that can serve as adsorption sites for both ^{14}C and ^{99}Tc as shown by the measured K_D values for these species on carbonates in the next section. ^{99}Tc is most likely present in the anticipated waste as pertechnetate form ($^{99}Tc(VII)O4$-)[11] which as an anion is not adsorbed to negatively charged sorption sites in waste or soils. In addition, the reducing agent (ferrous sulfate) should result in a reducing environment which will promote the formation of lower valence-state $^{99}Tc(IV)$ complexes and compounds that would be expected to form both discrete solid phases as well as complexes with mineral surfaces. All of these should result in the likely removal of Tc from solution and immobilization within sediments within the disposal cell. [11, 12]

2.1.3.5. K_D Values for Contaminated Zone Materials

This analysis assumes that literature values can be used to provide reasonable, conservative values of K_D for carbon-containing compounds in the contaminated zone. It is further assumed that the use of measured K_Ds from the literature to estimate attenuation in the contaminated zone is an adequate and conservative surrogate for more complex chemical reactions such as carbonation of concrete.

Measured K_D values for ^{14}C and ^{99}Tc on concrete for this analysis are taken from Szántó, et. al.[13] and are shown in the following table:

	Kd, cm3/g	
Material	^{99}Tc	^{14}C
Granite	4.2	2.4
Carbonate	46	4.4
Chlorite	21	2.6
Na-bentonite	19	1
Quartz	28	2.3
Concrete	2.1	4

The values of K_D for ^{14}C on Granite and Quartz shown in this table are also assumed to be applicable to backfill materials used at the USEI facility as they should represent reasonable analogs for the mineralogy of the materials from the Bruneau Formation used for such purposes.

[11] Shuh, D.k, W.W. Lukens, and C.J. Burnes, 2003. Research Program to Investigate the Fundamantal Geochemistry of Technicium: Final Report. U.S. Department of Energy Project Project Number: EMSP-73778.

[12] J. R. Lloyd, V.A. Sole, C.V.G. vanPraagh, and D.R. Lovley.2003. Direct and Fe(II)-Mediated Reduction of Technetium by Fe(III)-Reducing Bacteria: Applied and Environmental Microbiology. Sept. 2000, p. 3743–3749.

[13] Zs. Szántó, E. Hertelendi, M. Molnár and L. Palcsu, 1999. The Interaction of Trace Levels of ^{3}H, ^{99}Tc, ^{63}Ni, and ^{14}C with Granite, Concrete, Carbonate, Chlorite, Quartz, and Na-Bentonite: http://www.atomki.hu/ar98/e/e05/e05.html.

Sheppard and Thibault[6,14] provide the following values for K_D for C, Tc, and I. Their values for sand, Loam, and Clay should be applicable for the backfill materials used in disposal operations for the contaminated zone:

Material	^{14}C K_D cm^3/g	^{129}I K_D cm^3/g	^{99}Tc K_D cm^3/g
Sand	5	1	0.1
Loam	***20***	5	0.1
Clay	***1***	21	1
Organic Soil	***70***	5	1

Note that Sheppard and Thibault report K_D values in L/Kg. The table above has used the assumption that the density of water equals 1 Kg/L.

The values in bold italics in the table above reported by Sheppard and Thibault for ^{14}C were computed using soil to plant concentration ratios from modeling and were not measured using batch sorption or column tests. The probabilistic version of RESRAD uses a default mean K_D of $11 cm^3/g$ [15].

From this analysis, we conclude that reasonable, supportable K_D values for the ^{14}C-compounds likely to be present in waste disposal cell are between 2 cm^3/g and 10 cm^3/g.

Values for K_D assigned to each the contaminated zone, the five vadose zone layers, and the saturated zone are shown in Table 3.

[6]ibid.

[14]Sheppard, M.I, and D.H. Thibault, 1990. Default Soil/Liquid Partition Coefficients, Kds, for Four Major Soil Types: A Compendium: Health Physics, v. 59, no. 4, pp 471-482, Table 1.

[15] C. Yu, D. LePoire, E. Gnanapragasam, J. Arnish, S. Kamboj, B.M. Biwer, J.-J. Cheng, A. Zielen, and S.Y. Chen. November 2000: Development of Probabilistic RESRAD 6.0 and RESRAD-BUILD 3.0Computer Codes. U.S. Nuclear Regulatory Commission. Office of Nuclear Regulatory Research Radiation Protection, Environmental Risk and Waste Management Branch. NUREG/CR-6697 (Table 3.9, P. 3-30)

Table 3.-- Site-specific Kd values assigned to the RESRAD zones

		Contaminated Zone		USZ(1)		USZ(2)		USZ(3)		USZ(4)		USZ(5)		Sat. Zone	
Species	Conc. pCi/g	Kd cm^3/gm	Data Source	Kd cm^3/gm	Data Source	Kd cm^3/gm	Data Source	Kd cm^3/gm	Data Source	Kd cm^3/gm	Data Source	Kd cm^3/gm	Data Source	Kd cm^3/gm	Data Source
^{227}Ac	3.2	450	ST (Sand)	2400	ST (Clay)	450	ST (Sand)	450	ST (Sand)	450	ST (Sand)	450	ST (Sand)	450	ST (Sand)
^{108}Ag ^{110}Ag	10	90	ST (Sand)	180	ST (Clay)	90	ST (Sand)	90	ST (Sand)	90	ST (Sand)	90	ST (Sand)	90	ST (Sand)
^{241}Am ^{243}Am	0.1	1900	ST (Sand)	8400	ST (Clay)	1900	ST (Sand)	1900	ST (Sand)	1900	ST (Sand)	1900	ST (Sand)	1900	ST (Sand)
^{195}Au	100	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D
^{133}Ba	25	50	RR-D	50	RR-D	50	RR-D	50	RR-D	50	RR-D	50	RR-D	50	RR-D
^{14}C	10	5	SHMP (Concrete)	1	Less than ST	1	Less than ST	1	Less than ST	1	Less than ST	1	Less than ST	1	Less than ST
^{41}Ca	25	5	ST (Sand)	50	ST (Clay)	5	ST (Sand)	5	ST (Sand)	5	ST (Sand)	5	ST (Sand)	5	ST (Sand)
^{109}Cd	100	11	DJTM (Sand)	560	ST (Clay)	11	DJTM (Sand)	11	DJTM (Sand)	11	DJTM(Sandy Silt)	11	DJTM(Sandy Silt)	11	DJTM (Sand)
^{144}Ce	100	500	ST (Sand)	20000	ST (Clay)	500	ST (Sand)	500	ST (Sand)	500	ST (Sand)	500	ST (Sand)	500	ST (Sand)
^{252}Cf	0.1	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D
^{243}Cm ^{244}Cm ^{245}Cm ^{246}Cm ^{247}Cm ^{248}Cm	0.1	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D
^{57}Co ^{60}Co	10, 25	60	ST (Sand)	550	ST (Clay)	60	ST (Sand)	60	ST (Sand)	60	ST (Sand)	60	ST (Sand)	60	ST (Sand)
^{134}Cs ^{135}Cs ^{137}Cs	25, 25, 25	280	ST (Sand)	500	ST (Clay)	280	ST (Sand)	280	ST (Sand)	280	ST (Sand)	280	ST (Sand)	280	ST (Sand)
^{152}Eu ^{154}Eu ^{155}Eu	10, 10, 25	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D
^{55}Fe	100	220	ST (Sand)	165	ST (Clay)	220	ST (Sand)	220	ST (Sand)	220	ST (Sand)	220	ST (Sand)	220	ST (Sand)
^{152}Gd ^{153}Gd	100, 10	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D
^{68}Ge	100, 10	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D
^{3}H	1000	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D
^{129}I	0.01	0.2	< ST	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D
^{40}K	100	15	ST (Sand)	75	ST (Clay)	15	ST (Sand)	15	ST (Sand)	15	ST (Sand)	15	ST (Sand)	15	ST (Sand)
^{54}Mn	10	50	ST (Sand)	180	ST (Clay)	50	ST (Sand)	50	ST (Sand)	50	ST (Sand)	50	ST (Sand)	50	ST (Sand)
^{22}Na	10	10	RR-D	10	RR-D	10	RR-D	10	RR-D	10	RR-D	10	RR-D	10	RR-D
^{94}Nb ^{93m}Nb	100	160	ST (Sand)	900	ST (Clay)	160	ST (Sand)	160	ST (Sand)	160	ST (Sand)	160	ST (Sand)	160	ST (Sand)
^{59}Ni ^{63}Ni	100	400	ST (Sand)	650	ST (Clay)	400	ST (Sand)	400	ST (Sand)	400	ST (Sand)	400	ST (Sand)	400	ST (Sand)
^{237}Np	0.1	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D

Table 3 (concluded).-- Site-specific Kd values assigned to the RESRAD zones.

		Contaminated Zone		USZ(1)		USZ(2)		USZ(3)		USZ(4)		USZ(5)		Sat. Zone	
Species	Conc. pCi/g	Kd cm^3/ gm	Data Source	Kd cm^3/ gm	Data Source	Kd cm^3/ gm	Data Source	Kd cm^3/ gm	Data Source	Kd cm^3/ gm	Data Source	Kd cm^3/ gm	Data Source	Kd cm^3 /gm	Data Source
^{231}Pa	3.2	550	ST (Sand)	2700	ST (Clay)	550	ST (Sand)	550	ST (Sand)	550	ST (Sand)	550	ST (Sand)	550	ST (Sand)
^{210}Pb	333	270	ST (Sand)	550	ST (Clay)	270	ST (Sand)	270	ST (Sand)	270	ST (Sand)	270	ST (Sand)	270	ST (Sand)
^{147}Pm	100	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D
^{238}Pu ^{239}Pu ^{240}Pu ^{241}Pu ^{242}Pu ^{244}Pu	0.1	550	ST (Sand)	5500	ST (Clay)	550	ST (Sand)	550	ST (Sand)	550	ST (Sand)	550	ST (Sand)	550	ST (Sand)
^{226}Ra ^{228}Ra	112, 28	70	RR-D	70	RR-D	70	RR-D	70	RR-D	70	RR-D	70	RR-D	70	RR-D
^{106}Ru	25	55	ST (Sand)	800	ST (Clay)	55	ST (Sand)	55	ST (Sand)	55	ST (Sand)	55	ST (Sand)	55	ST (Sand)
^{125}Sb	100	45	ST (Sand)	250	ST (Clay)	45	ST (Sand)	45	ST (Sand)	45	ST (Sand)	45	ST (Sand)	45	ST (Sand)
^{147}Sm ^{151}Sm	10 100	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D	0.1	RR-D
^{90}Sr	100	15	ST (Sand)	110	ST (Clay)	15	ST (Sand)	15	ST (Sand)	15	ST (Sand)	15	ST (Sand)	15	ST (Sand)
^{99}Tc	1	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D
^{204}Tl	100	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D	0	RR-D
^{228}Th ^{229}Th ^{230}Th ^{232}Th	28, 28 83, 28	3200	ST (Sand)	5800	ST (Clay)	3200	ST (Sand)	3200	ST (Sand)	3200	ST (Sand)	3200	ST (Sand)	3200	ST (Sand)
^{233}U ^{234}U ^{235}U ^{236}U ^{238}U	3.2, 83, 3.2, 3.2 83	35	ST (Sand)	1600	ST (Clay)	35	ST (Sand)	35	ST (Sand)	35	ST (Sand)	35	ST (Sand)	35	ST (Sand)
^{65}Zn	10	200	ST (Sand)	2400	ST (Clay)	200	ST (Sand)	200	ST (Sand)	200	ST (Sand)	200	ST (Sand)	200	ST (Sand)

Notes: ST: Shepard and Thiebault [14], RR-D: RESRAD Default[6]; SHMP: Szanto, et. al[13]; DJTM: Dunnivant, et.al. [16]

[14]ibid.
[6]ibid.
[13]ibid.
[16] Dunnivant, F.M., P.M. Jardine, D.L. Taylor and J.F. McCarthy, Co-transport of cadmium and hexachlorobiphenyl by dissolved organic carbon through columns containing aquifer material, Environ. Science and Technology., 26, 360-368, 1992 (Cited in Envirobase™.)

2.2. Sensitivity Analysis

A sensitivity analysis was conducted to assess uncertainty in the total dose computed with RESRAD for water-pathways for the USEI facility caused by uncertainty in the following parameters:

- K_D values in the contaminated zone for ^{14}C, ^{129}I, and ^{99}Tc;
- Hydraulic conductivity of the contaminated zone (waste disposal cell)
- Hydraulic Conductivity of the Saturated Zone

The sensitivity analyses results are shown in Table 4, and show that RESRAD simulated the maximum water-pathway dose within 1000 years using reasonably conservative uncertainties in the sensitivity parameters is always less than 9.6 mrem/yr.

Table 4.-- Summary of sensitivity Analyses

Run	Analysis Description	Sensitivity Parameter Value	Sensitivity Parameter Units	Max Total Dose All Pathways mrem/yr	Max Total Dose Water Pathway mrem/yr
2	^{14}C K_D in Waste Cell Sensitivity	2	cm^3/gm	11.90	9.60
2	^{14}C K_D in Waste Cell Reference Case	5	cm^3/gm	9.60	7.30
3	^{14}C K_D in Waste Cell Sensitivity	7	cm^3/gm	9.50	7.20
4	^{14}C K_D in Waste Cell Sensitivity	10	cm^3/gm	9.50	7.20
5	^{129}I K_D in Waste Cell Sensitivity	0.1	cm^3/gm	11.10	8.80
2	^{129}I K_D in Waste Cell Reference Case	0.2	cm^3/gm	9.60	7.30
7	^{129}I K_D in Waste Cell Sensitivity	0.5	cm^3/gm	7.40	5.10
8	^{129}I K_D in Waste Cell Sensitivity	1	cm^3/gm	7.10	4.80
2	$^{99}ITcK_D$ in Waste Cell Sensitivity	0	cm^3/gm	9.60	7.30
9	$^{99}ITcK_D$ in Waste Cell Sensitivity	0.1	cm^3/gm	9.40	7.10
10	$^{99}ITcK_D$ in Waste Cell Sensitivity	0.5	cm^3/gm	8.70	6.40
2	Ksat of Waste Cell Reference Case	10	m/yr	9.60	7.30
11	Ksat of Waste Cell Sensitivity	50	m/yr	9.90	7.60
12	Ksat of Waste Cell Sensitivity	100	m/yr	10.00	7.70
13	Ksat of Saturated Zone Sensitivity	15	m/yr	8.90	6.60
14	Ksat of Saturated Zone Sensitivity	20	m/yr	9.60	7.30
2	Ksat of Saturated Zone Reference Case	25	m/yr	9.60	7.30
15	Ksat of Saturated Zone Sensitivity	50	m/yr	9.60	7.30

Reference Case

3. Conclusions

A large amount of available site-specific data and information has been used to develop site-specific parameters for the reference case RESRAD analysis. In particular, the thickness, zonation, and hydraulic properties of the vadose zone, the characteristics of the waste-disposal cell and low-permeability clay liner, and the Upper Aquifer that underlies the site have been assigned based upon site specific measurements. In addition, information provided by USEI on the characteristics of the anticipated wastes and the methods by which it will be co-disposed with other waste was used to assign site-specific values to contaminated zone RESRAD parameters.

The results of the reference case show that the reasonable and conservative expected dose within the 1000-year analysis period was always less than 9.6 mrem/yr from all pathways, and was always less than 7.3 mrem/yr from the water-born pathways. The results of sensitivity analyses show that the maximum reasonably conservative expected dose allowing for uncertainties in K_D values in the contaminated zone, the hydraulic conductivity of the saturated zone, and the hydraulic conductivity of the contaminated zone was always less than 11.9 mrem/yr from all pathways, and always less than 9.6 mrem/yr from the water-born pathways. Essentially the entire simulated dose from the non-waterborne pathway computed with RESRAD, is from radon. RESRAD radon pathway variables and conditions are discussed elsewhere in this submittal.

ATTACHMENT 6

USEI Radiological Sampling – Air & Soil

USEI Radiological Sampling – Air & Soil

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Ms. Marie McMonigle
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Grand View, ID 83624

LABORATORY REPORT NO.:	8048-34
DATE:	09-09-2009
SAMPLES RECEIVED:	06-25-2009
PURCHASE ORDER NO.:	

Enclosed are the results of the analyses for radium-226, thorium-232, isotopic uranium, plutonium-239/240, americium-241 and gamma emitting isotopes in five soil samples.

Should you have any questions concerning the results, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses on five soil samples

Lab Code	IDSO-3139	IDSO-3140	IDSO-3141	IDSO-3143	IDSO-3144
Sample Description	62209-Bkg	62209-6850 S	62209-684 E	62209-686NW	62209-6850N
Collection Date	06-22-09	06-22-09	06-22-09	06-22-09	06-22-09
Isotope			Concentration (pCi/g dry)		
Ra-226	0.88 ± 0.02	1.05 ± 0.03	1.03 ± 0.02	1.05 ± 0.03	1.16 ± 0.03
Date Analyzed	07-25-09	07-26-09	07-23-09	07-26-09	07-26-09
Th-232	0.04 ± 0.02	0.55 ± 0.05	0.51 ± 0.04	0.42 ± 0.10	0.51 ± 0.07
Date Analyzed	07-30-09	08-04-09	08-04-09	08-07-09	08-07-09
U-233/234	0.11 ± 0.01	0.12 ± 0.01	0.17 ± 0.01	0.14 ± 0.01	0.14 ± 0.02
U-235	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
U-238	0.14 ± 0.01	0.12 ± 0.01	0.16 ± 0.02	0.15 ± 0.02	0.16 ± 0.02
Date Analyzed	08-04-09	08-07-09	08-07-09	08-07-09	08-07-09
Pu-239/240	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Date Analyzed	08-20-09	08-20-09	08-20-09	08-20-09	08-20-09
Am-241	< 0.04	< 0.05	< 0.05	< 0.04	< 0.05
Date Analyzed	08-12-09	07-23-09	07-23-09	08-12-09	08-12-09

The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

Table 2. Results of analyses for gamma-emitting isotopes in five soil samples.

Lab Code	IDSO-3139	IDSO-3140	IDSO-3141	IDSO-3143	IDSO-3144
Sample Description	062209-BKG	6220968505	62209-684E	62209-686NW	62209-6850N
Collection Date	06-22-09	06-22-09	07-23-09	06-22-09	06-22-09
Date Analyzed	07-25-09	07-26-09	07-23-09	07-26-09	07-26-09
Isotope	Concentration (pCi/g dry)				
K-40	16.3 ± 0.2	17.8 ± 0.3	17.8 ± 0.3	17.4 ± 0.3	17.6 ± 0.3
Mn-54	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Co-58	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Co-60	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fe-59	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03
Zn-65	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Cs-134	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cs-137	0.44 ± 0.01	0.62 ± 0.01	0.72 ± 0.02	0.99 ± 0.02	0.91 ± 0.02
Tl-208	0.33 ± 0.01	0.36 ± 0.02	0.35 ± 0.02	0.37 ± 0.02	0.38 ± 0.02
Bi-212	0.96 ± 0.08	1.17 ± 0.14	1.16 ± 0.17	1.12 ± 0.17	1.19 ± 0.13
Bi-214	0.74 ± 0.02	1.00 ± 0.02	0.96 ± 0.03	0.98 ± 0.03	1.01 ± 0.02
Pb-212	0.97 ± 0.02	0.99 ± 0.02	1.00 ± 0.02	1.01 ± 0.20	1.11 ± 0.02
Pb-214	0.88 ± 0.02	1.05 ± 0.03	1.01 ± 0.03	1.05 ± 0.03	1.16 ± 0.03
Ra-228	1.00 ± 0.04	1.10 ± 0.06	1.07 ± 0.06	1.08 ± 0.06	1.10 ± 0.04

The error given is the probable counting error at 95% confidence level. Less than values are based on 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.: 8048-30
DATE: 01-27-2009
SAMPLES RECEIVED: 11-24-2008
PURCHASE ORDER NO.:

Enclosed are the results of the analyses for radium-226, thorium-232, isotopic uranium, plutonium-239/240, americium-241 and gamma emitting isotopes in four soil samples.

Should you have any questions concerning the results, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses on four soil samples.

Lab Code	IDSO-6651	IDSO-6652	IDSO-6653	IDSO-6654
Sample Description	New Background	@ #68 Mark	South of # 68-50	North of # 68-50
Collection Date	11-19-08	11-19-08	11-19-08	11-19-08
Isotope	**Concentration (pCi/g dry)**			
Ra-226	0.94 ± 0.02	0.91 ± 0.02	1.04 ± 0.02	0.96 ± 0.03
Date Analyzed	01-10-09	01-17-09	01-17-09	01-17-09
Th-232	0.54 ± 0.04	0.55 ± 0.09	0.45 ± 0.08	0.57 ± 0.07
Date Analyzed	01-14-09	01-14-09	01-14-09	01-14-09
U-233/234	0.13 ± 0.01	0.12 ± 0.01	0.10 ± 0.01	0.14 ± 0.01
U-235	0.01 ± 0.01	< 0.01	0.01 ± 0.01	< 0.01
U-238	0.14 ± 0.01	0.13 ± 0.01	0.10 ± 0.01	0.12 ± 0.01
Date Analyzed	01-17-09	01-17-09	01-17-09	01-17-09
Pu-239/240	< 0.01	< 0.01	< 0.01	< 0.01
Date Analyzed	01-14-09	01-14-09	01-14-09	01-14-09
Am-241	< 0.01	< 0.01	< 0.01	< 0.01
Date Analyzed	01-14-09	01-14-09	01-14-09	01-14-09

The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

Table 2. Results of analyses for gamma-emitting isotopes in four soil samples.

Lab Code	IDSO-6651	IDSO-6652	IDSO-6653	IDSO-6654
Sample Description	New Background	@ #68 Mark	South of # 68-50'	North of # 68-50'
Collection Date	11-19-08	11-19-08	11-19-08	11-19-08
Date Analyzed	12-18-08	12-18-08	12-19-08	12-30-08
Isotope	Concentration (pCi/g dry)			
K-40	16.0 ± 0.2	15.6 ± 0.3	17.3 ± 0.2	16.3 ± 0.2
Mn-54	< 0.01	< 0.01	< 0.01	< 0.01
Co-58	< 0.01	< 0.01	< 0.01	< 0.01
Co-60	< 0.01	< 0.01	< 0.01	< 0.01
Fe-59	< 0.01	< 0.03	< 0.03	< 0.03
Zn-65	< 0.02	< 0.02	< 0.02	< 0.02
Cs-134	< 0.01	< 0.01	< 0.01	< 0.01
Cs-137	0.62 ± 0.01	0.47 ± 0.01	0.02 ± 0.01	0.31 ± 0.01
Tl-208	0.35 ± 0.01	0.32 ± 0.01	0.35 ± 0.01	0.33 ± 0.01
Bi-212	1.09 ± 0.10	1.07 ± 0.13	1.20 ± 0.13	0.90 ± 0.08
Bi-214	0.89 ± 0.02	0.83 ± 0.02	0.81 ± 0.02	0.73 ± 0.02
Pb-212	1.00 ± 0.02	0.91 ± 0.02	1.05 ± 0.02	0.94 ± 0.02
Pb-214	1.01 ± 0.02	0.92 ± 0.03	0.93 ± 0.02	0.92 ± 0.02
Ra-228	1.07 ± 0.04	0.97 ± 0.04	1.11 ± 0.05	0.97 ± 0.03

The error given is the probable counting error at 95% confidence level. Less than values are based on 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-26
DATE:	09-05-2008
SAMPLES RECEIVED:	06-17-2008
PURCHASE ORDER NO.:	

Enclosed are the results of the analyses for radium-226, thorium-232, isotopic uranium, plutonium-239/240, americium-241 and gamma emitting isotopes in three soil samples.

Should you have any questions concerning the results, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses on three soil samples.

Lab Code	IDSO-2975	IDSO-2976	IDSO-2977
Sample Description	at Post	South 35'	North 35'
Collection Date	05-29-08	05-29-08	05-29-08
Isotope	**Concentration (pCi/g dry)**		
Ra-226	1.01 ± 0.02	0.90 ± 0.02	0.91 ± 0.02
Date Analyzed	07-16-08	07-16-08	07-17-08
Th-232	0.42 ± 0.03	0.55 ± 0.05	0.31 ± 0.08
Date Analyzed	07-18-08	07-18-08	07-18-08
U-233/234	0.19 ± 0.02	0.25 ± 0.03	0.09 ± 0.02
U-235	0.01 ± 0.01	0.01 ± 0.01	0.01 ± 0.01
U-238	0.16 ± 0.02	0.25 ± 0.03	0.10 ± 0.02
Date Analyzed	07-24-08	07-24-08	07-24-08
Pu-239/240	< 0.01	< 0.01	< 0.01
Date Analyzed	07-22-08	07-22-08	07-24-08
Am-241	< 0.02	< 0.01	< 0.02
Date Analyzed	09-04-08	09-04-08	09-04-08

The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

Table 2. Results of analyses for gamma-emitting isotopes in three soil samples.

Lab Code	IDSO-2975	IDSO-2976	IDSO-2977
Sample Description	at Post	South 35'	North 35'
Collection Date	05-29-08	05-29-08	05-29-08
Date Analyzed	07-16-08	07-16-08	07-17-08
Isotope	Concentration (pCi/g dry)		
K-40	19.6 ± 0.2	15.1 ± 0.2	19.6 ± 0.2
Mn-54	< 0.01	< 0.01	< 0.01
Co-58	< 0.01	< 0.01	< 0.01
Co-60	< 0.01	< 0.01	< 0.01
Fe-59	< 0.04	< 0.02	< 0.04
Zn-65	< 0.02	< 0.01	< 0.02
Cs-134	< 0.01	< 0.01	< 0.01
Cs-137	0.14 ± 0.01	0.08 ± 0.01	0.14 ± 0.01
Tl-208	0.44 ± 0.02	0.37 ± 0.01	0.44 ± 0.02
Bi-212	1.39 ± 0.12	1.20 ± 0.10	1.39 ± 0.12
Bi-214	0.72 ± 0.02	0.84 ± 0.02	0.72 ± 0.02
Pb-212	1.18 ± 0.02	0.89 ± 0.01	1.18 ± 0.02
Pb-214	1.01 ± 0.02	0.90 ± 0.02	1.01 ± 0.02
Ra-228	1.21 ± 0.03	1.39 ± 0.09	1.85 ± 0.12

The error given is the probable counting error at 95% confidence level. Less than values are based on 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-19
DATE:	10-23-2007
SAMPLES RECEIVED:	08-23-2007
PURCHASE ORDER NO.:	

Enclosed are the results of the analyses for radium-226, thorium-232, isotopic uranium, plutonium-239/240, americium-241 and gamma emitting isotopes in three soil samples.

Should you have any questions concerning the results, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses on three soil samples.

Lab Code	IDSO-5564	IDSO-5565	IDSO-5566
Sample Description	@ Sample PT	100' North	100' South
Collection Date	08-20-07	08-20-07	08-20-07
Isotope	Concentration (pCi/g dry)		
Ra-226	1.02 ± 0.04	1.04 ± 0.03	0.82 ± 0.03
Date Analyzed	09-22-07	09-22-07	09-23-07
Th-232	0.56 ± 0.12	0.59 ± 0.14	0.48 ± 0.08
Date Analyzed	09-17-07	09-17-07	09-17-07
U-233/234	0.13 ± 0.02	0.13 ± 0.02	0.18 ± 0.02
U-235	< 0.01	< 0.01	< 0.01
U-238	0.14 ± 0.02	0.14 ± 0.02	0.17 ± 0.02
Date Analyzed	09-17-07	09-17-07	09-17-07
Pu-239/240	< 0.01	< 0.01	< 0.01
Date Analyzed	09-17-07	09-17-07	09-17-07
Am-241	< 0.06	< 0.08	< 0.06
Date Analyzed	09-20-07	10-05-07	10-19-07

The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

Table 2. Results of analyses for gamma-emitting isotopes in three soil samples.

Lab Code	IDSO-5564	IDSO-5565	IDSO-5566
Sample Description	@ Sample PT	100' North	100' South
Collection Date	08-20-07	08-20-07	08-20-07
Date Analyzed	09-22-07	09-22-07	09-23-07

Isotope	Concentration (pCi/g dry)		
K-40	17.3 ± 0.4	17.7 ± 0.4	19.6 ± 0.3
Mn-54	< 0.01	< 0.01	< 0.01
Co-58	< 0.01	< 0.01	< 0.01
Co-60	< 0.01	< 0.01	< 0.01
Fe-59	< 0.02	< 0.02	< 0.02
Zn-65	< 0.02	< 0.02	< 0.03
Cs-134	< 0.01	< 0.01	< 0.01
Cs-137	0.66 ± 0.01	0.92 ± 0.02	0.04 ± 0.01
Tl-208	0.27 ± 0.01	0.36 ± 0.01	0.33 ± 0.02
Bi-212	< 0.21	1.21 ± 0.17	1.08 ± 0.11
Bi-214	0.73 ± 0.03	0.89 ± 0.03	0.70 ± 0.02
Pb-212	1.24 ± 0.05	1.37 ± 0.05	1.24 ± 0.05
Pb-214	1.02 ± 0.04	1.04 ± 0.03	0.82 ± 0.03
Ra-228	< 0.10	1.15 ± 0.07	1.06 ± 0.06

The error given is the probable counting error at 95% confidence level. Less than values are based on 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-16
DATE:	08-15-2007
SAMPLES RECEIVED:	05-29-2007
PURCHASE ORDER NO.:	

Enclosed are the results of the analyses for radium-226, thorium-232, isotopic uranium, plutonium-239/240, americium-241 and gamma emitting isotopes in three soil samples.

Should you have any questions concerning the results, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses on three soil samples.

Lab Code	IDSO-3185	IDSO-3186	IDSO-3187
Sample Description	Downwind	50' North	50' South
Collection Date	05-24-07	05-24-07	05-24-07
Isotope	**Concentration (pCi/g dry)**		
Ra-226	0.86 ± 0.03	0.91 ± 0.03	0.90 ± 0.03
Date Analyzed	07-05-07	07-06-07	07-06-07
Th-232	0.60 ± 0.08	0.44 ± 0.10	0.57 ± 0.13
Date Analyzed	07-23-07	07-23-07	07-23-07
U-233/234	0.13 ± 0.02	0.17 ± 0.02	0.14 ± 0.02
U-235	< 0.01	< 0.01	< 0.01
U-238	0.13 ± 0.02	0.13 ± 0.02	0.14 ± 0.02
Date Analyzed	07-06-07	07-06-07	07-06-07
Pu-239/240	< 0.01	< 0.01	< 0.01
Date Analyzed	06-30-07	06-30-07	06-30-07
Am-241	< 0.05	< 0.09	< 0.07
Date Analyzed	07-06-07	07-06-07	07-06-07

The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

Table 2. Results of analyses for gamma-emitting isotopes in three soil samples.

Lab Code	IDSO-3185	IDSO-3186	IDSO-3187
Sample Description	Downwind	50' North	50 South
Collection Date	05-24-07	05-24-07	05-24-07
Date Analyzed	07-05-07	07-06-07	05-24-07
Isotope	Concentration (pCi/g dry)		
K-40	18.2 ± 0.3	19.1 ± 0.3	18.4 ± 0.3
Mn-54	< 0.01	< 0.01	< 0.01
Co-58	< 0.01	< 0.01	< 0.01
Co-60	< 0.01	< 0.01	< 0.01
Fe-59	< 0.03	< 0.03	< 0.03
Zn-65	< 0.02	< 0.02	< 0.02
Cs-134	< 0.01	< 0.01	< 0.01
Cs-137	0.55 ± 0.02	0.42 ± 0.01	0.15 ± 0.01
Tl-208	0.33 ± 0.02	0.37 ± 0.02	0.37 ± 0.02
Bi-212	0.89 ± 0.23	1.07 ± 0.12	1.32 ± 0.22
Bi-214	0.78 ± 0.02	0.81 ± 0.02	0.84 ± 0.02
Pb-212	1.10 ± 0.05	1.22 ± 0.05	1.25 ± 0.04
Pb-214	0.86 ± 0.03	0.91 ± 0.03	0.90 ± 0.03
Ra-228	1.04 ± 0.06	1.12 ± 0.04	1.09 ± 0.05

The error given is the probable counting error at 95% confidence level. Less than values are based on 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-22
DATE:	03-26-2008
SAMPLES RECEIVED:	12-06-2007
PURCHASE ORDER NO.:	

Enclosed are the results of the analyses for radium-226, thorium-232, isotopic uranium, plutonium-239/240, americium-241 and gamma emitting isotopes in four soil samples.

Should you have any questions concerning the results, please do not hesitate to call.

Sincerely,

Bronia Grob, M.S.
Laboratory Manager

APPROVED BY ____________________
Tony Coorlim,
Quality Assurance

Table 1: Results of the analyses on four soil samples.

Lab Code	IDSO-8243	IDSO-8244	IDSO-8245	IDSO-8246
Sample Description	New Background	50' South	50' North	@ Point
Collection Date	11-30-07	11-30-07	11-30-07	11-30-07
Isotope	Concentration (pCi/g dry)			
Ra-226	1.14 ± 0.03	0.95 ± 0.02	1.02 ± 0.03	0.97 ± 0.02
Date Analyzed	01-15-08	01-17-08	01-19-08	01-22-08
Th-232	0.57 ± 0.05	0.33 ± 0.06	0.54 ± 0.04	0.53 ± 0.04
Date Analyzed	02-19-08	02-29-08	02-19-08	02-19-08
U-233/234	0.15 ± 0.02	0.14 ± 0.02	0.14 ± 0.02	0.15 ± 0.02
U-235	< 0.01	0.01 ± 0.01	0.01 ± 0.01	< 0.01
U-238	0.17 ± 0.02	0.16 ± 0.02	0.16 ± 0.02	0.15 ± 0.02
Date Analyzed	02-16-08	02-16-08	02-16-08	02-19-08
Pu-239/240	< 0.01	< 0.01	< 0.01	< 0.01
Date Analyzed	02-16-08	02-16-08	02-16-08	02-16-08
Am-241	< 0.18	< 0.17	< 0.23	< 0.16
Date Analyzed	03-20-08	03-07-08	03-07-08	03-07-08

The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

Table 2. Results of analyses for gamma-emitting isotopes in four soil samples.

Lab Code	IDSO-8243	IDSO-8244	IDSO-8245	IDSO-8246
Sample Description	New Background	50' South	50' North	@ Point
Collection Date	11-30-07	11-30-07	11-30-07	11-30-07
Date Analyzed	01-15-08	01-17-08	01-19-08	01-22-08
Isotope	Concentration (pCi/g dry)			
K-40	17.0 ± 0.3	17.7 ± 0.3	16.9 ± 0.3	17.1 ± 0.3
Mn-54	< 0.01	< 0.01	< 0.01	< 0.01
Co-58	< 0.01	< 0.01	< 0.01	< 0.01
Co-60	< 0.01	< 0.01	< 0.01	< 0.01
Fe-59	< 0.02	< 0.03	< 0.02	< 0.02
Zn-65	< 0.02	< 0.02	< 0.02	< 0.02
Cs-134	< 0.01	< 0.01	< 0.01	< 0.01
Cs-137	1.75 ± 0.03	0.57 ± 0.01	0.75 ± 0.02	0.67 ± 0.02
Tl-208	0.43 ± 0.02	0.34 ± 0.02	0.35 ± 0.01	0.35 ± 0.02
Bi-212	< 0.21	1.11 ± 0.16	1.22 ± 0.18	1.17 ± 0.16
Bi-214	0.98 ± 0.03	0.90 ± 0.02	0.97 ± 0.02	0.75 ± 0.02
Pb-212	1.26 ± 0.02	1.14 ± 0.05	1.24 ± 0.05	1.30 ± 0.05
Pb-214	1.14 ± 0.05	0.95 ± 0.02	0.91 ± 0.02	0.97 ± 0.02
Ra-228	1.27 ± 0.05	1.02 ± 0.05	1.06 ± 0.05	1.06 ± 0.05

The error given is the probable counting error at 95% confidence level. Less than values are based on 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-12
DATE:	02-22-2007
SAMPLES RECEIVED:	10-17-2006
PURCHASE ORDER NO.:	

Enclosed are the results of the analyses for radium-226, thorium-232, isotopic uranium, plutonium-239/240, americium-241 and gamma emitting isotopes in five soil samples.

Should you have any questions concerning the results, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses on five soil samples.

Lab Code	IDSO-7227	IDSO-7228	IDSO-7229	IDSO-7230	IDSO-7231
Sample Description	#68-50 Downwind	#68-100 Downwind	#68-100'SE	#68-100'NW	BKG NE of Site
Collection Date	10-12-06	10-12-06	10-12-06	10-12-06	10-12-06
Isotope	Concentration (pCi/g dry)				
Ra-226	1.06 ± 0.03	0.99 ± 0.03	0.95 ± 0.05	1.03 ± 0.02	1.08 ± 0.03
Date Analyzed	11-19-06	11-19-06	02-01-07	11-22-06	11-27-06
Th-232	0.49 ± 0.04	0.48 ± 0.03	0.48 ± 0.06	0.52 ± 0.04	0.51 ± 0.04
Date Analyzed	01-10-07	01-10-07	01-10-07	01-10-07	01-10-07
U-233/234	0.11 ± 0.01	0.10 ± 0.02	0.13 ± 0.02	0.13 ± 0.02	0.17 ± 0.02
U-235	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
U-238	0.13 ± 0.02	0.11 ± 0.02	0.13 ± 0.02	0.14 ± 0.02	0.18 ± 0.02
Date Analyzed	01-18-07	01-18-07	01-18-07	01-18-07	01-26-07
Pu-239/240	0.02 ± 0.01	< 0.02	< 0.01	0.04 ± 0.01[b]	< 0.01
Date Analyzed	01-10-07	01-10-07	01-12-07	01-10-07	01-10-07
Am-241	< 0.03	< 0.05	< 0.05	< 0.05	< 0.08
Date Analyzed	01-26-07	01-26-07	01-26-07	01-26-07	01-26-07

The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

Table 2. Results of analyses for gamma-emitting isotopes in five soil samples.

Lab Code	IDSO-7227	IDSO-7228	IDSO-7229	IDSO-7230	IDSO-7231
Sample Description	#68-50' Downwind	#68-100'Downwind	#68-100'SE	#65-100'NW	BKG NE of Site
Collection Date	10-12-06	10-12-06	10-12-06	10-12-06	10-12-06
Date Analyzed	10-28-06	10-28-06	10-28-06	10-28-06	10-28-06
Isotope	Concentration (pCi/g dry)				
K-40	18.1 ± 0.7	18.8 ± 0.7	18.2 ± 0.7	17.6 ± 0.7	18.6 ± 0.7
Mn-54	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02
Co-58	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
Co-60	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01
Fe-59	< 0.04	< 0.04	< 0.04	< 0.04	< 0.03
Zn-65	< 0.04	< 0.05	< 0.05	< 0.04	< 0.04
Cs-134	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
Cs-137	0.58 ± 0.05	0.45 ± 0.04	0.15 ± 0.02	0.83 ± 0.05	< 0.02
Tl-208	0.35 ± 0.04	0.36 ± 0.04	0.38 ± 0.04	0.35 ± 0.04	0.41 ± 0.03
Bi-212	1.33 ± 0.33	1.46 ± 0.33	1.21 ± 0.35	1.29 ± 0.39	1.55 ± 0.40
Bi-214	0.90 ± 0.05	0.82 ± 0.06	0.83 ± 0.05	0.89 ± 0.05	0.94 ± 0.06
Pb-212	1.14 ± 0.05	1.40 ± 0.12	1.38 ± 0.12	1.32 ± 0.12	1.69 ± 0.13
Pb-214	1.01 ± 0.07	0.92 ± 0.06	0.88 ± 0.07	1.03 ± 0.07	1.06 ± 0.06
Ra-228	1.26 ± 0.10	1.07 ± 0.13	1.14 ± 0.10	1.07 ± 0.10	1.37 ± 0.14

The error given is the probable counting error at 95% confidence level. Less than values are based on 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-5
DATE:	07-27-2006
SAMPLES RECEIVED:	04-14-2006
PURCHASE ORDER NO.:	

Enclosed are the results of the analyses for radium-226, thorium-232, isotopic uranium, plutonium-239/240, americium-241 and gamma emitting isotopes in five soil samples.

Should you have any questions concerning the results, please do not hesitate to call.

Sincerely,

Bronia Grob, M.S.
Laboratory Manager

APPROVED BY

Tony Coorlim
Quality Assurance

Table 1. Results of analyses on five soil samples

Lab Code	IDSO-2421	IDSO-2422	IDSO-2423	IDSO-2424	IDSO-2425
Sample Description	#65-1'S	#65-1'E	#65-50'S	#65-100'S	BKG NE of Site
Collection Date	04-06-06	04-06-06	04-06-06	04-06-06	04-06-06
Wet/dry ratio	1.06	1.07	1.05	1.06	1.05
Isotope	Concentration (pCi/g dry)				
Ra-226	1.07 ± 0.05	0.98 ± 0.08	1.04 ± 0.07	1.01 ± 0.06	1.01 ± 0.06
Date Analyzed	06-26-06	05-27-06	06-27-06	05-27-06	05-24-06
Th-232	0.49 ± 0.10	0.54 ± 0.10	0.57 ± 0.10	0.64 ± 0.16	0.60 ± 0.21
Date Analyzed	06-26-06	06-22-06	06-22-06	06-22-06	06-22-06
U-233/234	0.11 ± 0.02	0.19 ± 0.03	0.08 ± 0.02	0.12 ± 0.03	0.23 ± 0.04
U-235	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
U-238	0.14 ± 0.03	0.18 ± 0.03	0.14 ± 0.03	0.14 ± 0.03	0.20 ± 0.03
Date Analyzed	06-22-06	06-22-06	06-22-06	06-22-06	06-22-06
Pu-239/240	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02
Date Analyzed	07-04-06	06-26-06	07-07-06	06-22-06	06-22-06
Am-241	< 0.03	< 0.02	< 0.02	< 0.03	< 0.05
Date Analyzed	07-07-06	07-07-06	01-18-06	06-26-06	07-24-06

The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

Table 2. Results of analyses for gamma-emitting isotopes in five soil samples.

Lab Code	IDSO-2421	IDSO-2422	IDSO-2423	IDSO-2424	IDSO-2425
Sample Description	#65-1'S	#65-1'E	#65-50'S	#65-100'S	BKG NE of Site
Collection Date	04-06-06	04-06-06	04-06-06	04-06-06	04-06-06
Date Analyzed	06-27-06	05-27-06	06-27-06	05-27-06	05-24-06
Isotope	Concentration (pCi/g dry)				
K-40	18.8 ± 0.6	19.0 ± 0.9	20.4 ± 0.6	17.4 ± 0.7	17.6 ± 0.8
Mn-54	< 0.02	< 0.03	< 0.02	< 0.02	< 0.02
Co-58	< 0.04	< 0.04	< 0.03	< 0.03	< 0.02
Co-60	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01
Fe-59	< 0.08	< 0.09	< 0.10	< 0.07	< 0.09
Zn-65	< 0.06	< 0.09	< 0.06	< 0.07	< 0.04
Cs-134	< 0.03	< 0.05	< 0.03	< 0.04	< 0.03
Cs-137	0.95 ± 0.04	0.90 ± 0.06	0.71 ± 0.04	0.21 ± 0.02	< 0.03
Tl-208	0.42 ± 0.04	0.39 ± 0.05	0.43 ± 0.05	0.40 ± 0.04	0.41 ± 0.04
Bi-212	1.25 ± 0.21	1.22 ± 0.36	1.46 ± 0.21	1.56 ± 0.49	1.08 ± 0.35
Bi-214	0.98 ± 0.06	0.89 ± 0.07	0.99 ± 0.07	0.87 ± 0.07	0.94 ± 0.07
Pb-212	1.24 ± 0.04	1.20 ± 0.06	1.29 ± 0.05	1.14 ± 0.05	1.21 ± 0.05
Pb-214	1.07 ± 0.05	0.98 ± 0.08	1.04 ± 0.07	1.01 ± 0.06	1.01 ± 0.06
Ra-228	1.21 ± 0.10	1.20 ± 0.13	1.24 ± 0.12	1.37 ± 0.12	1.17 ± 0.12

The error given is the probable counting error at 95% confidence level. Less than values are based on 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-2
DATE:	01-30-2006
SAMPLES RECEIVED:	12-02-2005
PURCHASE ORDER NO.:	

Enclosed are the results of the analyses for radium-226, thorium-232, isotopic uranium, americium-241, plutonium-239/240 and gamma emitting isotopes in four soil samples.

Should you have any questions concerning the results, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of analyses on four soil samples.

Lab Code	SPSO-6733	SPSO-6734	SPSO-6735	SPSO-6736
Sample Description	#68-1'N	#68-1'S	#68-50'N	#68-50'S
Collection Date	10-28-05	10-28-05	10-28-05	10-28-05
Wet/dry ratio	1.07	1.09	1.05	1.08
Isotope	Concentration (pCi/g dry)			
Ra-226	1.02 ± 0.02	1.00 ± 0.03	1.02 ± 0.08	1.03 ± 0.08
Date Analyzed	01-11-06	01-11-06	01-12-06	01-11-06
Th-232	0.48 ± 0.07	0.43 ± 0.07	0.49 ± 0.07	0.48 ± 0.07
Date Analyzed	01-05-06	01-05-06	01-05-06	01-05-06
U-233/234	0.11 ± 0.03	0.07 ± 0.02	0.09 ± 0.03	0.09 ± 0.03
U-235	< 0.01	< 0.01	< 0.01	< 0.01
U-238	0.13 ± 0.03	0.09 ± 0.03	0.09 ± 0.03	0.11 ± 0.03
Date Analyzed	01-05-06	01-05-06	01-05-06	01-05-06
Pu-239/240	< 0.02	< 0.01	< 0.01	< 0.01
Date Analyzed	01-05-06	01-05-06	01-05-06	01-05-06
Am-241	< 0.04	< 0.02	< 0.02	< 0.01
Date Analyzed	01-12-06	01-18-06	01-18-06	01-18-06

The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

Table 3. Results of analyses for gamma-emitting isotopes in four soil samples.

Lab Code	SPSO-6733	SPSO-6734	SPS-6735	SPS-6736
Sample Description	#68-1'N	#68-1'S	#68-50'N	#68-50'N
Collection Date	11-28-05	11-28-05	11-28-05	11-28-05
Date Analyzed	01-11-06	01-11-06	01-12-06	01-11-06
Isotope	**Concentration (pCi/g dry)**			
Na-22	< 0.01	< 0.02	< 0.04	< 0.02
Mn-54	< 0.01	< 0.01	< 0.04	< 0.01
Co-58	< 0.01	< 0.02	< 0.04	< 0.02
Co-60	< 0.02	< 0.02	< 0.03	< 0.02
Fe-59	< 0.02	< 0.05	< 0.10	< 0.07
Zn-65	< 0.03	< 0.04	< 0.11	< 0.05
Zr-Nb-95	< 0.02	< 0.02	< 0.04	< 0.02
Ru-103	< 0.01	< 0.02	< 0.05	< 0.03
Ru-106	< 0.06	< 0.11	< 0.19	< 0.17
Sb-124	< 0.01	< 0.02	< 0.04	< 0.03
Sb-125	< 0.02	< 0.03	< 0.07	< 0.04
Cs-134	< 0.01	< 0.01	< 0.03	< 0.02
Cs-137	0.11 ± 0.01	0.09 ± 0.01	0.37 ± 0.06	0.06 ± 0.02
Ce-141	< 0.03	< 0.03	< 0.07	< 0.05
Ce-144	< 0.06	< 0.08	< 0.18	< 0.10
Eu-152	< 0.02	< 0.03	< 0.06	< 0.06
Eu-154	< 0.02	< 0.02	< 0.04	< 0.04
Eu-155	0.06 ± 0.02	< 0.04	< 0.10	< 0.10
Ra-228	1.10 ± 0.05	1.17 ± 0.07	1.28 ± 0.17	1.10 ± 0.14

Less than values are based on 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8100-7201
DATE:	08-08-2005
SAMPLES RECEIVED:	06-06-2005
PURCHASE ORDER NO.:	

Enclosed are the results of the analyses for radium-226, thorium-232, isotopic uranium, americium-241 and plutonium-239/240 in six soil samples.

Should you have any questions concerning the results, please do not hesitate to call.

Sincerely,

Bronia Grob, M.S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of analyses on five soil samples.

Lab Code	SPS-3060	SPS-3061	SPS-3062	SPS-3063	SPS-3064
Sample Description	53105SP651S	53105SP652N	53105SP6550N	53105SP6550S	53105BKG
Collection Date	05-31-05	05-31-05	05-31-05	05-31-05	05-31-05
Wet/dry ratio	1.07	1.09	1.05	1.08	1.03
Isotope	Concentration (pCi/g dry)				
Ra-226	1.33 ± 0.09	1.15 ± 0.07	1.27 ± 0.07	1.19 ± 0.07	1.00 ± 0.08
Date Analyzed	07-01-05	07-01-05	07-02-05	07-02-05	07-01-05
Th-232	0.61 ± 0.12	0.66 ± 0.14	0.51 ± 0.11	0.50 ± 0.08	0.54 ± 0.12
Date Analyzed	06-28-05	07-12-05	06-24-05	06-24-05	06-24-05
U-233/234	0.16 ± 0.04	0.16 ± 0.04	0.18 ± 0.04	0.19 ± 0.04	0.22 ± 0.04
U-235	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
U-238	0.18 ± 0.04	0.15 ± 0.04	0.22 ± 0.05	0.17 ± 0.03	0.23 ± 0.04
Date Analyzed	06-29-05	06-29-05	06-29-05	06-29-05	06-29-05
Pu-239/240	< 0.03	< 0.02	< 0.02	< 0.01	< 0.01
Date Analyzed	06-21-05	06-22-05	06-22-05	06-22-05	06-22-05
Am-241	< 0.04	< 0.03	< 0.01	< 0.05	< 0.04
Date Analyzed	07-20-05	07-01-05	07-01-05	07-20-05	07-12-05

The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

Table 2. Results of analyses on one soil sample.

Lab Code	SPS-3065
Sample Description	120704
Collection Date	12-07-04
Wet/dry ratio	1.03
Isotope	**Concentration (pCi/g dry)**
Ra-226	1.06 ± 0.06
Date Analyzed	07-02-05
Th-232	0.50 ± 0.09
Date Analyzed	06-28-05
U-233/234	0.21 ± 0.04
U-235	0.02 ± 0.01
U-238	0.23 ± 0.04
Date Analyzed	06-29-05
Pu-239	< 0.03
Date Analyzed	06-22-05
Am-241	< 0.03
Date Analyzed	07-01-05

The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

Table 3. Results of analyses for gamma-emitting isotopes in six soil samples.

Lab Code	SPS-3060	SPS-3061	SPS-3062	SPS-3063	SPS-3064	SPS-3065
Sample Description	53105SP651S	53105SP652N	53105SP6550N	53105SP6550S	53105BKG	120704
Collection Date	05-31-05	05-31-05	05-31-05	05-31-05	05-31-05	12-07-04
Date Analyzed	07-01-05	07-01-05	07-02-05	07-02-05	07-01-05	07-02-05
Isotope	Concentration (pCi/g dry)					
Na-22	< 0.03	< 0.02	< 0.01	< 0.03	< 0.02	< 0.02
Mn-54	< 0.02	< 0.03	< 0.03	< 0.02	< 0.02	< 0.03
Co-58	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.06
Co-60	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01
Fe-59	< 0.07	< 0.04	< 0.04	< 0.06	< 0.04	< 0.69
Zn-65	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04	< 0.06
Zr-Nb-95	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.30
Ru-103	< 0.03	< 0.03	< 0.03	< 0.02	< 0.03	< 0.50
Ru-106	< 0.14	< 0.18	< 0.19	< 0.17	< 0.12	< 0.10
Sb-124	< 0.03	< 0.03	< 0.03	< 0.03	< 0.02	< 0.19
Sb-125	< 0.06	< 0.06	< 0.05	< 0.07	< 0.04	< 0.05
Cs-134	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Cs-137	1.28 ± 0.05	0.69 ± 0.04	0.40 ± 0.04	1.42 ± 0.05	< 0.02	0.04 ± 0.02
Ce-141	< 0.06	< 0.05	< 0.07	< 0.04	< 0.06	< 1.21
Ce-144	< 0.08	< 0.14	< 0.12	< 0.18	< 0.11	< 0.19
Eu-152	< 0.04	< 0.04	< 0.05	< 0.05	< 0.05	< 0.04
Eu-154	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Eu-155	< 0.09	< 0.09	< 0.09	< 0.09	< 0.08	< 0.08
Ra-228	< 0.99	1.40 ± 0.83	< 1.27	1.42 ± 0.82	1.36 ± 0.67	< 1.08

Less than values are based on 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8100-7168
DATE:	04-26-2005
SAMPLES RECEIVED:	03-15-2005
PURCHASE ORDER NO.:	030407

Enclosed are the results of the analyses for radium-226, radium-228, isotopic uranium and isotopic thorium in four soil samples.

Should you have any questions concerning the results, please do not hesitate to call.

Sincerely,

Bronia Grob, M.S.
Lab Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

SAMPLES RETAINED THIRTY DAYS AFTER ANALYSIS

OK
[illegible] 4-24-05

Table 1. Results of analyses on four soil samples.

Lab Code	SPS-1170	SPS-1171	SPS-1172	SPS-1173
Sample Description	1'N. of SP 68	1'S. of SP 68	50'S. of SP 68	50'N. of SP 68
Collection Date	12-06-04	12-06-04	12-06-04	12-06-04
Isotope	Concentration (pCi/g dry)			
Ra-226	1.17 ± 0.07	1.25 ± 0.09	1.23 ± 0.08	1.32 ± 0.10
Date Analyzed	04-20-05	04-22-05	04-22-05	04-21-05
Ra-228	1.24 ± 0.17	1.29 ± 0.16	1.21 ± 0.13	1.16 ± 0.17
Date Analyzed	04-20-05	04-22-05	04-22-05	04-21-05
U-233/234	0.23 ± 0.04	0.29 ± 0.06	0.24 ± 0.04	0.29 ± 0.05
U-235	< 0.01	< 0.01	< 0.01	< 0.01
U-238	0.28 ± 0.04	0.31 ± 0.06	0.30 ± 0.05	0.36 ± 0.06
Date Analyzed	04-21-05	04-21-05	04-21-05	04-21-05
Th-228	0.85 ± 0.21	1.29 ± 0.29	0.92 ± 0.21	0.55 ± 0.21
Th-230	0.53 ± 0.10	0.49 ± 0.11	0.47 ± 0.09	0.56 ± 0.11
Th-232	0.52 ± 0.10	0.74 ± 0.14	0.61 ± 0.11	0.75 ± 0.12
Date Analyzed	04-21-05	04-21-05	04-21-05	04-21-05

The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8100-7107
DATE:	07-22-2004
SAMPLES RECEIVED:	06-08-2004
PURCHASE ORDER NO.:	030407

Enclosed are the results of the analyses for radium-226, radium-228, isotopic uranium and isotopic thorium in four soil samples.

Should you have any questions concerning the results, please do not hesitate to call.

Sincerely,

Rimma Amromin
Project Coordinator

APPROVED BY ______________
Bronia Grob, M. S.
Lab Manager

SAMPLES RETAINED THIRTY DAYS AFTER ANALYSIS

Table 1. Results of analyses on four soil samples.

Lab Code	SPS-2797	SPS-2798	SPS-2799	SPS-2800*	SPS-2801
Sample Description	64043 E 65	64043 W 65	640460 S 65	640460 S 65	640430 N 65
Collection Date	06-04-04	06-04-04	06-04-04	06-04-04	06-04-04
Isotope	Concentration (pCi/g dry)				
Ra-226	0.92 ± 0.04	0.90 ± 0.06	0.92 ± 0.03	0.89 ± 0.05	1.07 ± 0.04
Date Analyzed	07-11-04	07-12-04	07-11-04	07-14-04	07-11-04
Ra-228	1.07 ± 0.09	1.10 ± 0.14	1.05 ± 0.05	1.04 ± 0.08	1.14 ± 0.10
Date Analyzed	07-11-04	07-12-04	07-11-04	07-14-04	07-11-04
U-233/234	0.21 ± 0.06	0.23 ± 0.13	0.44 ± 0.22	0.17 ± 0.05	0.28 ± 0.08
U-235	< 0.02	< 0.05	< 0.08	< 0.01	< 0.02
U-238	0.39 ± 0.09	0.29 ± 0.15	0.46 ± 0.22	0.37 ± 0.07	0.39 ± 0.09
Date Analyzed	06-24-04	06-24-04	06-29-04	06-24-04	06-24-04
Th-228	1.26 ± 0.23	1.28 ± 0.28	0.98 ± 0.38	0.98 ± 0.24	1.09 ± 0.19
Th-230	0.64 ± 0.12	0.63 ± 0.13	1.32 ± 0.26	0.93 ± 0.12	0.89 ± 0.13
Th-232	0.78 ± 0.13	0.77 ± 0.15	0.85 ± 0.20	0.58 ± 0.12	0.95 ± 0.13
Date Analyzed	06-29-04	06-29-04	06-29-04	06-29-04	06-29-04

*Denotes a duplicate.
The error given is the probable counting error at 95% confidence level. Less than value is based on 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-35
DATE:	09-15-2009
SAMPLES RECEIVED:	07-14-2009
PURCHASE ORDER NO:	

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (2nd quarter 2009).

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate samples (2nd quarter 2009 composites).

Lab Code	IDAP-3536	IDAP-3539	IDAP-3538	IDAP-3535	IDAP-3537
Location	ADMIN	CELL 14	CELL 15	RTF	STEINER
Collection Start	4/1/2009	4/3/2009	4/3/2009	4/1/2009	4/21/2009
Collection End	7/1/2009	6/23/2009	6/23/2009	6/24/2009	7/11/2009
Volume Analyzed(m3)	36997.70	441.50	441.80	543.36	9653.20
Date Analyzed	7/30/2009	7/29/2009	7/29/2009	7/29/2009	7/30/2009
Isotope					
Be-7	1.08E-01 ± 2.2E-03	< 7.7E-02	< 8.1E-02	1.93E-01 ± 7.1E-02	8.50E-02 ± 4.7E-03
Mn-54	< 7.5E-05	< 5.6E-03	< 5.9E-03	< 5.0E-03	< 2.8E-04
Co-58	< 8.7E-05	< 6.1E-03	< 5.8E-03	< 5.3E-03	< 2.8E-04
Co-60	< 7.2E-05	< 5.7E-03	< 6.3E-03	< 5.4E-03	< 2.3E-04
Fe-59	< 1.9E-04	< 1.7E-02	< 1.5E-02	< 1.2E-02	< 4.2E-04
Zn-65	< 1.1E-04	< 9.5E-03	< 8.7E-03	< 7.7E-03	< 4.2E-04
Zr-95	< 1.3E-04	< 1.3E-02	< 9.3E-03	< 9.6E-03	< 4.0E-04
Ru-103	< 9.7E-05	< 1.1E-02	< 1.0E-02	< 8.2E-03	< 2.9E-04
Ru-106	< 4.6E-04	< 2.8E-02	< 3.7E-02	< 4.7E-02	< 2.5E-03
Cs-134	< 6.7E-05	< 5.6E-03	< 4.8E-03	< 4.4E-03	< 2.9E-04
Cs-137	< 8.1E-05	< 6.5E-03	< 5.4E-03	< 4.8E-03	< 3.2E-04
Ce-141	< 2.3E-04	< 1.9E-02	< 1.9E-02	< 1.5E-02	< 7.7E-04
Ce-144	< 6.2E-04	< 2.8E-02	< 4.3E-02	< 2.2E-02	< 3.0E-03

The error given is the probable counting error at the 95% confidence level.
Less than (<), value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (2nd quarter 2009 composites).

Sample Description	Administration	Cell 14	Cell 15	RTF	Steiner
Start Date	04-01-09	04-03-09	04-03-09	04-01-09	04-21-09
End Date	07-01-09	06-23-09	06-23-09	06-24-09	07-11-09
Volume (m^3)	73995.4	883.0	882.96	1086.72	19306.3
Lab Code	IDAP-3536	IDAP-3539	IDAP-3538	IDAP-3535	IDAP-3537
Isotope			Concentration (pCi/m^3)		
Ra-226	2.4 ± 0.3 E-04	< 3.2 E-03	8.5 ± 1.8 E-03	5.4 ± 1.3 E-03	< 1.2 E-04
Date Analyzed	08-19-09	08-20-09	08-19-09	08-19-09	08-19-09
Th-232	2.3 ± 0.1 E-04	1.0 ± 0.2 E-03	2.1 ± 0.3 E-03	6.4 ± 1.4 E-03	1.1 ± 0.1 E-04
Date Analyzed	08-20-09	08-28-09	08-28-09	09-11-09	09-11-09
U-233/234	2.0 ± 0.1 E-04	1.8 ± 0.3 E-03	2.6 ± 0.3 E-03	1.5 ± 0.1 E-02	2.8 ± 0.8 E-05
U-238	2.0 ± 0.1 E-04	1.3 ± 0.2 E-03	2.5 ± 0.3 E-03	1.5 ± 0.1 E-02	2.5 ± 0.7 E-05
Date Analyzed	09-02-09	09-02-09	09-02-09	09-02-09	09-02-09
Pu-239	< 1.0 E-06	< 8.1 E-05	< 9.0 E-05	< 6.6 E-05	< 4.2 E-06
Date Analyzed	09-02-09	09-04-09	09-04-09	09-02-09	09-02-09
Am-241	< 1.1 E-05	< 2.0 E-04	< 8.6 E-04	< 4.3 E-04	< 2.9 E-05
Date Analyzed	09-11-09	09-11-09	09-11-09	09-11-09	09-11-09

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.: 8048-31
DATE: 03-03-2009
SAMPLES RECEIVED: 01-06-2009
PURCHASE ORDER NO.:

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (4th quarter 2008).

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate samples (4th quarter 2008 composites).

Lab Code	IDAP-7309	IDAP-7313	IDAP-7312	IDAP-7311	IDAP-7310
Location	ADMINISTRATION	CELL 14	CELL 15	RTF	STEINER HOUSE
Collection Start	9/30/2008	10/10/2008	10/10/2008	10/1/2008	10/27/2008
Collection End	1/2/2009	12/29/2008	12/29/2008	12/31/2008	12/18/2008
Volume Analyzed(m3)	37133.00	441.35	441.48	509.40	15315.00
Date Analyzed	1/19/2009	2/9/2009	2/10/2009	2/2/2009	12/18/2008

Isotope	Concentration pCi/m3				
Be-7	5.4E-02 ± 1.9E-03	2.0E-01 ± 1.1E-01	< 9.1E-02	1.5E-01 ± 5.9E-02	1.0E-01 ± 4.2E-03
Mn-54	< 6.4E-05	< 4.3E-03	< 5.9E-03	< 4.4E-03	< 1.6E-04
Co-58	< 7.1E-05	< 6.9E-03	< 8.9E-03	< 5.5E-03	< 2.6E-04
Co-60	< 7.2E-05	< 4.3E-03	< 4.8E-03	< 4.6E-03	< 1.8E-04
Fe-59	< 1.4E-04	< 1.8E-02	< 1.9E-02	< 9.9E-03	< 4.4E-04
Zn-65	< 1.3E-04	< 8.6E-03	< 1.1E-02	< 9.4E-03	< 2.8E-04
Zr-95	< 1.5E-04	< 9.8E-03	< 1.4E-02	< 6.5E-03	< 3.8E-04
Ru-103	< 6.9E-05	< 7.5E-03	< 1.1E-02	< 6.4E-03	< 3.7E-04
Ru-106	< 6.5E-04	< 4.6E-02	< 5.1E-02	< 4.9E-02	< 1.8E-03
Cs-134	< 5.8E-05	< 4.8E-03	< 5.4E-03	< 4.3E-03	< 1.8E-04
Cs-137	< 9.6E-05	< 5.2E-03	7.1E-03 ± 4.0E-03	< 5.5E-03	< 1.7E-04
Ce-141	< 1.4E-04	< 2.1E-02	< 2.3E-02	< 1.6E-02	< 7.3E-04
Ce-144	< 5.2E-04	< 3.8E-02	< 4.2E-02	< 3.7E-02	< 1.6E-03

The error given is the probable counting error at the 95% confidence level.
Less than (<) value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (4th quarter 2008 composites).

Sample Description	Administration	Cell 14	Cell 15	RTF	Steiner
Start Date	09-30-08	10-10-08	10-10-08	10-01-08	10-27-08
End Date	01-02-09	12-29-08	12-29-08	12-31-08	12-18-08
Volume (m3)	74266.5	882.7	882.96	1018.8	30630.5
Lab Code	IDAP-7309	IDAP-7313	IDAP-7312	IDAP-7311	IDAP-7310
Isotope	Concentration (pCi/m^3)				
Ra-226	5.1 ± 1.2 E-05	1.8 ± 0.8 E-03	1.2 ± 0.6 E-03	1.3 ± 0.6 E-03	< 5.7 E-05
Date Analyzed	03-02-09	03-02-09	03-02-09	03-02-09	03-02-09
Th-232	1.3 ± 0.1 E-04	< 1.9 E-03	< 1.7 E-03	3.3 ± 0.4 E-03	1.3 ± 0.8 E-05
Date Analyzed	01-29-09	01-29-09	01-29-09	01-29-09	01-29-09
U-233/234	1.5 ± 0.1 E-04	9.7 ± 1.9 E-04	4.3 ± 0.4 E-03	4.6 ± 0.4 E-03	1.5 ± 0.5 E-05
U-238	1.4 ± 0.1 E-04	1.0 ± 0.2 E-03	4.3 ± 0.4 E-03	4.6 ± 0.4 E-03	1.2 ± 0.4 E-05
Date Analyzed	02-04-09	02-12-09	02-12-09	02-12-09	02-12-09
Pu-239	< 1.0 E-06	< 8.0 E-05	< 8.0 E-05	< 8.0 E-05	< 2.5 E-06
Date Analyzed	02-12-09	02-12-09	02-12-09	02-12-09	02-12-09
Am-241	< 2.7 E-06	< 1.5 E-04	< 2.5 E-04	< 2.1 E-04	< 5.7 E-06
Date Analyzed	01-29-09	01-29-09	01-29-09	01-29-09	01-29-09

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-28
DATE:	01-07-2009
SAMPLES RECEIVED:	10-15-2008
PURCHASE ORDER NO.:	

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (3rd quarter 2008).

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY ______________________
Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate samples (3rd quarter 2008 composites).

Lab Code	IDAP-5627	IDAP-5628	IDAP-5629	IDAP-5630	IDAP-5631
Location	ADMINISTRATION	CELL 14	CELL 15	RTF	STEINER HOUSE
Collection Start	6/30/2008	7/1/2008	7/1/2008	7/2/2008	7/28/2008
Collection End	9/30/2008	9/29/2008	9/29/2008	9/26/2008	9/30/2008
Volume Analyzed(m3)	35336.00	475.30	475.44	407.52	16026.00
Date Analyzed	11/11/2008	11/10/2008	11/10/2008	11/5/2008	11/11/2008

Isotope					
Be-7	9.7E-02 ± 2.7E-03	3.0E-01 ± 1.3E-01	2.4E-01 ± 9.3E-02	< 1.2E-01	1.1E-01 ± 5.2E-03
Mn-54	< 8.4E-05	< 4.9E-03	< 5.8E-03	< 7.3E-03	< 1.6E-04
Co-58	< 9.7E-05	< 5.7E-03	< 7.8E-03	< 9.8E-03	< 2.5E-04
Co-60	< 5.1E-05	< 4.7E-03	< 5.8E-03	< 5.8E-03	< 1.6E-04
Fe-59	< 1.5E-04	< 1.8E-02	< 1.9E-02	< 1.9E-02	< 4.4E-04
Zn-65	< 1.2E-04	< 8.3E-03	< 1.4E-02	< 1.3E-02	< 1.5E-04
Zr-95	< 1.9E-04	< 1.2E-02	< 1.6E-02	< 1.8E-02	< 4.7E-04
Ru-103	< 1.6E-04	< 8.1E-03	< 9.4E-03	< 6.8E-03	< 2.0E-04
Ru-106	< 8.2E-04	< 4.2E-02	< 6.0E-02	< 7.4E-02	< 1.4E-03
Cs-134	< 8.0E-05	< 4.7E-03	< 6.1E-03	< 6.9E-03	< 1.6E-04
Cs-137	< 8.0E-05	< 5.0E-03	< 5.8E-03	< 7.3E-03	< 1.6E-04
Ce-141	< 3.7E-04	< 2.1E-02	< 2.9E-02	< 1.3E-02	< 6.7E-04
Ce-144	< 5.6E-04	< 3.7E-02	< 5.2E-02	< 4.3E-02	< 1.1E-03

The error given is the probable counting error at the 95% confidence level.
Less than (<) value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (3rd quarter 2008 composites).

Sample Description	Administration	Cell 14	Cell 15	RTF	Steiner
Start Date	06-30-08	07-01-08	07-01-08	07-02-08	07-28-08
End Date	09-30-08	09-29-08	09-29-08	09-26-08	09-30-08
Volume (m3)	70671.9	950.6	950.88	815.04	32051.7
Lab Code	IDAP-5627	IDAP-5628	IDAP-5629	IDAP-5630	IDAP-5631
Isotope	Concentration (pCi/m^3)				
Ra-226	1.4 ± 0.2 E-04	< 1.5 E-03	1.7 ± 0.2 E-02	4.8 ± 1.5 E-03	< 8.7 E-05
Date Analyzed	12-01-08	12-01-08	12-11-08	12-11-08	12-11-08
Th-232	5.9 ± 0.9 E-04	1.2 ± 0.6 E-03	2.4 ± 0.3 E-02	9.7 ± 2.1 E-03	4.4 ± 1.3 E-05
Date Analyzed	12-09-08	12-09-08	12-09-08	12-12-08	12-12-08
U-233/234	3.4 ± 0.3 E-04	1.6 ± 0.4 E-03	5.1 ± 0.2 E-02	1.7 ± 0.1 E-02	6.8 ± 1.4 E-05
U-238	3.3 ± 0.3 E-04	1.6 ± 0.4 E-03	5.5 ± 0.2 E-02	1.7 ± 0.1 E-02	3.9 ± 1.0 E-05
Date Analyzed	12-12-08	12-05-08	12-05-08	12-05-08	12-08-08
Pu-239	< 3.1 E-06	< 2.1 E-04	< 2.2 E-04	< 2.3 E-04	< 4.8 E-06
Date Analyzed	12-12-08	12-05-08	12-05-08	12-05-08	12-05-08
Am-241	< 1.1 E-05	< 9.8 E-04	< 5.9 E-04	< 3.3 E-04	< 9.6 E-06
Date Analyzed	12-03-08	12-03-08	12-30-08	12-03-08	12-03-08

The error given is the probable counting error at the 95% confidence level. Less than (<) value is based on a 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-27
DATE:	09-30-2008
SAMPLES RECEIVED:	07-11-2008
PURCHASE ORDER NO.:	

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (2nd quarter 2008)

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY ______________________
Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate samples collected during second quarter 2008.

Lab Code	IDAP-3565	IDAP-3566	IDAP-3567	IDAP-3568	IDAP-3569
Collection Start	3/26/2008	4/3/2008	4/3/2008	4/3/2008	4/18/2008
Collection End	6/30/2008	6/25/2008	6/25/2008	6/26/2008	6/13/2008
Volume (m3)	34046.00	441.35	441.48	849.00	12033.00
Location	ADMINISTRATION	CELL 14	CELL 15	RTF	STEINER HOUSE
Date Analyzed	8/4/2008	8/1/2008	8/2/2008	8/3/2008	8/3/2008
Isotope					
Be-7	6.68E-02 ± 2.3E-03	0.19 ± 1.1E-01	< 9.2E-02	0.11 ± 3.4E-02	0.10 ± 1.1E-02
Mn-54	< 7.2E-05	< 4.2E-03	< 6.0E-03	< 2.7E-03	< 2.5E-04
Co-58	< 1.0E-04	< 5.8E-03	< 8.3E-03	< 3.4E-03	< 2.4E-04
Co-60	< 9.6E-05	< 6.5E-03	< 6.2E-03	< 3.5E-03	< 2.7E-04
Fe-59	< 3.0E-04	< 1.9E-02	< 1.4E-02	< 1.3E-02	< 6.3E-04
Zn-65	< 1.0E-04	< 9.1E-03	< 9.0E-03	< 5.3E-03	< 4.4E-04
Zr-95	< 1.8E-04	< 1.4E-02	< 1.2E-02	< 1.0E-02	< 6.1E-04
Ru-103	< 1.3E-04	< 7.2E-03	< 1.4E-02	< 5.7E-03	< 4.6E-04
Ru-106	< 7.7E-04	< 6.0E-02	< 4.1E-02	< 2.8E-02	< 2.7E-03
Cs-134	< 6.5E-05	< 5.5E-03	< 6.5E-03	< 3.4E-03	< 2.2E-04
Cs-137	< 8.6E-05	< 6.6E-03	< 6.7E-03	< 3.4E-03	< 1.9E-04
Ce-141	< 2.1E-04	< 1.9E-02	< 1.9E-02	< 6.3E-03	< 9.2E-04
Ce-144	< 6.0E-04	< 4.6E-02	< 3.7E-02	< 2.0E-02	< 1.8E-03

The error given is the probable counting error at the 95% confidence level.
Less than (<) value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (2nd quarter 2008 composites).

Sample Description	Administration	Cell 14	Cell 15	RTF	Steiner
Start Date	03-28-08	04-03-08	04-03-08	04-03-08	04-18-08
End Date	06-23-08	06-25-08	06-25-08	06-26-08	06-13-08
Volume (m3)	70645.6	882.7	882.96	1358.4	27325.9
Lab Code	IDAP-3565	IDAP-3566	IDAP-3567	IDAP-3568	IDAP-3569
Isotope	Concentration (pCi/m³)				
Ra-226	2.0 ± 0.3 E-04	< 3.5 E-03	1.4 ± 0.3 E-02	2.7 ± 1.1 E-03	< 8.9 E-05
Date Analyzed	08-14-08	08-14-08	08-14-08	08-14-08	08-14-08
Th-232	4.2 ± 0.7 E-04	2.1 ± 0.9 E-03	7.6 ± 2.6 E-03	1.6 ± 1.0 E-03	< 3.5 E-05
Date Analyzed	09-12-08	09-12-08	09-12-08	09-15-08	09-15-08
U-233/234	3.1 ± 0.2 E-04	1.2 ± 0.1 E-02	2.3 ± 0.1 E-02	7.7 ± 0.6 E-03	2.6 ± 1.0 E-05
U-238	2.9 ± 0.2 E-04	1.6 ± 0.1 E-02	2.3 ± 0.1 E-02	7.7 ± 0.6 E-03	2.2 ± 1.0 E-05
Date Analyzed	09-09-08	09-09-08	09-09-08	09-09-08	09-09-08
Pu-239	< 2.5 E-06	< 3.0 E-04	< 2.1 E-04	< 1.2 E-04	< 7.1 E-06
Date Analyzed	09-15-08	09-15-08	09-15-08	09-15-08	09-15-08
Am-241	< 2.5 E-06	< 1.7 E-04	< 2.8 E-04	< 8.1 E-05	< 5.1 E-06
Date Analyzed	09-05-08	09-05-08	09-12-08	09-05-08	09-05-08

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-24
DATE:	07-25-2008
SAMPLES RECEIVED:	04-08-2008
PURCHASE ORDER NO:	

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (1st quarter 2008).

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY ____________________
Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate samples (1st quarter 2008 composites).

Lab Code	IDAP-1668	IDAP-1669	IDAP-1670	IDAP-1671	IDAP-1672
Collection Date	3/28/2008	3/27/2008	3/27/2008	3/26/2008	3/18/2008
Location	ADMINISTRATION	CELL 14	CELL 15	RTF	STEINER HOUSE
Date Analyzed	05/20/08	05/13/08	05/15/08	05/12/08	05/16/08
Isotope					
Be-7	5.1E-02 ± 2.6E-03	< 1.0E-01	< 9.0E-02	1.6E-01 ± 4.9E-02	5.7E-02 ± 4.6E-03
Mn-54	< 8.5E-05	< 7.8E-03	< 7.9E-03	< 4.1E-03	< 2.4E-04
Co-58	< 1.2E-04	< 4.1E-03	< 7.4E-03	< 5.0E-03	< 1.8E-04
Co-60	< 8.7E-05	< 7.8E-03	< 7.8E-03	< 4.7E-03	< 2.1E-04
Fe-59	< 2.4E-04	< 1.3E-02	< 1.3E-02	< 1.2E-02	< 7.7E-04
Zn-65	< 1.9E-04	< 1.4E-02	< 1.4E-02	< 5.3E-03	< 4.3E-04
Zr-95	< 1.0E-04	< 1.7E-02	< 1.4E-02	< 1.1E-02	< 4.2E-04
Ru-103	< 1.5E-04	< 9.0E-03	< 1.3E-02	< 6.9E-03	< 4.4E-04
Ru-106	< 6.9E-04	< 6.1E-02	< 5.4E-02	< 2.8E-02	< 1.8E-03
Cs-134	< 8.2E-05	< 6.8E-03	< 5.5E-03	< 4.0E-03	< 2.0E-04
Cs-137	< 8.6E-05	< 6.6E-03	< 6.2E-03	< 4.5E-03	< 2.3E-04
Ce-141	< 3.8E-04	< 2.2E-02	< 2.1E-02	< 1.0E-02	< 5.0E-04
Ce-144	< 5.9E-04	< 5.1E-02	< 5.2E-02	< 3.4E-02	< 1.8E-03

The error given is the probable counting error at the 95% confidence level.
Less than (<) value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (1st quarter 2008 composites).

Sample Description	Administration	Cell 14	Cell 15	RTF	Steiner
Start Date	12-28-07	01-04-08	01-04-08	01-09-08	01-18-08
End Date	03-28-08	03-27-08	03-27-08	03-26-08	03-18-08
Volume (m3)	70645.6	882.7	882.96	1358.4	27325.9
Lab Code	IDAP-1668	IDAP-1669	IDAP-1670	IDAP-1671	IDAP-1672
Isotope	Concentration (pCi/m^3)				
Ra-226	2.0 ± 0.4 E-04	3.0 ± 1.7 E-03	< 4.4 E-03	< 2.5 E-03	< 1.4 E-04
Date Analyzed	06-16-08	06-16-08	06-16-08	06-16-08	06-16-08
Th-232	2.3 ± 0.3 E-04	< 2.2 E-03	2.5 ± 1.1 E-03	1.6 ± 0.5 E-03	< 2.2 E-05
Date Analyzed	06-20-08	06-20-08	06-20-08	06-20-08	06-20-08
U-233/234	2.2 ± 0.1 E-04	2.8 ± 0.5 E-03	4.6 ± 0.6 E-03	1.3 ± 0.3 E-03	1.6 ± 0.9 E-05
U-238	2.1 ± 0.1 E-04	2.3 ± 0.4 E-03	4.3 ± 0.6 E-03	1.3 ± 0.3 E-03	1.4 ± 0.8 E-05
Date Analyzed	06-28-08	06-28-08	06-28-08	06-28-08	06-28-08
Pu-239	< 2.9 E-06	< 2.1 E-04	< 2.9 E-04	< 1.8 E-04	< 2.5 E-06
Date Analyzed	06-25-08	06-25-08	06-25-08	06-25-08	06-25-08
Am-241	< 9.8 E-06	< 3.9 E-04	< 3.3 E-04	< 2.1 E-04	< 8.6 E-06
Date Analyzed	07-22-08	07-15-08	07-15-08	07-15-08	07-15-08

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-23
DATE:	04-17-2008
SAMPLES RECEIVED:	01-09-2008
PURCHASE ORDER NO:	

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (4th quarter 2007).

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate samples (4th quarter 2007 composites).

Lab Code	IDAP-8788	IDAP-8789	IDAP-8790	IDAP-8786	IDAP-8787
Collection Date	12/28/2007	12/28/2007	12/28/2007	12/26/2007	12/19/2007
	ADMINISTRATION	CELL 14	CELL 15	RTF	STEINER HOUSE
Volume (m3)	36243.00	441.35	441.48	815.04	10095.00

Isotope	Concentration (pCi/m^3)				
Be-7	6.9E-02 ± 2.5E-03	< 8.5E-02	1.9E-01 ± 1.0E-01	1.6E-01 ± 4.8E-02	8.1E-02 ± 6.7E-03
Mn-54	< 7.1E-05	< 5.4E-03	< 6.6E-03	< 2.6E-03	< 2.8E-04
Co-58	< 8.1E-05	< 5.4E-03	< 7.5E-03	< 4.1E-03	< 3.3E-04
Co-60	< 9.1E-05	< 4.8E-03	< 6.6E-03	< 4.2E-03	< 2.4E-04
Fe-59	< 2.7E-04	< 1.4E-02	< 1.3E-02	< 7.3E-03	< 9.6E-04
Zn-65	< 1.4E-04	< 1.0E-02	< 9.3E-03	< 7.1E-03	< 6.1E-04
Zr-95	< 1.9E-04	< 9.9E-03	< 1.5E-02	< 8.8E-03	< 8.1E-04
Ru-103	< 1.3E-04	< 6.8E-03	< 9.1E-03	< 6.9E-03	< 3.9E-04
Ru-106	< 7.2E-04	< 4.9E-02	< 5.8E-02	< 2.2E-02	< 2.0E-03
Cs-134	< 7.9E-05	< 5.1E-03	< 6.5E-03	< 3.5E-03	< 3.1E-04
Cs-137	< 8.4E-05	< 5.5E-03	< 7.3E-03	< 4.1E-03	< 3.0E-04
Ce-141	< 3.0E-04	< 1.2E-02	< 2.9E-02	< 1.2E-02	< 1.2E-03
Ce-144	< 6.4E-04	< 3.9E-02	< 6.2E-02	< 3.1E-02	< 3.2E-03

The error given is the probable counting error at the 95% confidence level.
Less than (<) value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (4th quarter 2007 composites).

Sample Description	Administration	Cell 14	Cell 15	RTF	Steiner
Start Date	09-27-07	10-04-07	10-04-07	10-03-07	10-22-07
End Date	12-28-07	12-28-07	12-28-07	12-26-07	12-19-07
Volume (m3)	72485.2	882.70	882.96	1630.08	20189.2
Lab Code	IDAP-8788	IDAP-8789	IDAP-8790	IDAP-8786	IDAP-8787
Isotope	Concentration (pCi/m³)				
Ra-226	1.1 ± 0.3 E-04	2.0 ± 1.1 E-03	5.2 ± 1.7 E-03	< 1.7 E-03	< 1.4 E-04
Date Analyzed	02-19-08	02-20-08	02-20-08	02-19-08	02-19-08
Th-232	1.7 ± 0.3 E-04	< 2.2 E-03	2.7 ± 0.9 E-03	9.1 ± 4.5 E-04	< 3.8 E-05
Date Analyzed	02-29-08	03-15-08	02-29-08	02-29-08	03-07-08
U-233/234	1.4 ± 0.1 E-04	1.5 ± 0.4 E-03	8.2 ± 0.8 E-03	9.3 ± 2.0 E-04	3.1 ± 1.2 E-05
U-238	1.4 ± 0.1 E-04	1.5 ± 0.4 E-03	8.0 ± 0.8 E-03	1.0 ± 0.2 E-03	2.6 ± 1.0 E-05
Date Analyzed	03-15-08	03-15-08	03-20-08	03-15-08	03-15-08
Pu-239	< 2.0 E-06	< 2.9 E-03	< 1.2 E-04	< 1.2 E-04	< 5.0 E-06
Date Analyzed	03-15-08	04-08-08	03-15-08	03-15-08	03-15-08
Am-241	< 3.4 E-05	< 1.3 E-03	< 1.6 E-03	< 1.6 E-04	< 5.3 E-05
Date Analyzed	03-20-08	03-11-08	03-11-08	03-11-08	04-05-08

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

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Mr. James Hancock
U S Ecology, Idaho
P.O. Box 400
Grand View, Idaho 83624

LABORATORY REPORT NO.:	8048-20
DATE:	02-04-2008
SAMPLES RECEIVED:	10-09-2007
PURCHASE ORDER NO.:	

Dear Mr. Hancock:

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (3rd quarter 2007).

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY:
Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate samples (3rd quarter 2007 composites).

Location	ADMINISTRATION	CELL 14	CELL 15	RTF	STEINER HOUSE
Lab Code	IDAP-7322	IDAP-7323	IDAP-7324	IDAP-7325	IDAP-7326
Date Analyzed	12/5/2007	12/5/2007	12/5/2007	12/6/2007	12/6/2007

Isotope	Concentration (pCi/m3)				
Be-7	9.4E-02 ± 3.5E-03	< 1.5E-01	< 1.4E-01	1.5E-01 ± 7.7E-02	8.6E-02 ± 7.6E-03
Mn-54	< 8.2E-05	< 7.6E-03	< 5.7E-03	< 4.2E-03	< 2.6E-04
Co-58	< 1.1E-04	< 9.9E-03	< 9.6E-03	< 4.2E-03	< 3.1E-04
Co-60	< 7.9E-05	< 5.9E-03	< 5.7E-03	< 3.2E-03	< 2.6E-04
Fe-59	< 3.2E-04	< 3.6E-02	< 2.3E-02	< 1.7E-02	< 5.6E-04
Zn-65	< 1.0E-04	< 1.1E-02	< 8.8E-03	< 5.2E-03	< 4.1E-04
Zr-95	< 2.5E-04	< 1.9E-02	< 1.3E-02	< 8.0E-03	< 6.5E-04
Ru-103	< 1.7E-04	< 2.7E-02	< 9.6E-03	< 5.5E-03	< 7.1E-04
Ru-106	< 6.0E-04	< 6.8E-02	< 5.0E-02	< 3.5E-02	< 2.3E-03
Cs-134	< 8.6E-05	< 7.1E-03	< 5.0E-03	< 3.6E-03	< 2.0E-04
Cs-137	< 8.6E-05	< 8.3E-03	< 6.2E-03	< 3.4E-03	< 2.2E-04
Ce-141	< 4.9E-04	< 5.8E-02	< 3.6E-02	< 1.4E-02	< 1.2E-03
Ce-144	< 6.2E-04	< 6.3E-02	< 3.3E-02	< 2.8E-02	< 1.8E-03

The error given is the probable counting error at the 95% confidence level.
Less than (<), value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (3rd quarter 2007 composites).

Sample Description	Administration	Cell 14	Cell 15	RTF	Steiner
Start Date	06-29-07	07-04-07	07-04-07	07-06-07	07-19-07
End Date	09-27-07	09-29-07	09-29-07	09-27-07	09-27-07
Volume (m3)	69271.3	882.70	882.96	1630.08	21631.2
Lab Code	IDAP-7322	IDAP-7323	IDAP-7324	IDAP-7325	IDAP-7326
Isotope			Concentration (pCi/m3)		
Ra-226	1.0 ± 0.3 E-04	5.5 ± 1.8 E-03	1.7 ± 0.2 E-02	7.8 ± 1.2 E-03	< 1.1 E-04
Date Analyzed	01-10-08	01-05-08	01-07-08	01-07-08	01-07-08
Th-232	2.1 ± 0.5 E-04	2.6 ± 1.8 E-03	6.9 ± 1.7 E-03	4.2 ± 1.2 E-03	4.8 ± 3.9 E-05
Date Analyzed	01-21-08	01-21-08	01-21-08	01-21-08	01-25-08
U-233/234	1.9 ± 0.2 E-04	6.8 ± 1.0 E-03	2.3 ± 0.2 E-02	5.9 ± 0.7 E-03	4.0 ± 2.1 E-05
U-238	1.8 ± 0.2 E-04	7.0 ± 1.0 E-03	2.9 ± 0.2 E-02	6.4 ± 0.7 E-03	4.3 ± 1.9 E-05
Date Analyzed	01-25-08	01-25-08	01-25-08	01-25-08	01-25-08
Pu-239	< 7.1 E-06	< 5.2 E-04	< 5.6 E-04	< 1.9 E-04	< 2.6 E-05
Date Analyzed	01-25-08	01-25-08	01-25-08	01-25-08	01-25-08
Am-241	< 5.7 E-05	< 3.6 E-03	< 2.6 E-03	< 1.2 E-03	< 6.5 E-05
Date Analyzed	01-21-08	01-02-08	01-02-08	01-02-08	01-02-08

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

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an Allegheny Technologies Co.

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Mr. James Hancock
U.S Ecology, Idaho
P.O. Box 400
Grand View, Idaho 83624

LABORATORY REPORT NO.	8048-18
DATE	09-13-2007
SAMPLES RECEIVED	07-03-2007
PURCHASE ORDER NO.	

Dear Mr. Hancock:

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (2nd quarter 2007).

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate samples.

Lab Code	IDAP-4178	IDAP-4179	IDAP-4180	IDAP-4181	IDAP-4182
Location	ADMINISTRATION	CELL 14	CELL 15	RTF	STEINER HOUSE
Collection Start	3/30/2007	4/5/2007	4/5/2007	4/4/2007	4/25/2007
Collection End	6/29/2007	6/26/2007	6/26/2007	6/27/2007	6/22/2007
Volume (m3)	70994.70	882.70	882.96	3260.16	15458.60

Isotope					
Be-7	7.9E-02 ± 3.4E-03	1.7E-01 ± 9.8E-02	1.6E-01 ± 7.6E-02	7.9E-02 ± 2.5E-02	1.0E-01 ± 9.6E-03
Mn-54	< 9.7E-05	< 5.9E-03	< 5.5E-03	< 1.7E-03	< 4.6E-04
Co-58	< 9.7E-05	< 7.9E-03	< 6.6E-03	< 2.2E-03	< 2.6E-04
Co-60	< 1.1E-04	< 7.7E-03	< 5.2E-03	< 1.8E-03	< 3.8E-04
Fe-59	< 1.6E-04	< 2.3E-02	< 1.5E-02	< 4.0E-03	< 1.1E-03
Zn-65	< 1.1E-04	< 1.3E-02	< 8.5E-03	< 3.4E-03	< 7.4E-04
Zr-95	< 1.1E-04	< 1.3E-02	< 1.3E-02	< 4.6E-03	< 8.8E-04
Ru-103	< 7.4E-05	< 8.5E-03	< 1.1E-02	< 1.9E-03	< 1.0E-03
Ru-106	< 7.8E-04	< 5.5E-02	< 4.1E-02	< 8.7E-03	< 3.8E-03
Cs-134	< 9.1E-05	< 6.6E-03	< 4.9E-03	< 1.9E-03	< 3.8E-04
Cs-137	< 1.0E-04	< 7.0E-03	< 5.8E-03	< 1.9E-03	< 4.0E-04
Ce-141	< 2.3E-04	< 2.8E-02	< 2.3E-02	< 7.2E-03	< 2.3E-03
Ce-144	< 7.4E-04	< 6.5E-02	< 3.3E-02	< 1.4E-02	< 3.2E-03

The error given is the probable counting error at the 95% confidence level.
Less than (<), value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (2nd quarter 2007 composites).

Sample Description	Administration	Cell 14	Cell 15	RTF	Steiner
Start Date	03-30-07	04-05-07	04-05-07	04-04-07	04-25-07
End Date	06-29-07	06-26-07	06-26-07	06-27-07	06-22-07
Volume (m3)	70994.70	882.70	882.96	3260.16	15,458.60
Lab Code	IDAP-4178	IDAP-4179	IDAP-4180	IDAP-4181	IDAP-4182
Isotope	Concentration (pCi/m3)				
Ra-226	2.0 ± 0.3 E-04	5.8 ± 1.8 E-03	1.2 ± 0.2 E-02	1.2 ± 0.4 E-03	< 1.4 E-04
Date Analyzed	09-05-07	09-05-07	09-05-07	09-05-07	09-05-07
Th-232	2.4 ± 0.2 E-04	2.5 ± 1.5 E-03	5.6 ± 1.6 E-03	1.5 ± 0.5 E-03	< 1.5 E-05
Date Analyzed	09-02-07	09-02-07	09-02-07	09-02-07	09-02-07
U-233/234	1.6 ± 0.2 E-04	2.4 ± 0.5 E-03	1.1 ± 0.1 E-02	1.3 ± 0.2 E-03	3.9 ± 1.9 E-05
U-238	1.6 ± 0.2 E-04	2.3 ± 0.5 E-03	1.2 ± 0.1 E-02	1.1 ± 0.2 E-03	2.6 ± 1.7 E-05
Date Analyzed	08-28-07	08-28-07	08-28-07	08-28-07	08-28-07
Pu-239	< 3.3 E-06	< 3.7 E-04	< 2.3 E-04	< 6.7 E-05	< 1.2 E-05
Date Analyzed	08-24-07	08-24-07	08-24-07	08-24-07	08-24-07
Am-241	< 5.3 E-05	< 1.4 E-03	< 1.6 E-03	< 3.3 E-04	< 6.8 E-05
Date Analyzed	08-28-07	08-28-07	08-28-07	08-28-07	08-28-07

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

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Mr. James Hancock
U S Ecology, Idaho
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Grand View, Idaho 83624

LABORATORY REPORT NO.:	8048-15
DATE:	07-10-2007
SAMPLES RECEIVED:	04-05-2007
PURCHASE ORDER NO.:	

Dear Mr. Hancock:

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (1st quarter 2007).

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air filter composites for the first quarter 2007.

Lab Code	IDAP-1883	IDAP-1882	IDAP-1880	IDAP-1881	IDAP-1879
Location	STEINER HOUSE	RTF	CELL 14	CELL 15	ADMINISTRATION
Collection Start	1/12/2007	1/4/2007	1/5/2007	1/5/2007	12/27/2006
Collection End	3/15/2007	3/28/2007	3/30/2007	3/30/2007	3/30/2007
Volume (m^3)	18825.20	2173.44	882.70	882.96	79280.90
Isotope					
Be-7	8.1E-02 ± 6.5E-03	1.6E-01 ± 2.6E-02	< 7.2E-02	1.3E-01 ± 6.0E-02	5.8E-02 ± 3.3E-03
Mn-54	< 2.7E-04	< 2.9E-03	< 5.8E-03	< 4.8E-03	< 1.4E-04
Co-58	< 4.7E-04	< 2.7E-03	< 6.7E-03	< 6.3E-03	< 9.1E-05
Co-60	< 2.7E-04	< 2.6E-03	< 4.4E-03	< 5.6E-03	< 1.1E-04
Fe-59	< 5.9E-04	< 6.2E-03	< 1.7E-02	< 8.4E-03	< 2.0E-04
Zn-65	< 5.6E-04	< 4.2E-03	< 1.1E-02	< 8.4E-03	< 1.0E-04
Zr-95	< 6.3E-04	< 4.1E-03	< 1.2E-02	< 9.3E-03	< 3.2E-04
Ru-103	< 5.5E-04	< 2.0E-03	< 6.1E-03	< 7.6E-03	< 2.0E-04
Ru-106	< 2.9E-03	< 1.5E-02	< 3.7E-02	< 4.6E-02	< 1.2E-03
Cs-134	< 2.4E-04	< 2.8E-03	< 5.2E-03	< 4.0E-03	< 9.6E-05
Cs-137	< 2.4E-04	< 2.9E-03	< 5.5E-03	< 4.9E-03	< 1.3E-04
Ce-141	< 1.3E-03	< 6.0E-03	< 1.4E-02	< 1.4E-02	< 2.9E-04
Ce-144	< 2.3E-03	< 2.1E-02	< 4.4E-02	< 4.1E-02	< 1.2E-03

The error given is the probable counting error at the 95% confidence level.
Less than (<), value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (1st quarter 2007 composites).

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	01-12-07	01-04-07	01-05-07	01-05-07	12-27-06
End Date	03-15-07	03-28-07	03-30-07	03-30-07	03-30-07
Volume (m3)	18,825.2	2173.44	882.70	882.96	79,280.90
Lab Code	IDAP-1883	IDAP-1882	IDAP-1880	IDAP-1881	IDAP-1879
Isotope	Concentration (pCi/m3)				
Ra-226	< 1.4 E-04	2.9 ± 0.7 E-03	2.7 ± 1.3 E-03	8.3 ± 1.8 E-03	2.4 ± 0.3 E-04
Date Analyzed	05-23-07	05-24-07	05-23-07	05-23-07	05-23-07
Th-232	< 2.8 E-05	7.3 ± 3.5 E-04	9.6 ± 5.6 E-04	3.1 ± 1.0 E-03	2.0 ± 0.4 E-04
Date Analyzed	06-22-07	06-22-07	06-22-07	06-22-07	06-22-07
U-233/234	1.6 ± 0.8 E-06	2.2 ± 0.4 E-03	1.2 ± 0.2 E-03	9.2 ± 0.6 E-03	1.6 ± 0.1 E-04
U-238	2.3 ± 0.8 E-05	2.4 ± 0.4 E-03	1.2 ± 0.2 E-03	9.3 ± 0.6 E-03	1.6 ± 0.1 E-04
Date Analyzed	06-07-07	06-07-07	06-07-07	06-07-07	06-07-07
Pu-239	< 3.7 E-05	< 1.2 E-04	< 2.6 E-04	< 4.3 E-04	< 3.0 E-06
Date Analyzed	06-07-07	06-01-07	06-07-07	06-01-07	06-01-07
Am-241	< 6.5 E-05	< 5.1 E-04	< 5.7 E-04	< 7.6 E-04	< 4.2 E-05
Date Analyzed	06-07-07	06-07-07	06-07-07	06-27-07	06-27-07

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

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LABORATORY REPORT NO.:	8048-14
DATE	03-08-2007
SAMPLES RECEIVED:	01-09-2007
PURCHASE ORDER NO.	

Dear Mr. Hancock:

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (4^{th} quarter 2006)

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate samples (4th quarter 2006 composites).

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	10-20-06	10-04-06	09-28-06	09-28-06	10-03-06
End Date	12-27-06	12-28-06	12-29-06	12-29-06	12-27-06
Volume (m3)	31,188.90	3465.47	973.30	962.20	68,270.50
Lab Code	IDAP-9624	IDAP-9623	IDAP-9621	IDAP-9622	IDAP-9620
Date Analyzed	02-09-07	02-09-07	02-09-07	02-09-07	02-09-07
Isotope	Concentration (pCi/m3)				
Be-7	6.0 ± 1.0 E-02	< 3.7 E-02	< 9.6 E-02	< 1.6 E-01	5.5 ± 0.6 E-02
Mn-54	< 1.1 E-04	< 2.2 E-03	< 1.4 E-02	< 1.5 E-02	< 2.4 E-04
Co-58	< 4.4 E-04	< 2.3 E-03	< 8.7 E-03	< 1.1 E-02	< 2.6 E-04
Co-60	< 2.5 E-04	< 2.4 E-03	< 1.0 E-02	< 9.2 E-03	< 1.7 E-04
Fe-59	< 1.1 E-03	< 4.7 E-03	< 2.6 E-02	< 1.5 E-02	< 3.3 E-04
Zn-65	< 6.0 E-04	< 1.9 E-03	< 2.0 E-02	< 3.8 E-02	< 4.2 E-04
Zr-95	< 9.0 E-04	< 5.3 E-03	< 2.5 E-02	< 3.4 E-02	< 3.7 E-04
Ru-103	< 6.7 E-04	< 4.4 E-03	< 1.9 E-02	< 1.5 E-02	< 5.3 E-04
Ru-106	< 4.8 E-03	< 2.5 E-02	< 9.9 E-02	< 1.3 E-01	< 2.2 E-03
Cs-134	< 4.5 E-04	< 2.1 E-03	< 1.0 E-02	< 9.1 E-03	< 1.8 E-04
Cs-137	< 5.0 E-04	< 2.1 E-03	< 1.1 E-02	< 1.3 E-02	< 2.3 E-04
Ce-141	< 1.6 E-03	< 6.0 E-03	< 4.5 E-02	< 4.1 E-02	< 1.3 E-03
Ce-144	< 3.5 E-03	< 1.8 E-02	< 9.3 E-02	< 7.2 E-02	< 1.8 E-03

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (4th quarter 2006 composites).

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	10-20-06	10-04-06	09-28-06	09-28-06	10-03-06
End Date	12-27-06	12-28-06	12-29-06	12-29-06	12-27-06
Volume (m3)	31,188.90	3465.47	973.30	962.20	68,270.50
Lab Code	IDAP-9624	IDAP-9623	IDAP-9621	IDAP-9622	IDAP-9620
Isotope	Concentration (pCi/m3)				
Ra-226	8.9 ± 4.3 E-05	5.3 ± 0.2 E-02	4.6 ± 1.3 E-03	3.7 ± 1.3 E-03	3.4 ± 0.4 E-04
Date Analyzed	02-21-07	02-20-07	02-20-07	02-20-07	02-20-07
Th-232	1.6 ± 0.9 E-05	6.6 ± 1.3 E-04	1.3 ± 0.4 E-03	2.3 ± 0.5 E-03	1.7 ± 0.2 E-04
Date Analyzed	02-20-07	02-20-07	02-20-07	02-20-07	02-20-07
U-233/234	1.9 ± 0.5 E-05	3.5 ± 0.1 E-03	1.7 ± 0.1 E-03	2.2 ± 0.1 E-03	1.4 ± 0.1 E-04
U-238	1.5 ± 0.4 E-05	3.4 ± 0.1 E-03	1.4 ± 0.1 E-03	2.5 ± 0.1 E-03	1.2 ± 0.1 E-04
Date Analyzed	02-16-07	02-16-07	02-16-07	02-16-07	02-16-07
Pu-239	< 8.9 E-06	< 2.0 E-04	< 3.3 E-04	< 4.0 E-04	< 1.3 E-05
Date Analyzed	02-23-07	02-21-07	02-21-07	02-21-07	02-21-07
Am-241	< 7.2 E-05	< 3.8 E-04	< 6.1 E-04	< 2.3 E-03	< 5.4 E-05
Date Analyzed	03-02-07	02-23-07	02-16-07	02-23-07	03-02-07

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

"Faxed Russ 2-6-07"

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Mr. James Hancock
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P.O. Box 400
Grand View, Idaho 83624

LABORATORY REPORT NO.:	8048-13
DATE:	01-31-2007
SAMPLES RECEIVED:	11-06-2006
PURCHASE ORDER NO.:	

Dear Mr. Hancock:

Enclosed are the results of the analyses for radium-226, thorium-232, uranium-233/234 and uranium-238 in five air filters samples (USEI RTF SLAPS Air Sampling Event)

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim
Quality Assurance

Table 1. Results of the analyses in five air filter samples (USEI RTF SLAPS Air Sampling Event).

Sample Description	RTF Q4-SLAPS RTF West	RTF Q4-SLAPS RTF West	RTF Q4-SLAPS RTF West	RTF Q4-SLAPS RTF West	RTF Q4-SLAPS RTF West
Sample Date	10-28-06	10-28-06	10-30-06	10-30-06	10-31-06
Sample Time	06:00-09:50	09:50-14:40	06:00-13:00	13:00-16:30	06:10-10:45
Volume (m3)	232.00	315.00	466.59	231.67	319.90
Lab Code	IDAP-8501	IDAP-8502	IDAP-8503	IDAP-8504	IDAP-8505
Isotope	Concentration (pCi/m3)				
Ra-226	1.4 ± 0.1 E00	2.6 ± 0.1 E00	2.9 ± 0.1 E-01	6.1 ± 0.1 E-02	2.3 ± 0.1 E00
Date Analyzed	12-28-06	12-28-06	12-28-06	12-28-06	01-08-07
Th-232	2.0 ± 1.2 E-03	2.2 ± 1.0 E-03	6.4 ± 4.7 E-04	9.3 ± 8.8 E-04	1.3 ± 0.7 E-03
Date Analyzed	01-29-07	01-29-07	01-29-07	01-29-07	01-29-07
U-233/234	4.5 ± 0.2 E-02	6.5 ± 0.2 E-02	9.1 ± 0.9 E-03	1.6 ± 0.1 E-02	2.8 ± 0.1 E-02
U-238	4.4 ± 0.2 E-02	6.6 ± 0.2 E-02	9.2 ± 0.9 E-03	1.6 ± 1.0 E-02	2.8 ± 0.1 E-02
Date Analyzed	01-26-07	01-26-07	01-26-07	01-26-07	01-26-07

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

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Mr. James Hancock
U S Ecology, Idaho
P.O. Box 400
Grand View, Idaho 83624

LABORATORY REPORT NO.:	8048-11
DATE:	01-23-2007
SAMPLES RECEIVED:	10-09-2006
PURCHASE ORDER NO.:	

Dear Mr. Hancock:

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (3rd quarter 2006)

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY:

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate samples (3rd quarter 2006 composites).

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	07-13-06	07-06-06	07-07-06	07-06-06	06-29-06
End Date	09-22-06	09-28-06	09-21-06	09-22-06	10-03-06
Volume (m3)	26,560.20	876.62	814.80	815.04	72,301.90
Lab Code	IDAP-6974	IDAP-6970	IDAP-6973	IDAP-6972	IDAP-6971
Date Analyzed	10-24-06	10-26-06	10-24-06	10-24-06	10-26-06
Isotope	**Concentration (pCi/m3)**				
Be-7	1.3 ± 0.1 E-01	3.4 ± 1.1 E-01	< 1.2 E-01	< 7.9 E-02	9.5 ± 0.2 E-02
Mn-54	< 1.7 E-04	< 4.2 E-03	< 7.1 E-03	< 6.6 E-03	< 4.6 E-05
Co-58	< 1.3 E-04	< 7.0 E-03	< 7.6 E-03	< 5.1 E-03	< 5.2 E-05
Co-60	< 1.9 E-04	< 6.8 E-03	< 6.9 E-03	< 4.1 E-03	< 5.5 E-05
Fe-59	< 6.0 E-04	< 1.7 E-02	< 1.9 E-02	< 1.5 E-02	< 1.5 E-04
Zn-65	< 2.8 E-04	< 6.7 E-03	< 1.5 E-02	< 9.7 E-03	< 1.1 E-04
Zr-95	< 5.1 E-04	< 1.2 E-02	< 2.1 E-02	< 1.6 E-02	< 1.7 E-04
Ru-103	< 3.5 E-04	< 7.7 E-03	< 1.1 E-02	< 6.7 E-03	< 9.0 E-05
Ru-106	< 1.8 E-03	< 6.8 E-02	< 6.9 E-02	< 6.0 E-02	< 6.5 E-04
Cs-134	< 2.2 E-04	< 6.7 E-03	< 7.4 E-03	< 5.9 E-03	< 5.6 E-05
Cs-137	< 1.4 E-04	< 7.7 E-03	< 8.9 E-03	< 5.6 E-03	< 7.3 E-05
Ce-141	< 6.1 E-04	< 1.9 E-02	< 2.9 E-02	< 2.2 E-02	< 2.3 E-04
Ce-144	< 1.7 E-03	< 5.0 E-02	< 5.6 E-02	< 3.3 E-02	< 6.6 E-04

The error given is the probable counting error at the 95% confidence level. Less than (<) value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (3rd quarter 2006 composites).

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	07-13-06	07-06-06	07-07-06	07-06-06	06-29-06
End Date	09-22-06	09-28-06	09-21-06	09-22-06	10-03-06
Volume (m3)	26,560.20	876.62	814.80	815.04	72,301.90
Lab Code	IDAP-6974	IDAP-6970	IDAP-6973	IDAP-6972	IDAP-6971
Isotope	Concentration (pCi/m3)				
Ra-226	< 7.7 E-05	< 3.1 E-03	8.0 ± 2.0 E-03	5.9 ± 0.4 E-02[a]	2.2 ± 0.3 E-04
Date Analyzed	11-21-06	11-20-06	11-20-06	11-20-06	11-20-06
Th-232	< 1.6 E-05	5.4 ± 4.0 E-04	6.7 ± 4.4 E-04	3.2 ± 0.6 E-03	1.4 ± 0.1 E-04
Date Analyzed	12-15-06	12-15-06	12-15-06	12-15-06	12-15-06
U-233/234	1.2 ± 0.3 E-05	4.7 ± 0.8 E-04	6.8 ± 1.1 E-04	4.5 ± 0.3 E-03	8.3 ± 0.4 E-05
U-238	1.2 ± 0.3 E-05	4.5 ± 0.8 E-04	7.3 ± 1.1 E-04	4.7 ± 0.3 E-03	8.6 ± 0.4 E-05
Date Analyzed	12-28-06	12-20-06	12-20-06	12-20-06	12-20-06
Pu-239	< 8.7 E-06	< 1.5 E-04	< 3.4 E-04	< 1.6 E-04	< 5.0 E-06
Date Analyzed	12-15-06	12-15-06	12-15-06	12-15-06	12-15-06
Am-241	< 1.2 E-05	< 4.2 E-04	< 6.3 E-03	< 6.0 E-04	< 9.7 E-06
Date Analyzed	01-18-07	01-18-07	01-18-07	01-18-07	01-18-07

[a] Re-analysis: 6.4 ± 0.5 E-02 pCi/m3.
The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

2Q2006

Environmental, Inc.
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Mr. James Hancock
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P.O. Box 400
Grand View, Idaho 83624

LABORATORY REPORT NO.:	8048-8
DATE:	09-22-2006
SAMPLES RECEIVED:	07-12-2006
PURCHASE ORDER NO:	

Dear Mr. Hancock:

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (2nd quarter 2006)

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY: ______________________
Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate samples (2nd quarter 2006 composites).

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	04-14-06	04-05-06	04-07-06	04-07-06	03-31-06
End Date	06-29-06	06-28-06	06-27-06	06-27-06	06-29-06
Volume (m3)	16,375.5	1,975.62	889.50	882.96	72,266.4
Lab Code	IDAP-4810	IDAP-4809	IDAP-4807	IDAP-4808	IDAP-4806
Date Analyzed	07-31-06	07-27-06	08-10-06	08-08-06	07-29-06
Isotope	Concentration (pCi/m3)				
Be-7	1.4 ± 0.1 E-01	1.5 ± 0.4 E-02	1.9 ± 1.0 E-01	< 1.8 E-01	9.4 ± 0.6 E-02
Mn-54	< 7.1 E-04	< 2.7 E-03	< 6.0 E-03	< 1.0 E-02	< 1.1 E-04
Co-58	< 6.9 E-04	< 2.8 E-03	< 7.2 E-03	< 1.3 E-02	< 1.2 E-04
Co-60	< 4.9 E-04	< 1.1 E-03	< 4.4 E-03	< 9.7 E-03	< 1.2 E-04
Fe-59	< 1.9 E-03	< 6.6 E-03	< 1.2 E-02	< 2.2 E-02	< 4.1 E-04
Zn-65	< 9.1 E-04	< 6.1 E-03	< 1.2 E-02	< 2.1 E-02	< 2.6 E-04
Zr-95	< 1.1 E-03	< 8.3 E-03	< 2.3 E-02	< 3.0 E-02	< 4.4 E-04
Ru-103	< 1.6 E-03	< 3.9 E-03	< 1.6 E-02	< 2.5 E-02	< 2.6 E-04
Ru-106	< 7.1 E-03	< 2.5 E-02	< 6.3 E-02	< 1.2 E-01	< 1.3 E-03
Cs-134	< 7.4 E-04	< 2.8 E-03	< 5.6 E-03	< 1.0 E-02	< 1.3 E-04
Cs-137	< 7.4 E-04	< 3.5 E-03	< 7.7 E-03	< 1.1 E-02	< 1.8 E-04
Ce-141	< 2.9 E-03	< 8.5 E-03	< 1.6 E-02	< 3.4 E-02	< 4.4 E-04
Ce-144	< 7.4 E-03	< 2.3 E-02	< 4.8 E-02	< 9.2 E-02	< 1.6 E-03

The error given is the probable counting error at the 95% confidence level. Less than (<) value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (2nd quarter 2006 composites).

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	04-14-06	04-05-06	04-07-06	04-07-06	03-31-06
End Date	06-29-06	06-28-06	06-27-06	06-27-06	06-29-06
Volume (m3)	16,375.5	1,975.62	889.50	882.96	72,266.4
Lab Code	IDAP-4810	IDAP-4809	IDAP-4807	IDAP-4808	IDAP-4806
Isotope	Concentration (pCi/m3)				
Ra-226	< 1.3 E-04	5.2 ± 0.9 E-03	5.6 ± 1.7 E-03	6.8 ± 1.5 E-03	< 2.9 E-05
Date Analyzed	09-15-06	09-15-06	09-13-06	09-14-06	09-13-06
Th-232	< 3.9 E-05	1.9± 0.8 E-04	9.8 ± 9.2 E-04	3.6 ± 1.5 E-03	1.9 ± 0.3 E-04
Date Analyzed	09-15-06	09-15-06	09-15-06	09-15-06	09-15-06
U-233/234	< 3.0 E-05	3.3 ± 0.4 E-03	8.2 ± 5.4 E-04	3.6 ± 0.9 E-03	1.8 ± 0.3 E-04
U-238	3.8 ± 3.5 E-05	3.2 ± 0.4 E-03	1.9 ± 0.8 E-03	5.0 ± 1.0 E-03	2.0 ± 0.3 E-04
Date Analyzed	09-01-06	09-01-06	09-01-06	09-01-06	09-01-06
Pu-239	< 1.2 E-05	< 2.6 E-05	< 2.1 E-04	< 6.9 E-04	< 5.2 E-06
Date Analyzed	09-18-06	09-15-06	09-15-06	09-15-06	09-15-06
Am-241	< 3.8 E-04	< 1.3 E-03	< 1.7 E-03	< 2.0 E-03	< 6.5 E-05
Date Analyzed	09-06-06	09-12-06	09-12-06	09-12-06	09-12-06

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

1Q 2006

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Mr. James Hancock
U.S Ecology, Idaho
P.O. Box 400
Grand View, Idaho 83624

LABORATORY REPORT NO.:	8048-6
DATE:	06-16-2006
SAMPLES RECEIVED:	04-18-2006
PURCHASE ORDER NO.:	

Dear Mr. Hancock:

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 in five quarterly air filters composites (1st quarter 2006)

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate samples (1st quarter 2006 composites).

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	01-07-06	12-28-05	12-29-05	01-07-06	12-30-05
End Date	03-10-06	03-29-06	03-31-06	03-30-06	03-31-06
Volume (m3)	17,170.2	1,765.92	971.0	889.752	74,012.4
Lab Code	IDAP-2503	IDAP-2502	IDAP-2500	IDAP-2501	IDAP-2499
Date Analyzed	04-27-06	04-26-06	04-30-06	04-26-06	04-27-06
Isotope	Concentration (pCi/m3)				
Be-7	6.1 ± 0.9 E-02	< 5.0 E-02	< 9.2 E-02	< 1.1 E-01	5.4 ± 0.7 E-02
Mn-54	< 5.7 E-04	< 4.3 E-03	< 6.7 E-03	< 9.3 E-03	< 6.3 E-04
Co-58	< 6.1 E-04	< 4.4 E-03	< 9.0 E-03	< 9.0 E-03	< 6.9 E-04
Co-60	< 5.8 E-04	< 4.6 E-03	< 6.7 E-03	< 1.0 E-02	< 7.0 E-04
Fe-59	< 1.1 E-03	< 8.7 E-03	< 2.6 E-02	< 2.2 E-02	< 1.0 E-03
Zn-65	< 1.1 E-03	< 8.0 E-03	< 1.4 E-02	< 1.4 E-02	< 1.8 E-03
Zr-95	< 1.3 E-03	< 7.1 E-03	< 2.0 E-02	< 2.7 E-02	< 1.5 E-03
Ru-103	< 4.8 E-04	< 6.0 E-03	< 1.4 E-02	< 1.6 E-02	< 7.5 E-04
Ru-106	< 3.6 E-03	< 2.5 E-02	< 6.9 E-02	< 9.7 E-01	< 4.4 E-03
Cs-134	< 3.9 E-04	< 3.0 E-03	< 6.2 E-03	< 7.5 E-03	< 5.4 E-04
Cs-137	< 5.1 E-04	< 4.5 E-03	< 8.8 E-03	< 1.0 E-02	< 4.8 E-04
Ce-141	< 9.8 E-04	< 8.4 E-03	< 2.3 E-02	< 2.3 E-02	< 1.1 E-03
Ce-144	< 3.5 E-03	< 2.8 E-02	< 6.9 E-02	< 7.5 E-02	< 2.7 E-03

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate samples (1st quarter 2006 composites).

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	01-07-06	12-28-05	12-29-05	01-07-06	12-30-05
End Date	03-10-06	03-29-06	03-31-06	03-30-06	03-31-06
Volume (m3)	17,170.2	1,765.92	971.0	889.752	74,253.60
Lab Code	IDAP-2503	IDAP-2502	IDAP-2500	IDAP-2501	IDAP-2499
Isotope	Concentration (pCi/m3)				
Ra-226	< 7.2 E-05	3.8 ± 0.9 E-03	< 2.5 E-03	1.9 ± 1.0 E-03	2.0 ± 0.3 E-04
Date Analyzed	05-22-06	05-22-06	05-22-06	05-22-06	05-22-06
Th-232	2.3 ± 1.2 E-05	1.6 ± 0.3 E-03	1.8 ± 1.1 E-03	1.3 ± 0.3 E-03	3.9 ± 0.4 E-04
Date Analyzed	06-09-06	06-09-06	06-15-06	06-09-06	06-09-06
U-233/234	1.0 ± 0.9 E-05	1.1 ± 0.4 E-03	1.8 ± 0.4 E-03	1.2 ± 0.7 E-03	2.4 ± 0.2 E-04
U-238	1.9 ± 1.1 E-05	1.3 ± 0.4 E-03	1.8 ± 0.4 E-03	2.8 ± 1.0 E-03	3.4 ± 0.2 E-04
Date Analyzed	05-26-06	05-25-06	05-25-06	05-25-06	05-25-06
Pu-239	< 1.1 E-05	< 6.8 E-05	< 1.9 E-04	< 1.5 E-04	< 5.8 E-06
Date Analyzed	05-26-06	06-09-06	05-26-06	06-09-06	05-26-06
Am-241	< 6.5 E-05	< 3.1 E-04	< 2.0 E-03	< 1.1 E-03	< 2.0 E-05
Date Analyzed	06-09-06	06-09-06	06-09-06	06-09-06	06-09-06

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

4Q 2005

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Mr. James Hancock
U S Ecology, Idaho
P.O. Box 400
Grand View, Idaho 83624

LABORATORY REPORT NO.:	8048-4
DATE:	02-21-2006
SAMPLES RECEIVED:	01-10-2006
PURCHASE ORDER NO:	

Dear Mr. Hancock:

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 on five quarterly composite air filters (4th quarter 2005)

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY ______________________
Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate composite samples.

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration	Administration
Start Date	10-07-05	10-06-05	10-04-05	10-04-05	09-30-05	09-30-05
End Date	12-16-05	12-21-05	12-29-05	12-29-05	12-30-05	12-30-05
Volume (m3)	17,119.20	1,494.24	943.8	913.524	74,253.60	74,253.60
Lab Code	IDAP-7401	IDAP-7402	IDAP-7406	IDAP-7405	IDAP-7403	IDAP-7404
Date Analyzed	01-18-06	01-20-06	01-17-06	01-17-06	01-18-06	01-18-06
Isotope			Concentration (pCi/m3)			
Be-7	8.2 ± 1.9 E-02	< 1.2 E-01	< 7.3 E-02	< 8.2 E-02	5.5 ± 0.7 E-02	5.9 ± 0.5 E-02
Mn-54	< 1.2 E-03	< 8.9 E-03	< 4.2 E-03	< 4.5 E-03	< 3.6 E-04	< 2.8 E-04
Co-58	< 1.4 E-03	< 4.6 E-03	< 7.6 E-03	< 6.5 E-03	< 3.8 E-04	< 2.9 E-04
Co-60	< 7.9 E-04	< 1.0 E-02	< 6.5 E-03	< 6.0 E-03	< 1.9 E-04	< 2.2 E-04
Fe-59	< 1.9 E-03	< 1.5 E-02	< 1.5 E-02	< 1.2 E-02	< 4.3 E-04	< 5.8 E-04
Zn-65	< 1.9 E-03	< 8.7 E-03	< 1.1 E-02	< 1.1 E-02	< 4.5 E-04	< 3.9 E-04
Zr-95	< 1.9 E-03	< 1.1 E-02	< 1.2 E-02	< 1.4 E-02	< 1.7 E-04	< 3.9 E-04
Ru-103	< 1.5 E-03	< 1.3 E-02	< 5.8 E-03	< 8.2 E-03	< 3.3 E-04	< 3.4 E-04
Ru-106	< 7.9 E-03	< 7.5 E-02	< 5.7 E-02	< 4.4 E-02	< 2.1 E-03	< 1.9 E-03
Cs-134	< 1.4 E-03	< 1.0 E-02	< 6.5 E-03	< 8.7 E-03	< 3.2 E-04	< 3.0 E-04
Cs-137	< 1.4 E-03	< 9.1 E-03	< 5.1 E-03	< 8.4 E-03	< 3.4 E-04	< 2.7 E-04
Ce-141	< 1.6 E-03	< 3.5 E-02	< 1.5 E-02	< 2.1 E-02	< 5.2 E-04	< 4.8 E-04
Ce-144	< 5.7 E-03	< 1.0 E-01	< 4.4 E-02	< 6.8 E-02	< 1.4 E-03	< 1.2 E-03

Denotes a duplicate.
The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate composite samples.

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration	Administration
Start Date	10-07-05	10-06-05	10-04-05	10-04-05	09-30-05	09-30-05
End Date	12-16-05	12-21-05	12-29-05	12-29-05	12-30-05	12-30-05
Volume (m3)	17,119.20	1,494.24	943.8	913.524	74,253.60	74,253.60
Lab Code	IDAP-7401	IDAP-7402	IDAP-7406	IDAP-7405	IDAP-7403	IDAP-7404*
Isotope	Concentration (pCi/m3)					
Ra-226	1.9 ± 0.8 E-04	2.1 ± 1.0 E-03	3.5 ± 1.1 E-03	< 1.8 E-03	1.2 ± 0.4 E-04	8.9 ± 3.1 E-05
Date Analyzed	02-08-06	02-21-06	02-09-06	02-09-06	02-15-06	02-08-06
Th-232	< 3.9 E-05	< 1.4 E-04	< 6.3 E-04	1.8 ± 0.6 E-03	1.9 ± 0.2 E-04	1.5 ± 0.2 E-04
Date Analyzed	02-04-06	02-13-06	02-04-06	02-13-06	02-13-06	02-04-06
U-233/234	3.3 ± 2.5 E-05	1.4 ± 0.4 E-03	1.3 ± 0.7 E-03	9.4 ± 4.8 E-04	1.5 ± 0.2 E-04	1.1 ± 0.2 E-04
U-238	3.3 ± 2.3 E-05	1.2 ± 0.4 E-03	1.2 ± 0.6 E-03	1.3 ± 0.6 E-03	1.9 ± 0.2 E-04	1.5 ± 0.2 E-04
Date Analyzed	02-08-06	02-10-06	02-10-06	02-10-06	02-10-06	02-10-06
Pu-239	< 1.3 E-05	< 1.9 E-04	< 3.9 E-04	< 3.1 E-04	< 5.2 E-06	< 4.3 E-06
Date Analyzed	02-10-06	02-10-06	02-10-06	02-08-06	02-08-06	02-08-06
Am-241	< 1.7 E-05	< 2.1 E-04	< 4.7 E-04	< 2.3 E-04	< 1.0 E-05	< 1.9 E-05
Date Analyzed	02-01-06	02-01-06	02-01-06	02-01-06	02-01-06	02-01-06

* Denotes a duplicate..

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

Faxed to Russ 12/13-05
Q3 2005

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Mr. James Hancock
U S Ecology, Idaho
P.O. Box 400
Grand View, Idaho 83624

LABORATORY REPORT NO.:	8048-1
DATE:	11-30-2005
SAMPLES RECEIVED:	10-12-2005
PURCHASE ORDER NO.:	

Dear Mr. Hancock:

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 on five quarterly composite air filters (3rd quarter 2005)

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

B Grob

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate composite samples.

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	08-05-05	07-11-05	07-06-05	07-06-05	07-01-05
End Date	09-19-05	09-28-05	09-29-05	09-29-05	09-30-05
Volume (m3)	17,333.2	1,779.5	844.0	913.5	74,127.9
Lab Code	SPAP-5707	SPAP-5708	SPAP-5709	SPAP-5710	SPAP-5706
Date Analyzed	11-01-05	11-01-05	11-01-05	11-01-05	11-01-05
Isotope	Concentration (pCi/m3)				
Be-7	7.4 ± 2.3 E-02	< 1.7 E-01	< 2.0 E-01	< 2.7 E-01	1.0 ± 0.1 E-01
Mn-54	< 1.2 E-03	< 1.3 E-02	< 1.1 E-02	< 1.7 E-02	< 2.8 E-04
Co-58	< 1.1 E-03	< 1.3 E-02	< 1.5 E-02	< 1.2 E-02	< 3.9 E-04
Co-60	< 6.1 E-04	< 8.1 E-03	< 1.4 E-02	< 1.0 E-02	< 3.0 E-04
Fe-59	< 3.6 E-03	< 4.1 E-02	< 3.5 E-02	< 2.9 E-02	< 5.1 E-04
Zn-65	< 1.5 E-03	< 1.5 E-02	< 1.8 E-02	< 1.8 E-02	< 3.5 E-04
Zr-95	< 2.7 E-03	< 3.0 E-02	< 1.8 E-02	< 3.6 E-02	< 4.1 E-04
Ru-103	< 1.3 E-03	< 2.2 E-02	< 1.0 E-02	< 2.4 E-02	< 4.4 E-04
Ru-106	< 1.1 E-02	< 5.6 E-02	< 1.4 E-01	< 2.2 E-01	< 1.4 E-03
Cs-134	< 1.2 E-03	< 8.2 E-03	< 1.8 E-02	< 1.4 E-02	< 3.2 E-04
Cs-137	< 1.3 E-03	< 1.6 E-02	< 1.8 E-02	< 2.2 E-02	< 3.4 E-04
Ce-141	< 3.3 E-03	< 2.8 E-02	< 5.8 E-02	< 3.8 E-02	< 8.4 E-04
Ce-144	< 1.1 E-02	< 6.4 E-02	< 9.6 E-02	< 1.5 E-01	< 2.7 E-03

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate composite samples.

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	08-05-05	07-11-05	07-06-05	07-06-05	07-01-05
End Date	09-19-05	09-28-05	09-29-05	09-29-05	09-30-05
Volume (m3)	17,333.2	1,779.5	844.0	913.5	74,127.9
Lab Code	SPAP-5707	SPAP-5708	SPAP-5709	SPAP-5710	SPAP-5706
Isotope	Concentration (pCi/m3)				
Ra-226	1.3 ± 0.7 E-04	7.1 ± 1.2 E-03	2.5 ± 1.1 E-03	3.4 ± 1.4 E-03	2.6 ± 0.3 E-04
Date Analyzed	11-14-05	11-14-05	11-14-05	11-14-05	11-14-05
Th-232	6.0 ± 2.7 E-05	4.7 ± 0.7 E-03	3.3 ± 0.7 E-03	1.6 ± 0.5 E-03	2.7 ± 0.3 E-04
Date Analyzed	11-17-05	11-15-05	11-15-05	11-15-05	11-15-05
U-233/234	9.4 ± 3.0 E-05	1.5 ± 0.1 E-02	3.6 ± 0.7 E-03	3.9 ± 0.8 E-03	1.2 ± 0.2 E-04
U-238	5.7 ± 2.3 E-05	1.4 ± 0.1 E-02	3.0 ± 0.7 E-03	6.4 ± 1.0 E-03	1.1 ± 0.2 E-04
Date Analyzed	11-09-05	11-09-05	11-10-05	11-11-05	11-09-05
Pu-239	< 1.4 E-05	< 2.1 E-04	< 2.5 E-04	< 3.2 E-04	< 2.8 E-06
Date Analyzed	11-09-05	11-09-05	11-09-05	11-09-05	11-09-05
Am-241	< 1.6 E-05	< 2.2 E-04	< 4.0 E-04	< 3.7 E-04	< 4.8 E-05
Date Analyzed	11-15-05	11-15-05	11-17-05	11-29-05	11-15-05

The error given is the probable counting error at the 95% confidence level. Less than (<) value is based on a 4.66 sigma counting error for the background sample.

Faxed to Kuss
8/18-05

Q2 2005

Environmental, Inc.
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Mr. James Hancock	LABORATORY REPORT NO.	8100-7204
U.S Ecology, Idaho	DATE	08-15-2005
P.O. Box 400	SAMPLES RECEIVED	07-15-2005
Grand View, Idaho 83624	PURCHASE ORDER NO.	

Dear Mr. Hancock:

Enclosed are the results of the analyses for gamma-emitting isotopes, radium-226, thorium-232, uranium-233/234, uranium-238, plutonium-239 and americium-241 on five quarterly composite air filters (2nd quarter 2005)

Should you have any questions or other concerns, please do not hesitate to call.

Sincerely,

Bronia Grob, M.S.
Laboratory Manager

APPROVED BY ______________________
Tony Coorlim,
Quality Assurance

Table 1. Results of the analyses for gamma-emitting isotopes in five air particulate composite samples.

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	04-01-05	04-08-05	04-05-05	03-31-05	04-01-05
End Date	06-24-05	07-01-05	06-30-05	06-30-05	07-01-05
Volume (m3)	18,993.8	1,741.6	950.6	950.6	73,952.9
Lab Code	SPAP-4046	SPAP-4047	SPAP-4048	SPAP-4049	SPAP-4050
Date Analyzed	07-27-05	08-01-05	07-27-05		
Isotope	Concentration (pCi/m3)				
Be-7	8.0 ± 0.9 E-02	< 5.5 E-02	< 8.4 E-02	< 8.4 E-02	7.3 ± 4.8 E-02
Mn-54	< 4.8 E-04	< 3.5 E-03	< 5.7 E-03	< 6.7 E-03	< 2.0 E-04
Co-58	< 5.6 E-04	< 3.4 E-03	< 7.0 E-03	< 6.2 E-03	< 2.8 E-04
Co-60	< 5.8 E-04	< 3.3 E-03	< 8.7 E-03	< 6.5 E-03	< 1.9 E-04
Fe-59	< 1.3 E-03	< 1.2 E-02	< 2.4 E-02	< 1.7 E-02	< 4.2 E-04
Zn-65	< 1.2 E-03	< 5.1 E-03	< 1.7 E-02	< 1.0 E-02	< 3.3 E-04
Zr-95	< 1.5 E-03	< 5.6 E-03	< 2.1 E-02	< 1.4 E-02	< 4.7 E-04
Ru-103	< 4.9 E-04	< 4.1 E-03	< 1.0 E-02	< 7.7 E-03	< 3.2 E-04
Ru-106	< 3.9 E-03	< 3.2 E-02	< 6.6 E-02	< 5.3 E-02	< 1.9 E-03
Cs-134	< 6.6 E-04	< 3.6 E-03	< 9.1 E-03	< 6.0 E-03	< 1.4 E-04
Cs-137	2.6 ± 0.1 E-02	< 4.2 E-03	4.2 ± 1.0 E-02	1.1 ± 0.6 E-02	< 1.3 E-04
Ce-141	< 1.5 E-03	< 1.7 E-02	< 1.8 E-02	< 1.5 E-02	< 6.9 E-04
Ce-144	< 3.8 E-03	< 2.7 E-02	< 4.1 E-02	< 4.7 E-02	< 1.6 E-03

The error given is the probable counting error at the 95% confidence level. Less than, (<), value is based on a 4.66 sigma counting error for the background sample.

Table 2. Results of the analyses in five air particulate composite samples.

Sample Description	Steiner House	RTF	Cell 14	Cell 15	Administration
Start Date	04-01-05	04-08-05	04-05-05	03-31-05	04-01-05
End Date	06-24-05	07-01-05	06-30-05	06-30-05	07-01-05
Volume (m3)	18,993.8	1,741.6	950.6	950.6	73,952.9
Lab Code	SPAP-4046	SPAP-4047	SPAP-4048	SPAP-4049	SPAP-4050
Isotope	Concentration (pCi/m3)				
Ra-226	1.3 ± 0.7 E-04	4.0 ± 1.0 E-03	5.2 ± 1.6 E-03	4.8 ± 1.5 E-03	1.7 ± 0.1 E-04
Date Analyzed	08-10-05	08-10-05	08-10-05	08-10-05	08-10-05
Th-232	8.1 ± 2.0 E-05	3.3 ± 0.7 E-03	5.3 ± 0.9 E-03	6.8 ± 1.0 E-03	1.9 ± 0.2 E-04
Date Analyzed	08-09-05	08-09-05	08-09-05	08-09-05	08-12-05
U-233/234	3.3 ± 1.1 E-04	6.3 ± 1.5 E-03	6.9 ± 2.0 E-03	9.5 ± 2.3 E-03	1.8 ± 0.4 E-04
U-238	1.1 ± 0.7 E-04	3.4 ± 1.1 E-03	6.0 ± 1.9 E-03	8.6 ± 2.2 E-03	1.7 ± 0.3 E-04
Date Analyzed	08-11-05	08-11-05	08-11-05	08-11-05	08-11-05
Pu-239	< 1.7 E-05	< 1.1 E-04	< 4.1 E-04	< 2.1 E-04	< 7.2 E-06
Date Analyzed	08-09-05	08-09-05	08-09-05	08-09-05	08-11-05
Am-241	< 1.2 E-04	< 1.1 E-03	< 1.3 E-03	< 5.0 E-04	< 1.8 E-05
Date Analyzed	08-11-05	08-11-05	08-11-05	08-11-05	08-11-05

The error given is the probable counting error at the 95% confidence level. Less than (<) value is based on a 4.66 sigma counting error for the background sample.

Cap 88 Information

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Clean Air Act Assessment Package - 1988

S Y N O P S I S   R E P O R T

Non-Radon Individual Assessment
Feb 28, 2006 04:51 pm

Facility: US Ecology Idaho, Inc.
Address: 40200 Lemley Rd.
City: Grand View
State: ID Zip:

Source Category: Fusrap-Norm
Source Type: Area
Emission Year: 2005

Comments: Grand View
2005

Effective Dose Equivalent
(mrem/year)

6.94E-04

At This Location: 1000 Meters West Northwest

Dataset Name: Idaho-2005
Dataset Date: 2/28/2006 4:51:00 PM
Wind File: C:\CAP88-PC30\WindLib\24131.WND

MAXIMALLY EXPOSED INDIVIDUAL

ation Of The Individual: 1000 Meters West Northwest
ime Fatal Cancer Risk: 1.86E-08

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
Adrenals	4.45E-05
B Surfac	4.98E-05
Breasts	6.68E-04
St Wall	4.74E-05
ULI Wall	5.22E-05
Kidneys	4.34E-05
Lungs	4.79E-05
Ovaries	4.74E-05
R Marrow	4.81E-05
Spleen	4.98E-05
Thymus	6.35E-05
Uterus	5.99E-05
Bld Wall	2.17E-04
Brain	5.39E-05
Esophagu	5.01E-05
SI Wall	4.52E-05
LLI Wall	7.82E-05
Liver	6.01E-04
Muscle	5.32E-05
Pancreas	5.79E-05
Skin	4.76E-05
Testes	4.95E-05
Thyroid	4.68E-05
EFFEC	6.94E-04

RADIONUCLIDE EMISSIONS DURING THE YEAR 2005

Nuclide	Type	Size	Source #1 Ci/y	TOTAL Ci/y
U-238	M	1	9.4E-07	9.4E-07
Th-230	S	1	4.1E-06	4.1E-06
Ra-226	M	1	3.2E-07	3.2E-07
Rn-222	G	0	3.2E-07	3.2E-07
Po-218	M	1	3.2E-07	3.2E-07
Pb-214	M	1	3.2E-07	3.2E-07
At-218	M	1	3.2E-07	3.2E-07
Bi-214	M	1	3.2E-07	3.2E-07
Po-214	M	1	3.2E-07	3.2E-07
Pb-210	M	1	3.2E-07	3.2E-07
Bi-210	M	1	3.2E-07	3.2E-07
Po-210	M	1	3.2E-07	3.2E-07
Th-232	S	1	3.8E-07	3.8E-07
Ra-228	M	1	3.8E-07	3.8E-07
Ac-228	M	1	3.8E-07	3.8E-07
Th-228	S	1	3.8E-07	3.8E-07
Ra-224	M	1	3.8E-07	3.8E-07
Rn-220	G	0	3.8E-07	3.8E-07
Po-216	M	1	3.8E-07	3.8E-07
Pb-212	M	1	3.8E-07	3.8E-07
Bi-212	M	1	3.8E-07	3.8E-07
Po-212	M	1	3.8E-07	3.8E-07
Tl-208	M	1	3.8E-07	3.8E-07
Pa-234m	M	1	9.4E-07	9.4E-07
Th-234	S	1	9.4E-07	9.4E-07

SITE INFORMATION

Temperature:	10 degrees C
Precipitation:	18 cm/y
Humidity:	5 g/cu m
Mixing Height:	1000 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.00
Area (sq m): 2400.00

Plume Rise
Momentum (m/s): 0.00
(Exit Velocity)

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.400	0.440
Fraction From Assessment Area:	0.300	0.600	0.560
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1000

Cap 88 – 2006

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Clean Air Act Assessment Package - 1988

S Y N O P S I S   R E P O R T

Non-Radon Individual Assessment
Feb 28, 2007 10:34 am

Facility: US Ecology Idaho
Address: 20400 Lemley Drive
City: Grand View
State: ID Zip:

Source Category:
Source Type: Area
Emission Year: 2006

Comments: No
Comments

Effective Dose Equivalent
(mrem/year)

4.30E-04

At This Location: 1000 Meters West Northwest

Dataset Name: 2006 USEI
Dataset Date: 2/28/2007 10:34:00 AM
Wind File: C:\CAP88-PC30\WndFiles\24131.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual:	1000 Meters West Northwest
Lifetime Fatal Cancer Risk:	1.16E-08

RADIONUCLIDE EMISSIONS DURING THE YEAR 2006

Nuclide	Type	Size	Source #1 Ci/y	TOTAL Ci/y
U-238	M	1	4.5E-07	4.5E-07
Th-234	S	1	4.4E-07	4.4E-07
Pa-234m	M	1	4.4E-07	4.4E-07
Pa-234	M	1	4.4E-07	4.4E-07
U-234	M	1	4.4E-07	4.4E-07
Th-230	S	1	2.5E-06	2.5E-06
Ra-226	M	1	3.8E-07	3.8E-07
Rn-222	G	0	3.8E-07	3.8E-07
Po-218	M	1	3.8E-07	3.8E-07
Pb-214	M	1	3.8E-07	3.8E-07
At-218	M	1	3.8E-07	3.8E-07
Bi-214	M	1	3.8E-07	3.8E-07
Po-214	M	1	3.8E-07	3.8E-07
Pb-210	M	1	3.8E-07	3.8E-07
Bi-210	M	1	3.8E-07	3.8E-07
Po-210	M	1	3.8E-07	3.8E-07
Th-232	S	1	1.8E-07	1.8E-07
Ra-228	M	1	1.9E-07	1.9E-07
Ac-228	M	1	1.9E-07	1.9E-07
Th-228	S	1	1.9E-07	1.9E-07
Ra-224	M	1	1.9E-07	1.9E-07
Rn-220	G	0	1.9E-07	1.9E-07
Po-216	M	1	1.9E-07	1.9E-07
Pb-212	M	1	1.9E-07	1.9E-07
Bi-212	M	1	1.9E-07	1.9E-07
Po-212	M	1	1.9E-07	1.9E-07
Tl-208	M	1	1.9E-07	1.9E-07
Cs-137	F	1	1.0E-08	1.0E-08
Ba-137m	M	1	1.0E-08	1.0E-08
Sr-90	M	1	7.0E-09	7.0E-09
Y-90	M	1	7.0E-09	7.0E-09

SITE INFORMATION

Temperature:	10 degrees C
Precipitation:	18 cm/y
Humidity:	8 g/cu m
Mixing Height:	1000 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.00
Area (sq m): 2400.00

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Zero:	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.400	0.440
Fraction From Assessment Area:	0.300	0.600	0.560
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1000

Cap 88 – 2007

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S   R E P O R T

Non-Radon Individual Assessment
May 22, 2008 10:46 pm

Facility: USEI
Address: 20400 Lemley Rd.
City: Grand View
State: ID Zip:

Source Category:
Source Type: Area
Emission Year: 2007

Comments: no
comment

Effective Dose Equivalent
(mrem/year)

3.92E-04

At This Location: 1000 Meters West Northwest

Dataset Name: USEI2007
Dataset Date: 5/22/2008 10:20:00 PM
Wind File: C:\Program Files\CAP88-PC30\WndFiles\24131.W

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 1000 Meters West Northwest
Lifetime Fatal Cancer Risk: 2.40E-10

RADIONUCLIDE EMISSIONS DURING THE YEAR 2007

Nuclide	Type	Size	Source #1 Ci/y	TOTAL Ci/y
U-238	M	1	6.1E-07	6.1E-07
Th-234	S	1	6.1E-07	6.1E-07
Pa-234m	M	1	6.1E-07	6.1E-07
Pa-234	M	1	6.1E-07	6.1E-07
U-234	M	1	5.7E-07	5.7E-07
Th-230	S	1	6.6E-07	6.6E-07
Ra-226	M	1	5.7E-07	5.7E-07
Rn-222	G	0	5.7E-07	5.7E-07
Po-218	M	1	5.7E-07	5.7E-07
Pb-214	M	1	5.7E-07	5.7E-07
At-218	M	1	5.7E-07	5.7E-07
Bi-214	M	1	5.7E-07	5.7E-07
Po-214	M	1	5.7E-07	5.7E-07
Pb-210	M	1	5.5E-07	5.5E-07
Bi-210	M	1	5.5E-07	5.5E-07
Po-210	M	1	5.5E-07	5.5E-07
Th-232	S	1	4.9E-07	4.9E-07
Ra-228	M	1	4.8E-07	4.8E-07
Ac-228	M	1	4.8E-07	4.8E-07
Th-228	S	1	4.8E-07	4.8E-07
Ra-224	M	1	4.8E-07	4.8E-07
Rn-220	G	0	4.8E-07	4.8E-07
Po-216	M	1	4.8E-07	4.8E-07
Pb-212	M	1	4.8E-07	4.8E-07
Bi-212	M	1	4.8E-07	4.8E-07
Po-212	M	1	0.0E+00	0.0E+00
Tl-208	M	1	1.7E-07	1.7E-07
Cs-137	F	1	1.1E-11	1.1E-11
Ba-137m	M	1	1.0E-11	1.0E-11
Sr-90	M	1	2.2E-11	2.2E-11
Y-90	M	1	2.2E-11	2.2E-11
U-235	M	1	2.6E-08	2.6E-08
Th-231	S	1	2.6E-08	2.6E-08
Pa-231	M	1	2.6E-08	2.6E-08
Ac-227	M	1	2.6E-08	2.6E-08
Th-227	S	1	2.6E-08	2.6E-08
Fr-223	M	1	2.6E-08	2.6E-08
Ra-223	M	1	2.6E-08	2.6E-08
Rn-219	G	0	2.6E-08	2.6E-08
Po-215	M	1	2.6E-08	2.6E-08
Pb-211	M	1	2.6E-08	2.6E-08
Bi-211	M	1	2.6E-08	2.6E-08
Tl-207	M	1	2.6E-08	2.6E-08
Po-211	M	1	2.6E-08	2.6E-08

SITE INFORMATION

Temperature: 10 degrees C
Precipitation: 100 cm/y
Humidity: 8 g/cu m
Mixing Height: 1000 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.00
Area (sq m): 2400.00

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Zero:	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.400	0.440
Fraction From Assessment Area:	0.300	0.600	0.560
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1000

Cap 88 – 2008

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S   R E P O R T

Non-Radon Individual Assessment
May 14, 2009 06:15 pm

Facility: US Ecology Idaho
Address: 20400 Lemley Road
City: Grand View
State: ID Zip: 83624

Source Category: NORM
Source Type: Area
Emission Year: 2008

Comments: dose from airborne particulates
for 2008

Effective Dose Equivalent
(mrem/year)

2.70E-04

At This Location: 1000 Meters West Northwest

ataset Name: USEI2008
ataset Date: 5/14/2009 5:33:00 PM
Wind File: C:\Program Files\CAP88-PC30\WndFiles\24131.W

MAXIMALLY EXPOSED INDIVIDUAL

ation Of The Individual: 1000 Meters West Northwest
ime Fatal Cancer Risk: 1.73E-10

RADIONUCLIDE EMISSIONS DURING THE YEAR 2008

Nuclide	Type	Size	Source #1 Ci/y	TOTAL Ci/y
U-238	M	1	6.1E-07	6.1E-07
Th-234	S	1	6.1E-07	6.1E-07
Pa-234m	M	1	6.1E-07	6.1E-07
Pa-234	M	1	6.1E-07	6.1E-07
U-234	M	1	6.1E-07	6.1E-07
Th-230	S	1	8.9E-07	8.9E-07
Ra-226	M	1	7.8E-07	7.8E-07
Rn-222	G	0	7.8E-07	7.8E-07
Po-218	M	1	7.8E-07	7.8E-07
Pb-214	M	1	7.8E-07	7.8E-07
At-218	M	1	7.8E-07	7.8E-07
Bi-214	M	1	7.8E-07	7.8E-07
Po-214	M	1	7.8E-07	7.8E-07
Pb-210	M	1	9.5E-07	9.5E-07
Bi-210	M	1	9.5E-07	9.5E-07
Po-210	M	1	9.5E-07	9.5E-07
Th-232	S	1	1.7E-07	1.7E-07
Ra-228	M	1	2.3E-07	2.3E-07
Ac-228	M	1	2.3E-07	2.3E-07
Th-228	S	1	2.3E-07	2.3E-07
Ra-224	M	1	2.3E-07	2.3E-07
Rn-220	G	0	2.3E-07	2.3E-07
Cs-137	F	1	2.0E-09	2.0E-09
Ba-137m	M	1	2.0E-09	2.0E-09
Sr-90	M	1	7.3E-10	7.3E-10
Y-90	M	1	7.3E-10	7.3E-10
H-3	V	0	1.6E-10	1.6E-10
Na-22	M	1	6.1E-13	6.1E-13
Co-60	M	1	2.8E-12	2.8E-12
Eu-152	M	1	3.5E-11	3.5E-11
Gd-152	M	1	3.5E-12	3.5E-12
Po-216	M	1	2.3E-07	2.3E-07
Pb-212	M	1	2.3E-07	2.3E-07
Bi-212	M	1	2.3E-07	2.3E-07
Po-212	M	1	2.3E-07	2.3E-07
Tl-208	M	1	8.4E-08	8.4E-08

SITE INFORMATION

Temperature: 10 degrees C
Precipitation: 18 cm/y
Humidity: 8 g/cu m
Mixing Height: 1000 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.00
Area (sq m):64749.00

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Zero:	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.400	0.440
Fraction From Assessment Area:	0.300	0.600	0.560
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1000

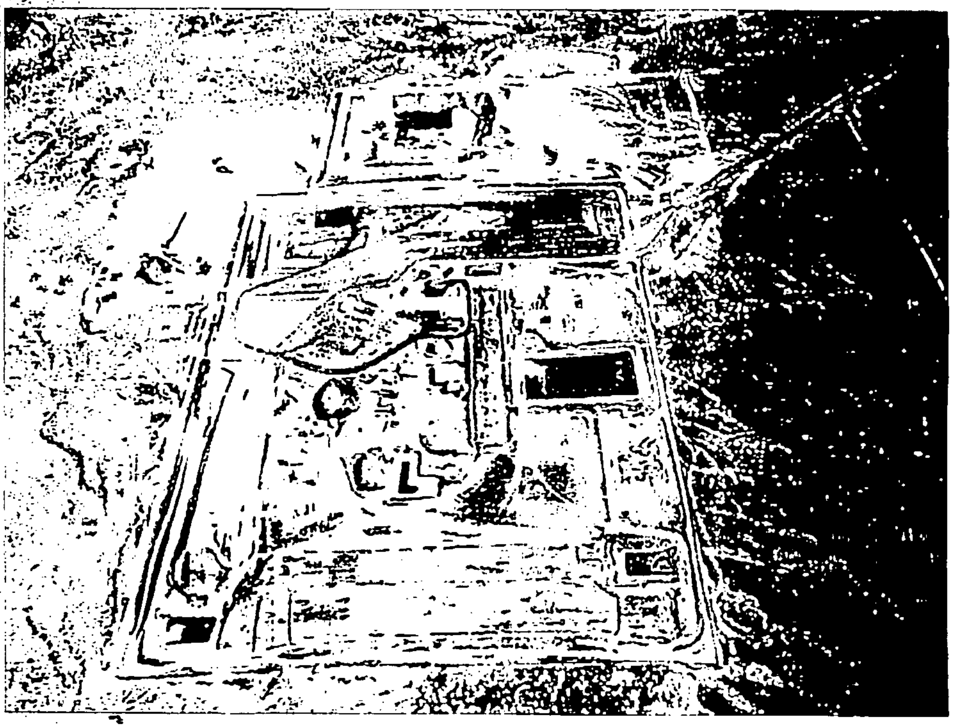
ATTACHMENT 7

American Geotechnics, June 28, 2006, Hazardous Waste Facility Siting License Application Cell 16, Grand View, Idaho

Hazardous Waste Facility Siting License Application Cell 16 Grand View, Idaho

Prepared for
U.S. ECOLOGY IDAHO

June 28, 2006



Prepared By
American Geotechnics

AMERICAN GEO TECHNICS

Prepared for

US Ecology Idaho
P.O. Box 400
Grand View, Idaho 83624

Attention: Simon Bell, Vice President of Hazardous Waste Operations

Hazardous Waste Facility Siting License Application Cell 16

Grand View, Idaho

American Geotechnics
Project No. 06B-C1202
June 30, 2006

Prepared by

American Geotechnics

Document No. 11

PROFESSIONAL ENGINEER REGISTERED 7042 STATE OF IDAHO REX WILLIAM HANSEN

6/30/2006

Tim C. Johnson, EIT
Geotechnical Engineer

Rex W. Hansen, PE
Principal Engineer

AMERICAN GEO TECHNICS

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AMERICAN GEO TECHNICS

1.0 Introduction

US Ecology Idaho (USEI) is planning to construct a new Resource Conservation and Recovery Act (RCRA) Subtitle C and Toxic Substance Control Act (TSCA) landfill cell within Section 19 of Township 4S, Range 2E, Boise Meridian, Owyhee County. Idaho. Although a specific location for future cells is unknown at this time. two potential locations are shown on Figure 1, Site Vicinity Map, in Appendix A. This "*Site Certification Application*" (Application) is intended to provide information necessary to obtain site certification from the Idaho Department of Environmental Quality (DEQ) for proposed hazardous waste landfill cells within Section 19. Based on the information provided in this document, USEI requests that DEQ certify all of Section 19 for future hazardous waste landfill development.

USEI currently operates a RCRA Subtitle C and Toxic Substance Control Act (TSCA) Hazardous Waste Treatment, Storage and Disposal Facility (EPA ID No. IDD073114654) approximately 10 miles west of Grand View in Owyhee County, Idaho (Figure 2). The current permitted facility, known as USEI Site B (Site B), occupies approximately 120 acres in the north central portion of Section 19. USEI owns all of Section 19 (640 acres) and other adjoining property as outlined in Figure 2.

USEI proposes siting the remaining 400 acres of Section 19. Prior to the existing. active disposal Cell 15 reaching capacity, a new disposal Cell 16 is proposed for continued operation. Although operations are expected to continue at the same or an increased rate, an additional impact greater than that established by the current operating facility, is not anticipated.

This Application was prepared to comply with:

- Idaho's Department of Environmental Quality's (DEQ) Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities within Idaho
- Idaho Solid Waste Management Rules Idaho Department of Administration Procedures Act (IDAPA), Chapter 58
- Idaho Statutes Title 39, Chapter 58
- Title 40 of the Code of Federal Regulations (40 CFR), Parts 264

According to the aforementioned rules and regulations, it is necessary to evaluate and certify that the proposed landfill site meets certain conditions. This Application summarizes the applicability of current rules and regulations with respect to Section 19. This document demonstrates that Section 19 meets or exceeds minimum regulatory standards and is suitable for disposal of hazardous waste allowed by federal and state law or all solid waste allowed under the Idaho Solid Waste Facility Siting Act.

1.1 Name and Residence of the Applicant

"An applicant for a siting license shall include the name and residence of the applicant." (Idaho Statutes 39-5813-a)

USEI is the applicant on this site license. The treatment, storage and disposal facility (TSDF) for which a siting license is being sought is located in Owyhee County, Grand View, Idaho.

USEI obtained a RCRA part B permit in December 1988 for commercial hazardous waste treatment, storage, and disposal at its Site B facility west of Grand View, Idaho. This application is for the expansion of that facility. The General Manager and contact is Ryan McDermott. The mailing address of USEI Site B is P.O. Box 400, Grand View, ID 83624.

1.2 Location

"An applicant for a siting license shall include the location of the proposed hazardous waste treatment, storage, or disposal facility." (Idaho Statutes 39-5813-b)

Site B occupies approximately 120 acres in the northern half of Section 19, Township 4 South, Range 2 East, Boise Meridian. Section 19 is a parcel of land that encompasses 640 acres and is owned by USEI. The proposed siting area is the remainder of Section 19. It will encompass at least one new disposal cell within the remaining 400 acres minus buffer zones and excluded areas as discussed herein.

Owyhee County is a ranching and agricultural area of approximately 7,678 square miles. The county is sparsely populated, with an average population of 1.4 people per square mile.

The area surrounding Section 19 is very sparsely populated. The nearest public facility is a gas station mini-mart in Grand View, which is approximately 10 miles southeast of Section 19. Grand View has a population of approximately 500 persons. Approximately 170 people live within four miles of Section 19 (Exposure Information Report, 1985).

AMERICAN GEO TECHNICS

Additional Site Information is:

EPA ID Number:	IDD073114654
Physical Address:	20400 Lemley Road Grand View, ID 83624
Telephone No.:	(208) 834.2275
Latitude:	43 03'-56"
Longitude:	116 15'-44"

AMERICAN GEO TECHNICS

2.0 Engineering and Hydrogeologic Information

"*An applicant for a siting license shall include engineering or hydrogeologic information to indicate compliance with technical criteria as adopted in the Hazardous Waste Management Plan if applicable.*" (Idaho Statutes 39-5813-c)

Charles Feast, as senior hydrogeologist and project manager at CH2M Hill from 1979 to 1999, and since 2001 with Feast Geosciences, was the primary author or senior technical lead for most of the geologic and hydrogeologic studies conducted at Site B. Sections 2.1 through 2.6 of this Application were prepared from a summary document provided by Mr. Feast for this application (Feast 2006).

Since the mid-1980's, the geology and hydrogeology at Site B has been extensively studied and characterized to obtain and renew hazardous waste treatment, storage and disposal permits through the US Environmental Protection Agency (EPA) and DEQ. Most of this work has been conducted within the boundaries and perimeter of the current active portion of the facility. The following text draws directly from previous reports and studies and includes both direct text and amended or summarized text from numerous sources previously submitted to DEQ. The exception to the summation and paraphrasing of previous studies is a new geologic cross-section along the west side of the current facility boundary prepared specifically for this submittal.

2.1 Geologic Setting

General Geology

Section 19 lies within Owyhee County in southwestern Idaho and geographically comprises a portion of the Snake River Valley. The geology of the area surrounding Section 19 is dominated by the sedimentary facies of the Idaho Group, which are underlain by the older basalts and rhyolites of the western Snake River Plain. These sediments and volcanics were deposited in a fault-bounded basin on the western margin of the western Snake River Plain. The sediments and volcanics of the Snake River Plain unconformably contact the predominantly plutonic rocks of the mountainous highlands north and west of Section 19.

The oldest rocks of the mountainous area to the north and to the southwest of Section 19 are of Jurassic and Cretaceous age and are of granitic and granodioritic composition. These rocks represent the margin of the Idaho batholith, forming the extreme western limits of the Rocky Mountains. Metamorphic rocks are found locally associated with the plutonic rocks in the uplift.

Within the Snake River Valley are younger (Tertiary and Quaternary) deposits of the Idaho Group that were deposited as pediment sands, gravels, silts and clays of lacustrine (lake) and fluvial (river) origin in the form of piedmont plains with intermingled and superimposed silicic and basaltic extrusive volcanic and pyroclastic flow rocks that range in age from Miocene to early Recent. The floors of the presently active watercourses and their overflow areas are blanketed with the most recent materials. These recent materials were derived from deposits of windblown silts, fine sands, and bench or terrace deposits of pre-existing gravelly materials.

General Stratigraphy

The stratigraphy and approximate thickness of each geologic unit can be characterized as follows, in ascending order (deepest and oldest first):

- Poison Creek Formation – 600 plus feet
- Banbury Basalts – 200 plus feet
- Chalk Hills Formation – 200 plus feet
- Glenns Ferry Formation – 1,500 plus feet
- Bruneau Formation – 0 to 100 plus feet

Figure E-7 (Appendix B), a detailed staratigraphic column prepared from the driller's log for an artesian well drilled in 1958 at Site B, illustrates the stratigraphic sequence at Section 19.

Poison Creek and Chalk Hills Formations

The Poison Creek and Chalk Hills formations are lacustrine deposits of the Snake River Plain. The Poison Creek Formation separates the general groundwater systems from the local groundwater systems.

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Banbury Basalts

Approximately 200 feet of basalt, known as the Banbury Basalts, separate the Poison Creek Formation and the Chalk Hills Formation. These basalts are the first fractured rock system encountered beneath Section 19, and occur at a depth of approximately 2,285 feet below ground surface (bgs).

Glenns Ferry Formation

The Glenns Ferry Formation represents lacustrine, fluvial, and flood plain deposits. The first encountered groundwater at the proposed siting area is in this formation. The first water-bearing zones beneath Section 19 consist of two groups of thin sand beds that are interbedded in the fine-grained lacustrine sediments of the Glenns Ferry Formation.

Bruneau Formation

The Bruneau Formation consists of unconsolidated lake deposits containing basalt flows and tuff beds to high-energy river gravels. These are coarse-grained deposits that are located at the ground surface near Section 19.

Subsurface Conditions

Subsurface conditions at Section 19 have been determined primarily based on the subsurface conditions encountered in the excavation of Landfill Cell 14 and Cell 15, and the logging of the groundwater monitoring wells drilled at various locations around Section 19.

Section 19 soils are composed primarily of layers of silty sands, sandy silts, silts, and massive clays. The top 30 to 40 feet are composed primarily of silty and gravelly sands, which are underlain by silty sands and clays to a depth of approximately 150 feet. Below 150 feet, thick beds of inorganic silts and clays are encountered. These materials were deposited primarily in a lacustrine environment. Soil boring data show that relatively consistent, uniform soil conditions exist throughout Section 19.

2.2 Hydrologeologic Setting

Detailed descriptions of the hydrogeology at Section 19 are provided in the numerous support documents prepared prior to and subsequent to the issuance of the Part B permit. The general description and discussion in the following paragraphs is provided to describe the subsurface conditions relevant to the Section 19 Siting Application and is not to provide a comprehensive presentation of the complex hydrogeology at Section 19.

Section 19 is underlain by two water-bearing units identified as the Upper and Lower Aquifers. These hydrologic units consist of two distinct swarms or sets of thin beds of very fine sand and fine silty sand embedded in a silty clay matrix. A confining layer of massive clay, 20 to 30 feet thick, separates the two aquifers.

Water chemistry, geologic core logging, and geophysical logging during site characterization differentiated the two aquifers. These two aquifers appear geologically similar over most of Section 19, with an exception occurring in the northwestern most corner. In this corner, the saturated portion of the Upper Aquifer appears thicker, most likely due a thicker sequence of sand layers acting as the host unit. The groundwater monitoring system established for Site B (as part of the permitting process) has maintained the Upper and Lower Aquifer distinction. The monitoring well system at Site B consists of 33 wells and piezometers in the Upper Aquifer, and 22 wells and piezometers in the Lower Aquifer, as shown on Figure 3.

The total saturated thickness of the Upper Aquifer ranges from less than 20 feet thick to about 80 feet thick. Within the aquifer section, the cumulative thickness of sand beds ranges from 1.5 feet to 35 feet, with an average thickness of approximately 7 feet. Sand beds appear to be thicker, and the cumulative sand bed thickness appears highest, in the northwestern portion of Section 19. The number of sand beds decrease, and individual beds thin, to the east and to the south of Section 19.

Water in the Upper Aquifer flows into Section 19 from the northwest and exits across the eastern facility boundary as shown on Figure 4. Water in the Lower Aquifer enters from the southwest, flows to the northeast and exits Section 19 beneath the eastern Site B boundary as shown on Figure 5. The Upper Aquifer exhibits unconfined (water table) to semi-confined conditions, while the Lower Aquifer is confined. Based on the surface elevation of the monitoring points, depth to water in the Upper Aquifer ranges from 135 feet to 190 feet bgs , and the potentiometric surface of the Lower Aquifer ranges from 190 feet to about 215 feet bgs .

The subsurface stratigraphy of Section 19, including the Upper Aquifer host lithologies that dip or slope downward to the northeast approximately 2 to 5 degrees. As a consequence of this dip, the sand beds hosting the Upper Aquifer gradually rise above water and progressively become unsaturated from north to south across Site B. The southern limit of saturation in the Upper Aquifer crosses the southern portion of Site B from northwest to southeast and slightly north of the northern edge of Cell 14. The Lower Aquifer also dips to the northeast, but is saturated beneath the entire Site B facility.

Figures 6 and 7 are north-south cross-sections along the western and eastern sides (respectively) of the current Site B boundaries. These figures show the principal stratigraphic units beneath Site B including the Lower Aquifer, the confining layer and primary stratigraphic divisions within and above the Upper Aquifer. The effect of the northerly dipping formations on the saturated thickness and southerly extent of the Upper Aquifer is illustrated on these figures by the intersection of the water table and the inner confining layer separating the Upper and Lower Aquifers.

There are no existing wells or borings in the eastern or western extents of Section 19 to document continuity of the hydrogeologic conditions studied in detail beneath and adjacent to the current Site B boundaries. However, the geologic setting, including outcrops visible in the southern and western topographic highlands bordering the plateau on which Site B is located, indicates similar stratigraphic continuity, and therefore similar hydrogeolic continuity beneath Section 19. This is especially true in the eastern portion of Section 19, where groundwater contours and flow lines are uniformly spaced and consistent, suggesting uniform conditions in the immediate area. The western portion of Section 19 is topographically higher than the east, and the extent of the Upper Aquifer in this portion of Section 19 is largely unknown. While well yields in both aquifers appear to vary according to the thickness and cumulative occurrence of sand beds within the saturated zone, they range from about 5 gallons per minute in the northwest corner of Site B to less than 0.5 gallons per minute across the eastern and southern extent of the Upper Aquifer. The Lower Aquifer is generally thinner and contains fewer sand beds. Lower Aquifer wells all yield less than 0.5 gallons per minute. The general water chemistry of the both aquifers is high in total dissolved solids, exceeding 1,000 mg/l in all wells except U-4, which is around 900 mg/l. The low well yields, combined with poor water quality, indicate that neither of the water bearing zones represent viable or economically significant resources.

2.3 Siting Criteria

Depth to Groundwater

> *"No new hazardous waste land disposal facility shall be placed where the seasonal-high depth of the groundwater, beneath the proposed site, is less than 100 feet below the lowest point of disposal. Perched saturated zones may be exempt from exclusionary criterion if it can be demonstrated that the saturated zone has no economic or*

> *consumptive usable purpose.*" (Idaho Hazardous Waste Management Plan: Minimum Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities Within Idaho-1A)

Water levels in the Lower Aquifer monitoring wells range from 185 to 215 feet bgs depending on the surface elevation of measurement. Projecting future water levels in the Lower Aquifer is complicated by the transient effects of soil loading from Cells 14 and 15 and because the aquifer is under confined conditions under all but possibly the extreme southern edge of Cell 15. Under confined conditions, the depth to water in a well is less than the depth to water in the aquifer because the water rises above the confining layer in the well.

The Upper Aquifer is under unconfined/semi-confined water table conditions: consequently the measured depth to water is essentially the depth to saturated sediments. Water levels range from 135 feet bgs in the topographically low area near the northwest corner of Site B, to 198 feet bgs across the southeastern portion of Site B. The depth to water and subsequent rising water levels may limit the design depth of future cells that extend over that the northwest corner of Section 19 to disposal depths less than 35 feet bgs. This potential Cell location is discussed further in the following section. The low well yields from both the Upper and Lower Aquifers, combined with poor water quality, indicate that neither of the water bearing zones represent viable or economically significant resources.

Fine Grained Unconsolidated Sediment Formations

> *"No new hazardous waste land disposal facility shall be placed where the thickness of fine-grained (predominantly clay and silt) unconsolidated sediments above the water table is less than 25 feet."* (Idaho Hazardous Waste Management Plan: Minimum Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities Within Idaho-1B)

The thickness of fine-grained sediments above the Lower Aquifer exceeds 100 feet. In addition to the numerous beds of clay and silty clay comprising the lower part of the Upper Aquifer, the confining clay between the two aquifers consists of a single massive unit approximately 20 to 40 feet thick.

The thickness of fine-grained sediments above the Upper Aquifer exceeds 60 feet over most of Site B with the exception of the northwest corner. Here the higher groundwater and low topography combine to limit the amount of clay and silt to 25 to 30 feet thick. As shown on Figure 6, the sedimentary sequence above water is comprised of thinly bedded, fine sand with thickly bedded silts and clays. During previous monitoring well drilling, this sedimentary package has been logged as interbedded silty sand or sandy silt and clay. The individual silt and clay beds cannot usually be individually identified. At well U-1, a detailed, continuous core was obtained to a depth of 140 feet (CH2M Hill, 2000). In this boring, 31 feet of silt and clay beds were penetrated. The individual beds range from 1 inch to 2 feet thick. In addition, there are several relatively thick, fine silty sand beds that include thin beds of silt and clay not included in the cumulative total. In general, from about 120 feet and deeper, the sediments are predominantly (approximately 70 percent) silt size or finer (Figure 6).

Groundwater Monitoring Considerations

A new waste disposal cell most likely will require modifications to the current monitoring well network. These modifications possibly include the abandonment of several wells, the installation of replacement wells, and new dedicated down gradient wells. The final layout of the cell determined during permitting, including the location of individual sub-cell sumps, will dictate the ultimate monitoring well configuration.

For example, if Cell 16 covers most of the western side of Section 19, subject to buffer and setback requirements across the west side, the following monitoring wells would likely be impacted:

- U-1
- U-2
- U-3
- Possibly L-38

In addition, the following piezometers (wells used for water levels only) would likely be impacted:

- UP-28
- UP-29
- LP-14

The general approach to modifying the groundwater monitoring system for a new Cell overlapping an existing well will be to drill suitable replacement background monitoring wells, and conduct parallel groundwater sampling over at least one hydrogeologic cycle to establish some correlation between the new and existing wells. Once a period of data overlap is obtained and a correlation determined, the existing wells will be plugged and abandoned according to state and federal regulations and the steel surface casing removed or cut off below the construction depth of the cell.

New down gradient wells, designated to monitor specific Cell leak detection and leak collection sumps, may be required. These wells would be installed in appropriate locations. For the example were a new Cell 16 to cover most of the western side of Section 19, new downgradient wells designated to specific leak detection and leak collection sumps would be installed along the west side of the existing Cell 5. Additionally, well locations would be considered where the wells not only monitor Cell sumps, but also groundwater impacts detected at existing wells such as U-1, which may have been exacerbated by the recent capping of Cell 5. Wells impacted by constructing a new Cell would likely be included in the semi-annual groundwater monitoring program.

A specific program addressing the modification of the monitoring well network, including installation of new wells and abandonment of existing wells, would be defined during the permit modification process. Likewise, the location of piezometers would be evaluated.

Cell Design Excavation Depth

Prior to the final design and submission of the permit modification to DEQ, subsurface investigation would be performed to determine site specific subsurface characteristics. Additionally, ground water monitoring wells would be installed and monitored to determine the seasonal-high depth to groundwater. Results from these investigations and monitoring would be used to determine future construction design criteria to meeting all permitting requirements.

2.4 Rising Groundwater

Water levels in both the Upper and Lower aquifers at Site B were noted to be rising since 1984 when successive water level measurements were first recorded. In 1999 USEI conducted an evaluation of the rate of rise and sources of the rising groundwater (CH2M Hill, 1999). Consequently, DEQ required USEI to re-evaluate rising groundwater at Site B every two years. Thus, re-evaluation reports were prepared and submitted in 2001 (CH2M Hill, 2001), 2003 (Feast Geosciences, 2003) and 2005 (Feast Geosciences, 2006). The results of the initial study and subsequent re-evaluations are summarized as follows:

- The age of the Upper Aquifer water ranges from less than 1,000 years on the western (upgradient) portion of Site B, to 5,000 to 9,000 years before present on the eastern (downgradient) portion of the Site B.
- The Lower Aquifer ranges from 10,700 to 12,700 years before present in the wells across

the northern edge of Cell 14.

- The source of water in the Upper Aquifer appears to be Castle Creek.
- The source of water in the Lower Aquifer was not specifically identified, but based on gradient, the source is thought to be southwest of the site; and based on isotope data, the recharge area is thought to be at least 1,000 feet higher than the headwaters of Castle Creek.
- Upper Aquifer water levels have risen an average of 5.8 feet since 1989 and the Lower Aquifer water levels have risen an average of 6.3 feet.
- Using data collected since 1989, the rate of rise for the Upper Aquifer is 0.35 feet per year, and for the Lower Aquifer it is 0.49 feet per year.
- Beginning in 1997, the rate of rise in most of the Upper Aquifer and Lower Aquifer wells has decreased from the pre-1997 time frame. Since 1997, the average rate of rise in the Upper Aquifer is 0.23 feet per year and in the Lower Aquifer it is 0.37 feet per year.
- Water levels in the Upper Aquifer wells on the eastern side of Site B are rising more slowly than the wells on the western side (0.18 feet per year versus 0.34 feet per year).
- Water levels in the Lower Aquifer respond to changes in surficial un-loading and loading as Cell 14 and Cell 15 are/were excavated and re-filled and the excavation spoil piles were emplaced.
- The groundwater at Site B does not exhibit significant seasonal variations. Prior to the late 1990's water levels were rising fast enough to obscure the seasonal fluctuation. Since the late 1990's the rate of water level rise is slow enough that a seasonal fluctuation of about 0.5 feet is becoming evident in the hydrographs of most wells.
- Rising groundwater at Site B has not caused any significant changes to the flow paths in either aquifer or in the efficacy of the current monitoring well system.

Water levels measured in the Upper Aquifer wells in the northwest corner of Site B appear to be rising more slowly than any of the other Upper Aquifer wells across Site B. In addition, the rate of rise appears to be slowing down. From 2003 to 2005 the average rate of rise in wells U-3 and U-4 was 0.15 feet per year. This decreasing rate of rise is apparently the result of incoming water filling sandy sediments on the northwest side and the incoming groundwater backing up as the generally less transmissive Upper Aquifer, across the center and east sides of the Site B, slowly respond to the increased hydraulic head.

In the probable Upper Aquifer recharge area at Castle Creek, the water surface elevation is approximately 2450 feet mean sea level (msl). The maximum level for the Upper Aquifer at Site B is tied to the elevation of Castle Creek as the recharge source and dependent of the rate of recharge and subsequent lateral discharge of water across the site. As water levels rise, additional sand horizons become saturated and the aquifer is able to discharge more water. Consequently, there should be a self limiting maximum water level for the Upper Aquifer in the northwest portion of Site B. Although this exact level is not known, the self limiting maximum water level is at an elevation significantly lower than the recharge area.

There are no estimates of the maximum water level for the Lower Aquifer. Since the aquifer is confined, water levels could continue to rise until sufficient differential head develops across the confining bed between the Upper and Lower Aquifers so that upward leakage limits additional water level increases.

2.5 Depth to Fractured Rock

"No new hazardous waste land disposal facility shall be placed where the depth to fractured rock (e.g. basalt. rhyolite, limestone, dolomite, etc.) is less than 100 feet below the lowest point of disposal." (Idaho Hazardous Waste Management Plan: Minimum Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities Within Idaho-1B)

Figure E-7 (Appendix B) is a stratigraphic column prepared from the log of a 3,100 foot deep artesian supply well drilled at Site B by the US Army Corps of Engineers (USACE) in 1958. Site B is underlain by 2,285 feet of clay and shale overlying the Banbury Basalt, which is the first fractured rock is encountered. This artesian well was plugged and abandoned 1986.

2.6 Surface Water

"No new hazardous waste land disposal facility shall be placed within 2500 feet of surface water bodies (e.g., lakes and perennial rivers or streams. etc.)." (Idaho Hazardous Waste Management Plan: Minimum Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities Within Idaho-2A)

"The active portion of the facility shall be located such that the facility shall not cause contamination of surface waters, unless such surface waters are an integral part of the non-municipal solid waste management facility's operation for storm water and/or leachate management." (IDAPA 58.01.06-013.01.C)

The surface water body nearest to Section 19 is Castle Creek. Castle Creek is a perennial stream running generally from southwest to northeast to its confluence with the Snake River to the north. As shown in Figure 8, Castle Creek is located within Sections 13 and 24 of Township 4S, Range 1E, in its reaches nearest to Section 19. Figure 8 shows the required 2,500 foot surface water body buffer zone. The buffer zone extends into the northwest corner of Section 19 and generally overlaps the required 500 foot inactive buffer zone where no active cells may be constructed, as discussed in Section 12.0. However, a small portion of the surface water buffer zone extends beyond the inactive buffer zone into the northwest corner of Section 19. This portion of Section 19 will be maintained as an inactive buffer to meet the surface water buffer zone requirement. That is, no landfill cells will be constructed within the portion of the surface water buffer zone that extends into Section 19 beyond the 500 foot inactive buffer zone.

2.7 Water Wells

> *"No new hazardous waste land disposal facility shall be sited within 1000 feet of existing public/private irrigation and water supply wells, unless it can be demonstrated that natural hydrogeologic barriers isolate the site location from the aquifer being pumped."* (Idaho Hazardous Waste Management Plan: Minimum Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities Within Idaho-2B)
>
> *"The active portion of the facility shall be located, designed and constructed such that the facility shall not cause contamination to a drinking water source or cause contamination of groundwater."* (IDAPA 58.01.06-13.01.D)

Figure 9 shows the locations and construction dates of all wells located within the vicinity of Section 19 that are registered with the Idaho Department of Water Resources (IDWR). According to the IDWR database, the well nearest to the Section 19 boundary (well #13) is registered to the Bonus Cove Ranch and has a domestic, single residence usage with a production capacity of 50 gallons per minute. The exact location of well #13 was not surveyed for this report. However, the IDWR database indicates that well #13 is located within the northwest quarter of the northeast quarter of Section 20. Thus, well #13 must be at least one-half of the distance of Section 20 from Section 19. That is, the well nearest to the siting area (well #13) is located at least one-half mile, or 2,640 feet from the Section 19 boundary, satisfying the regulatory constraints concerning proximity to water wells.

2.8 Flood Plain

> "*No new hazardous waste land disposal facility shall be sited within a floodplain of a 500-YEAR (recurrence interval) flood.*" (Idaho Hazardous Waste Management Plan: Minimum Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities Within Idaho-2C)
>
> "*A facility shall not be located within a one hundred (100) year flood plain if the facility will restrict the flow of the one hundred (100) year flood, reduce the temporary water storage capacity of the flood plain, or result in a washout of solid waste so as to pose a hazard to human health and the environment.*" (IDAPA 58.01.06-13.01.A)
>
> "*A facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-yr flood.*" (EPA 40 CFR 264.18.B)

No part of Section 19 is located within a designated A, B, or C class floodplain as identified by the Federal Emergency Management Agency (FEMA). Figure 10 depicts the elevations of Section 19 and demonstrates the natural elevation barriers that protect Section 19 from the flooding of Castle Creek. Approximately 95 percent of Section 19 is has an elevation greater than 2500 feet above sea level (msl). The lowest elevation in the northeast corner of Section 19 is approximately 2475 feet above MSL. This "lowest elevation" is approximately 1.5 miles away and 50 feet above the nearest stretch of Castle Creek, lying at approximately elevation 2425 feet above MSL. The topographic contours demonstrate the tendency of the natural landscape to direct floodwaters away from Section 19 toward the Snake River to the north, which is approximately 200 feet below the lowest elevation of Section 19.

2.9 Fault Zones, Seismic Zones, and Unstable Areas

> "*No new hazardous waste land disposal facility shall be sited within areas that are in close proximity of active fault zones (i.e., displacement within Holocene time) or other tectonically active or unstable areas (e.g. paleo-landslides, etc.).*" (Idaho Hazardous Waste Management Plan: Minimum Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities Within Idaho-2D)
>
> "*No facility may be located on land that would threaten the integrity of the design.*" (IDAPA 58.01.06-013.E)
>
> "*Portions of new facilities where treatment, storage, or disposal of hazardous waste will be conducted must be located within 61 meters (200 feet) of a fault which has had displacement in Holocene time*". (EPA 40 CFR 264.18.A)

Figure 11 shows a satellite image of the Site B location and the distance to the nearest faults that have experienced movement within the Holecene epoch according to the Idaho Geologic Survey. The Halfway Gulch Fault and the Water Tank Fault are approximately 22 miles and 24 miles from the facility, respectively. Thus, the fault proximity regulations as stated above are satisfied.

Figure 12 shows the locations of earthquake epicenters occurring in Idaho from 1880 to present having a Richter magnitude of 4.5 or greater. Figures 13 and 14 display the 10 percent probability of exceeding the mapped firm ground acceleration and acceleration coefficients, respectively, during a 50 year period in Idaho. Figure 13 indicates the effective peak firm ground acceleration is less than 0.05g and Figure 14 indicates the effective peak velocity-related acceleration coefficient (A_v) is 0.09.

As shown in Figures 12, 13, and 14, Section 19 is located within a region exhibiting seismic stability, at least since the year 1880, and low probability of significant ground acceleration during a seismic event.

For the purpose of developing earthquake spectral response accelerations, Section 19 is classified as Site Class C, for use with the International Building Code.

As shown on the USGS Earthquake Hazards Program computer database output (Appendix C), the probable maximum horizontal acceleration (or probabilistic peak ground acceleration) having 10 percent or greater probability in 250 years in the vicinity of Section 19 is 0.11g. Thus, indicating the Site is located within a seismic impact zone, which is similar to other landfills in Southern Idaho. During the design phase, prior to applying for a permit modification, best management practices will be used to design engineered structures to withstand horizontal acceleration forces according to the International Building Code (IBC, 2000).

For instance, under the direction of an Idaho Registered Professional Engineer, a slope stability analysis will be performed incorporating seismic conditions and site-specific strength parameters to define maximum allowable cell slope conditions. Earthen embankments will be designed to withstand a 0.11g horizontal acceleration. Geosynthetic and clay liners utilized in the proposed landfill will be analyzed for tear and potential slippage under static and dynamic conditions and designed to remain stable under anticipated seismic accelerations. Additional landfill features, such as leachate collection, surface water control, and cover systems, will also be designed to remain stable under the anticipated seismic accelerations.

Section 19 does not contain surface or subterranean pysiographic features that are characteristic of unstable areas and thus does not pose a threat to the design integrity of a hazardous waste facility. (Characteristic physiographic features include poor foundation conditions; mass sliding conditions causing avalanches, debris slides, debris flows, block sliding, rock fall, solifluction; and karst conditions including sink holes, sinking streams, caves, large springs, or blind valleys.)

2.10 Subsurface Mining, Caves, and Salt Bed Formations

> *"No new hazardous waste land disposal facility shall be located within areas overlying any subsurface mining."* (Idaho Hazardous Waste Management Plan: Minimum Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities Within Idaho-2E)

> *"The placement of any noncontainerized or bulk liquid hazardous waste in any salt dome formation, salt bed formation, underground mine or cave is prohibited, except for the Department of Energy Waste Isolation Pilot Project in New Mexico."* (EPA 40 CFR 264.18.C)

No active, inactive, or abandoned mining operations exist beneath, or in the vicinity of Section 19. In addition, after conducting a mineral potential survey in 1992, the Bureau of Land Management concluded that no locatable or salable minerals were present in commercial quantities within Section 19 (Appendix D).

The geologic stratigraphy discussion in Section 2.0 does not indicate that salt dome or salt bed formations exist within Section 19.

3.0 Waste Description and Environmental Protection Agency Waste Codes

"An application for a siting license shall include a description of the types of wastes proposed to be handled at the facility." (Idaho Statutes 39-5813.D)

According to Title 40 of the Code of Federal Regulations, Section 261, hazardous wastes are described as (1) characteristic waste, (2) nonspecific source waste, (3) specific source waste, and (4) discarded commercial chemical products.

The Environmental Protection Agency (EPA) hazardous waste codes for waste accepted by USEI are shown in Table 1, on page 22 and 23 of this report. The contaminant listing for these waste codes are available in Title 40, Code of Federal Regulation, Section 261.

3.1 Characteristic Waste

Characteristic wastes (40 CFR 261. 20-24) are wastes the EPA identified as having one of the four characteristics, or traits, of hazardous waste: ignitability, corrosivity, reactivity, and toxicity. They are designated using a "D" in the waste code. Waste is considered hazardous if it exhibits any of these characteristics. These properties are measurable by standardized and available testing methods that can be found in a manual entitled Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846).

Some examples of characteristic wastes include certain paints, degreasers, and solvents that are ignitable (D001); corrosive battery acid (D002): certain reactive cyanides or sulfide-bearing wastes (D003): and wastes considered toxic because they contain high concentrations of heavy metals, such as cadmium (D006), lead (D008), or mercury (D009).

3.2 Nonspecific Source Wastes

Nonspecific source wastes (40 CFR 261. 31) are material-specific wastes, such as solvent wastes, electroplating wastes, or metal heat-treating wastes, commonly produced by a wide variety (non specific sources) of manufacturing and industrial processes. They are designated using an "F" in the waste code.

Some examples of nonspecific source waste are wastewater treatment sludges from electroplating operations (F006), process wastes such as distillation residues, heavy ends, tars, and reactor clean-out wastes (F024).

3.3 Specific Source Wastes

Specific source wastes (40 CFR 261.32) are wastes from specifically identified industries such as wood preserving, petroleum refining, steel mills, and organic chemical manufacturing. They are designated using a "K" in the waste code.

Some examples of specific source wastes are wastewater treatment sludge from the production of chrome yellow and orange pigments (K002), electric arc furnace dust (K061), and tar storage tank residues from coal tar refining (K147).

3.4 Discarded Commercial Chemical Products

Discarded commercial chemical products (40 CFR 261.33) are off-specification products, container residuals, spill residue runoff, or active ingredients that have spilled or are unused and intended to be discarded (designated with "P" and "U" waste codes). If the intent is to use the material or recycle it, it is not considered a hazardous waste.

Some examples of discarded commercial chemical products include: Aldicarb (P070), parathion (P089), and vinyl chloride (U043).

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Table 1
EPA Hazardous Waste Codes for Waste Accepted at US Ecology Idaho, Grand View, Idaho

Characteristic Wastes	Non-specific Source Wastes	Specific Source Wastes			Discarded Commercial Chemical Products								
					Acute Toxic Wastes			Toxic Wastes					
D001	F001	K001	K047	K124	P001	P050	P106	U001	U048	U095	U143	U189	U247
D002	F002	K002	K048	K125	P002	P051	P108	U002	U049	U096	U144	U190	U248
D003	F003	K003	K049	K126	P003	P054	P109	U003	U050	U097	U145	U191	U249
D004	F004	K004	K050	K131	P004	P057	P110	U004	U051	U098	U146	U192	U271
D005	F005	K005	K051	K132	P005	P058	P111	U005	U052	U099	U147	U193	U278
D006	F006	K006	K052	K136	P007	P059	P112	U006	U053	U101	U148	U194	U279
D007	F007	K007	K060	K141	P008	P060	P113	U007	U055	U102	U149	U196	U280
D008	F008	K008	K061	K142	P009	P062	P114	U008	U056	U103	U150	U197	U328
D009	F009	K009	K062	K143	P010	P063	P115	U009	U057	U105	U151	U200	U353
D010	F010	K010	K069	K144	P011	P064	P116	U010	U058	U106	U152	U201	U359
D011	F011	K011	K071	K145	P012	P065	P118	U011	U059	U107	U153	U202	U364
D012	F012	K013	K073	K147	P013	P066	P119	U012	U060	U108	U154	U203	U367
D013	F019	K014	K083	K148	P014	P067	P120	U014	U061	U109	U155	U204	U372
D014	F020	K015	K084	K149	P015	P068	P121	U015	U062	U110	U156	U205	U373
D015	F021	K016	K085	K150	P016	P069	P122	U016	U063	U111	U157	U206	U387
D016	F022	K017	K086	K151	P017	P070	P123	U017	U064	U112	U158	U207	U389
D017	F023	K018	K087	K156	P018	P071	P127	U018	U066	U113	U159	U208	U394
D018	F024	K019	K088	K157	P020	P072	P128	U019	U067	U114	U160	U209	U395
D019	F025	K020	K093	K158	P021	P073	P185	U020	U068	U115	U161	U210	U404
D020	F026	K021	K094	K159	P022	P074	P188	U021	U069	U116	U162	U211	U409
D021	F027	K022	K095	K161	P023	P075	P189	U022	U070	U117	U163	U213	U410
D022	F028	K023	K096	K169	P024	P076	P190	U023	U071	U118	U164	U214	U411
D023	F032	K024	K097	K170	P026	P077	P191	U024	U072	U119	U165	U215	
D024	F034	K025	K098	K171	P027	P078	P192	U025	U073	U120	U166	U216	
D025	F035	K026	K099	K172	P028	P081	P194	U026	U074	U121	U167	U217	
D026	F037	K027	K100	K174	P029	P082	P196	U027	U075	U122	U168	U218	
D027	F038	K028	K101	K175	P030	P084	P197	U028	U076	U123	U169	U219	
D028	F039	K029	K102	K176	P031	P085	P198	U029	U077	U124	U170	U220	

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Table 1
EPA Hazardous Waste Codes for Waste Accepted at US Ecology Idaho, Grand View, Idaho

Characteristic Wastes	Non-specific Source Wastes	Specific Source Wastes			Discarded Commercial Chemical Products							
					Acute Toxic Wastes			Toxic Wastes				
D029		K030	K103	K177	P033	P087	P199	U030	U078	U125	U171	U221
D030		K031	K104	K178	P034	P088	P201	U031	U079	U126	U172	U222
D031		K032	K105		P036	P089	P202	U032	U080	U127	U173	U223
D032		K033	K106		P037	P092	P203	U033	U081	U128	U174	U225
D033		K034	K107		P038	P093	P204	U034	U082	U129	U176	U226
D034		K035	K108		P039	P094	P205	U035	U083	U130	U177	U227
D035		K036	K109		P040	P095		U036	U084	U131	U178	U228
D036		K037	K110		P041	P096		U037	U085	U132	U179	U234
D037		K038	K111		P042	P097		U038	U086	U133	U180	U235
D038		K039	K112		P043	P098		U039	U087	U134	U181	U236
D039		K040	K113		P044	P099		U041	U088	U135	U182	U237
D040		K041	K114		P045	P101		U042	U089	U136	U183	U238
D041		K042	K115		P046	P102		U043	U090	U137	U184	U239
D042		K043	K116		P047	P103		U044	U091	U138	U185	U240
D043		K044	K117		P048	P104		U045	U092	U140	U186	U243
		K045	K118		P049	P105		U046	U093	U141	U187	U244
		K046	K123					U047	U094	U142	U188	U246

4.0 Scenic, Historic, Cultural and Recreational Information

> *"An application for a siting license shall include information showing harm to scenic, historic, cultural or recreational values is not substantial or can be mitigated."* (Idaho Statutes 39-5813.E)

In 1991, USEI's predecessor, Envirosafe Inc., commissioned a cultural resources clearance survey of Section 19 (see Appendix E) in support of proposed facility expansions. The survey was commissioned in order to identify and evaluate potential prehistoric or historic cultural resources within Section 19, and to protect any identified resources from potential destruction due to expanded landfill activities. The survey satisfies applicable governing Federal mandates including the Antiquities Act of 1906, the Historic Sites Act of 1935, the Historic Preservation Act (NHPA) of 1996, the National Environmental Policy Act of 1969 (NEPA), the Archeological and Historic Preservation Act of 1974 and other pertinent legislation.

One small potentially significant site was identified on the southern boundary of Section 19 where obsidian flakes were found. After reviewing the survey report, the Bureau of Land Management inspected and inventoried the site, declared that no further cultural work was necessary, and granted full cultural resource clearance for Section 19 (Appendix E).

In April of 2006, American Geotechnics issued an explanatory letter and a formal request for cultural resource guidance concerning expanded landfill operations in all of Section 19 to the Idaho State Historical Preservation Office (SHPO). The SHPO issued a response letter stating that Section 19 contained no sites eligible for the National Register of Historic Places (Appendix E). In addition, SHPO concluded that no further cultural resource investigation of Section 19 was necessary, and that landfill expansion within Section 19 may proceed without further review from the SHPO.

4.1 Parks and Reserved Lands

> *"The active portion of the facility shall not be located closer than one thousand (1000) feet from the boundary of any state or national park, or land reserved or withdrawn for scenic or natural use including, but not limited to, wild and scenic areas, national monuments, wilderness areas, historic sites, recreation areas, preserves and scenic trails."* (IDAPA 58.01.06-013.G)

In order to determine the proximity of Section 19 to reserved lands, American Geotechnics issued a formal request for information and guidance to the Idaho Department of Parks and Recreation (IDPR). In response, a letter was issued by Mr. Jeff Cook of the IDPR (Appendix F). Mr. Cook identified two reserved lands in the relative vicinity of Section 19; Bruneau Dunes State Park and the Snake River Birds of Prey National Conservation Area (SRBPNCA).

Bruneau Dunes State Park is located approximately 30 miles southeast of the US Ecology Hazardous Waste Landfill facility, well away from the required 1000 foot reserved lands buffer zone described above. The SRBPNCA occupies several miles of the Snake River and adjacent lands to the northwest of the US Ecology facility. The boundaries of the area are greater than 1000 feet from any Section 19 boundary. Mr. Cook requested that American Geotechnics contact Mr. John Sullivan for further guidance concerning possible effects expanded landfill activities within Section 19 may have on the SRBPNCA. Mr. Sullivan is the SRBPNCA manager. A summary of his response is provided in Section 4.2.

4.2 Snake River Birds of Prey National Conservation Area

American Geotechnics issued a formal request for information and guidance to Mr. John Sullivan concerning the impacts landfill construction and operation within Section 19 may have on the Snake River Birds of Prey National Conservation Area (SRBPNCA). Mr. Sullivan issued a response letter (Appendix F) requesting that a buffer zone be provided such that monitoring wells and associated access roads would not be required on Bureau of Land Management (BLM) owned lands adjacent to Section 19. In a subsequent telephone conference (Appendix F), Mr. Sullivan clarified his request, stating that access roads to monitoring wells on BLM lands could have detrimental effects by increasing access to areas near the SRBPNCA. After review, Mr. Sullivan indicated that the required 500 foot inactive buffer zone (see Section 12) would satisfy his request, as long as expanded landfill activities within Section 19 did not require monitoring wells or access roads to be constructed on BLM lands.

5.0 Transport Risk and Accident Impact

> *"An application for a siting license shall include information showing that the risk and impact of accident during transport of hazardous waste is not substantial or can be mitigated."* (Idaho Statutes 39-5813.F)

Section 19 is located within a sparsely populated region of Owyhee County Idaho. According to the 2005 census report, Owyhee County has a population density of 1.4 persons per square mile. The nearest population center to Section 19 is Grand View, Idaho, which has a population of 470 people (2005 Census Report) and is located approximately 10 miles southeast of the facility.

The two transportation routes leading to Section 19 are also located in sparsely populated areas. From Interstate 84 (I-84), the primary route to USEI's gate in Section 19 is via Simco Road which exits from I-84 approximately 20 miles northwest of Mountain Home. Idaho. Simco Road traverses primarily through agriculture lands and undeveloped lands owned by the Bureau of Land Management (BLM). A secondary route approaches USEI on State Highway 67 from Murphy, Idaho to the northwest. This route is also bounded by sparsely populated agricultural and BLM lands. The sparsely populated locations near Section 19 and routes leading to Section 19 help to minimize the risk and impact to human health due to an accident during waste transport.

With respect to environmental risk and impact, the wetlands, riparian zones, and waterways of the Snake River are particularly sensitive to waste transport accidents. Sensitive routes include bridges and roadways traveling adjacent to the river, or waterways leading to or originating from the river. Such stretches along the routes to Section 19 are minimal, occurring primarily over the bridge at Grand View, Idaho and at the Walters Ferry Bridge south of Nampa, Idaho. The SH-67 route also passes over several ephemeral and perennial streams, including Castle Creek. Overall, these sensitive areas are few and isolated along the two routes to Section 19, which helps to minimize the environmental risk and impact due to an accident during waste transport.

To further minimize the risk and impact of an accident during waste transport, each waste transporter is required to submit and adhere to a detailed accident contingency plan. Each plan is designed to minimize the risk of an accident, and to minimize the human and environmental impacts should an accident occur. The contingency plan requires all transport personnel to be trained and instructed according to Occupational Safety and Health Administration (OSHA) standards, and to receive yearly OSHA refresher courses.

Each waste transporter is trained and instructed in the general maintenance of all equipment, inspection and reporting procedures, contingency plan implementation, and operation and use of a respirator. In addition, each waste transporter is trained in emergency action, including procedures to contact emergency personnel, contain spills, protect the public, and assist police, fire department, and hazardous materials teams in identifying contaminants. Each transport vehicle must be routinely inspected to insure proper operation, and must include safety, spill control and emergency equipment. These measures are enforced to assure protection to the environment and the public to the extent possible in case of a waste transport accident. An example transportation contingency plan from Steve Forler Trucking, Inc., is shown in Appendix G.

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6.0 Impact on Local Government

"An application for a siting license shall include information showing that the impact on local government is not adverse regarding health, safety, cost and consistency with local planning and existing development or can be mitigated". (Idaho Statutes 39-5813.G)

6.1 Health and Safety

Additional landfills within Section 19 will be constructed in support of continued operations at Site B's existing facility. New landfills will be constructed and operated in a manner equal to, or similar to, current landfills. Thus, there will be no change in risk of incidents that would require local governmental services, and no significant change in operations at the site that would increase demands on local emergency response or law enforcement services.

6.2 Economic Impact

Site B is a significant source of revenue and economic vitality for Owyhee County, Elmore County, and the state of Idaho. A 2006 economic impact report commissioned by USEI (Appendix H) concluded the following:

Year 2005 direct and indirect fiscal impacts in Idaho includes:

- Provided 250 jobs
- Paid $14.8 million in payroll
- Provided $31.6 million in additional spending within Idaho
- Paid $4.75 million in taxes and fees

USEI is the largest property tax payer in Owyhee County and in the Bruneau-Grand View School District (providing approximately 15 percent of the District's total tax revenue).

USEI is Owyhee County's largest private non-agricultural employer.

The USEI average hourly wage is 39 percent higher than the average wage in Owyhee County. USEI provides full health coverage and other benefits after 30 days of hire to its employees.

7.0 Proximity to Residential Structures

> *"No new hazardous waste land disposal facility shall be sited within 5000 feet of any off-site residential structure that is routinely occupied at least 8 hours/day"*. (Idaho Hazardous Waste Management Plan: Minimum Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities Within Idaho-3A)

Figure 15 shows the residential locations in nearest proximity to Section 19, along with the required 5000 foot buffer zone associated with each residence. The 5000 foot buffer zone associated with the Hansen residence extends into the southern half of the western edge of Section 19. The area where Section 19 and the Hansen residential buffer zone overlap will be maintained as an inactive buffer area to satisfy the residential buffer zone requirement. No active cells shall be placed in this portion of Section 19.

8.0 Proximity to Schools, Airports, Hospitals, and Churches

> *"No new hazardous waste land disposal facility shall be sited within 3 miles of schools, airports, hospitals, churches"*. (Idaho Hazardous Waste Management Plan: Minimum Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities Within Idaho-3B)

8.1 Area Schools

A list of public and private schools in the vicinity of Section 19 is provided in Appendix I. Each school was located using current phone directory and internet resources. Distances were estimated using aerial photographs. The school nearest to Section 19 is the Grand View Elementary School, located approximately 10 miles from Section 19.

8.2 Area Airports

Figure 16 shows a satellite photograph of Site B and the distance to the nearest Federal Aviation Administration (FAA) registered airports and the Mountain Home Air Force Base. The nearest FAA registered runway is located in Murphy, Idaho, approximately 18 miles from Section 19. The nearest turbofan jet airport is located at the Mountain Home Air Force Base, approximately 20 miles from Section 19. The FAA registered airports were located through a telephone inquiry with FAA personnel. Section 19 is outside the required proximity limits to airports.

8.3 Area Hospitals

A list of hospitals in the vicinity of Section 19 is provided in Appendix I. The hospitals were located using current phone directories and internet resources. Distances were estimated using aerial photographs. The medical center nearest to Section 19 is located on the Mountain Home Air Force Base, at a distance of approximately 20.5 miles. The nearest public hospital is located in Mountain Home, Idaho, at a distance of approximately 29.6 miles.

8.4 Area Churches

A list of churches in the vicinity of Section 19 is provided in Appendix I. The churches were located using current phone directories and internet resources. Distances were estimated using aerial photographs. The church nearest to Section 19 is located in Grand View, Idaho at a distance of approximately 10.3 miles.

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9.0 Proximity to Population Centers

> "*No new hazardous waste land disposal facility shall be sited within 3 miles from a population center greater than 150 people*". (Idaho Hazardous Waste Management Plan: Minimum Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities Within Idaho-3C)

As shown in Figure 1, Section 19 is not located within 3 miles of any population center greater than 150 people. The nearest existing population center greater than 150 people is Grand View, Idaho, located approximately 10 miles southeast of Section 19 on Hwy 78. Base on the distances cited above, siting a landfill in Section 19 will not present hazard to a population center.

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10.0 Endangered or Threatened Species

> *"The facility shall not cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife or result in the destruction or adverse modification of the critical habitat of endangered or threatened species as identified in 50 CFR Part 17".* (IDAPA 58.01.05-013.B)

In accordance with the Endangered Species Act of 1973, American Geotechnics issued a formal request to the United States Fish and Wildlife Service (USFWS) to determine the existence and status of any endangered, threatened, proposed endangered, or otherwise protected species that may be affected by hazardous waste landfill operations within Section 19. A response letter was issued by the USFWS (Appendix J) indicating that our request for information satisfied the requirements for obtaining an official list of species as required by the Endangered Species Act, Section 7(c).

In addition to providing an official list of endangered, threatened, and proposed species that may exist within Section 19, the USFWS response letter provides information and guidelines concerning formal consultations with the USFWS should these species be located.

The protected species listed by the USFWS include:

- Snake River Physa snail (Physa natricina) — Listed Endangered
- Idaho Springsnail (Pyrgulopsis idahoensis) — Listed Endangered
- Utah Valvata (Valvata utahensis) — Listed Endangered
- Bliss Rapids snail (Taylorconcha serpenticola) — Listed Threatened
- Slickspot Peppergrass (Lepidium papilliferum) — Proposed Endangered

American Geotechnics issued a formal request to the Idaho Fish and Game Department (IDFG) to determine the status of these protected species within Section 19. After review, the IDFG department issued a response letter (Appendix J) concluding that no federally listed endangered or threatened species were located on, or near, Section 19. In addition, the letter provided information concerning the likelihood of Slickspot Peppergrass existing within Section 19, concluding that the habitat necessary to support Slickspot Peppergrass does not exist within Section 19. The IDFG department arrived at this conclusion from personal experience and after consultation with the lead botanist at the Idaho

Conservation Data Center (Mr. Michael Mancuso). Based on the low likelihood of Slickspot Peppergrass existing within Section 19, the IDFGD stated that a rare plant survey to locate Slickspot Peppergrass in Section 19 was not warranted. Therefore, a rare plant survey to locate Slickspot Peppergrass was not conducted for this siting application.

Appendix J also includes a letter from Rebecca Thompson, a wildlife biologist, discussing the habitat necessary for each of the endangered snails listed by the USFWS above, and the possibility that such habitat exists within Section 19. As stated by Ms. Thompson, each of these snails exists within river waters, and no such habitat is provided within Section 19. Therefore, the probability of any of listed endangered snails existing within Section 19 is low.

In addition to federally listed species, several Bureau of Land Management (BLM) sensitive plant species are known to exist within Section 19 (Appendix J). These species include:

- Desert Pincushion (*Chaenactis stevioides*)
- Spreading Gelia (*Ipomopsis polycladon*)
- White-Margined Xax plant (*Glyptopleura marginata*)

The IDFG department provided remarks and guidance concerning each of these species, indicating that the exact location of these plants varies from year to year. The ability of these plants to relocate and the existence of seed sources on properties adjacent to Section 19, allows each of these plants to recolonize after any disturbance. Thus, the IDFG department stated that a rare plant survey to locate BLM sensitive plants was not warranted. Accordingly, no rare plant survey for these species was conducted for this siting application.

11.0 Wetlands

The USACE regulates all activities associated with waters of the United States, including wetlands. In particular, USACE administers Section 404 of the Clean Water Act, which requires a Department of the Army permit to be obtained for any operation releasing or discharging fill material into waters of the United States. American Geotechnics issued a formal inquiry to the USACE to determine whether hazardous waste landfill activities within Section 19 would adversely affect Castle Creek, or any other waterways under the jurisdiction of the USACE. After review, USACE issued a response letter (Appendix K) concluding that landfill activities within Section 19 would not involve areas under USACE jurisdiction, and that a permit under Section 404 of the Clean Water Act would not be required.

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12.0 Inactive Buffer Zone

"An area of at least 500 feet surrounding the "active" (disposal location) portion of the site shall be provided as an inactive buffer zone." (Idaho Hazardous Waste Management Plan: Minimum Technical Siting Criteria for Commercial Hazardous Waste Land Disposal Facilities Within Idaho-4)

"The active portion of a facility shall not be located closer than one hundred (100) feet to the property line." (IDAPA 58.01.06-013.F)

Figure 2 displays the USEI property and Section 19 boundaries. The 500 foot inactive buffer zones shall be maintained from the Section 19 boundary lines to the west and south. All of the USEI property within Section 18 shall be maintained as an inactive buffer zone, which will satisfy the 500 foot northern inactive buffer zone requirement. Thus, active cells may be placed up to the boundary of Section 19 to the north. The inactive buffer zone to the west is controlled by the western USEI property boundary. A 500 foot inactive buffer zone shall be maintained along the north and south legs of the western boundary as shown. Active cells may be constructed up to the western boundary of Section 19 where the USEI property boundary extends into Section 20 as shown.

13.0 Composite Buffer Zone Map

Figure 17 displays the composite buffer zone requirements for Section 19 given the location of Castle Creek, the current USEI property boundaries, and the current residential locations. This siting application applies to all of Section 19. No active cells shall be placed in required buffer zones within Section 19. At present, there are two permanent buffer zones: the Castle Creek waterway buffer zone and the Bureau of Land Management (BLM) No-Waste Agreement buffer zone. With respect to land within Section 19, the Castle Creek waterway buffer zone is the only permanent buffer zone.

Non-permanent buffer zones within Section 19 include the 500 foot inactive buffer zone and the residential buffer zone corresponding to the Hansen residence as discussed in Section 7.0. The buffer zones are considered non-permanent because the boundaries defining these zones can potentially be relocated while satisfying regulatory requirements. For instance, should USEI acquire land adjacent to Section 19 to satisfy the inactive buffer zone requirements, active cells could be placed up to the boundary of Section 19. In addition, the residential buffer zone requirement within Section 19 could potentially be removed by USEI acquiring the existing Hansen residence.

In short, this siting application applies to all of Section 19. With regard to buffer zones, active cells may be constructed in any area of Section 19, as long as the buffer zone requirements are satisfied. The only permanent buffer zone within Section 19 is the Castle Creek waterway buffer, which extends into the northwest corner of Section 19, covering approximately 40 acres.

14.0 Summary

In summary, it is American Geotechnics' opinion that Section 19 exceeds the minimum physical requirements for siting hazardous waste landfills. No physical features or conditions were identified that are believed to compromise the integrity of a landfill within Section 19 within the prescribed boundaries herein.

Prior to obtaining a waste permit, the landfill shall be designed to meet the minimum Federal and State design and construction standards for a RCRA Subtitle C Hazardous Waste Landfill.

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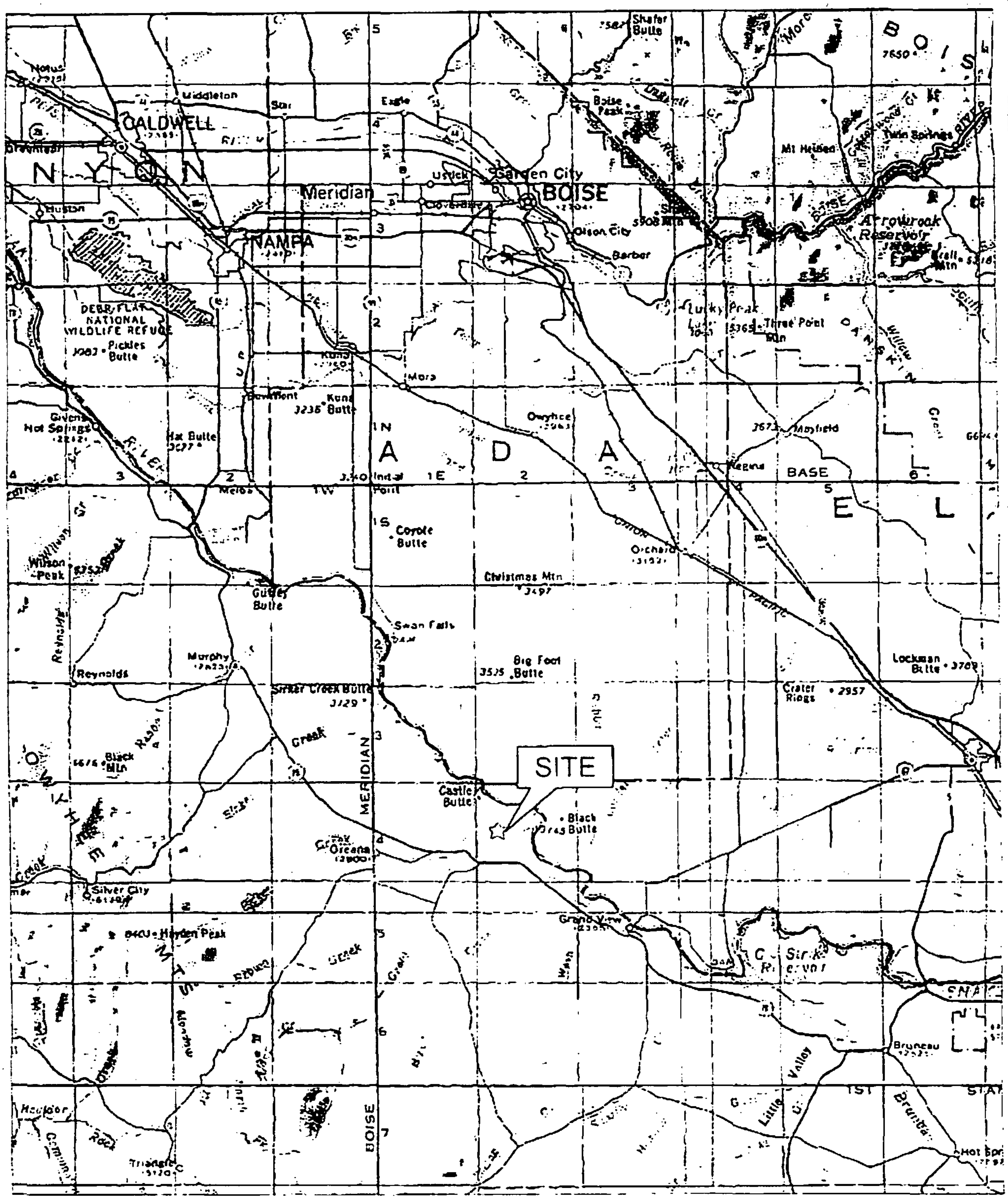
APPENDIX A

FIGURES

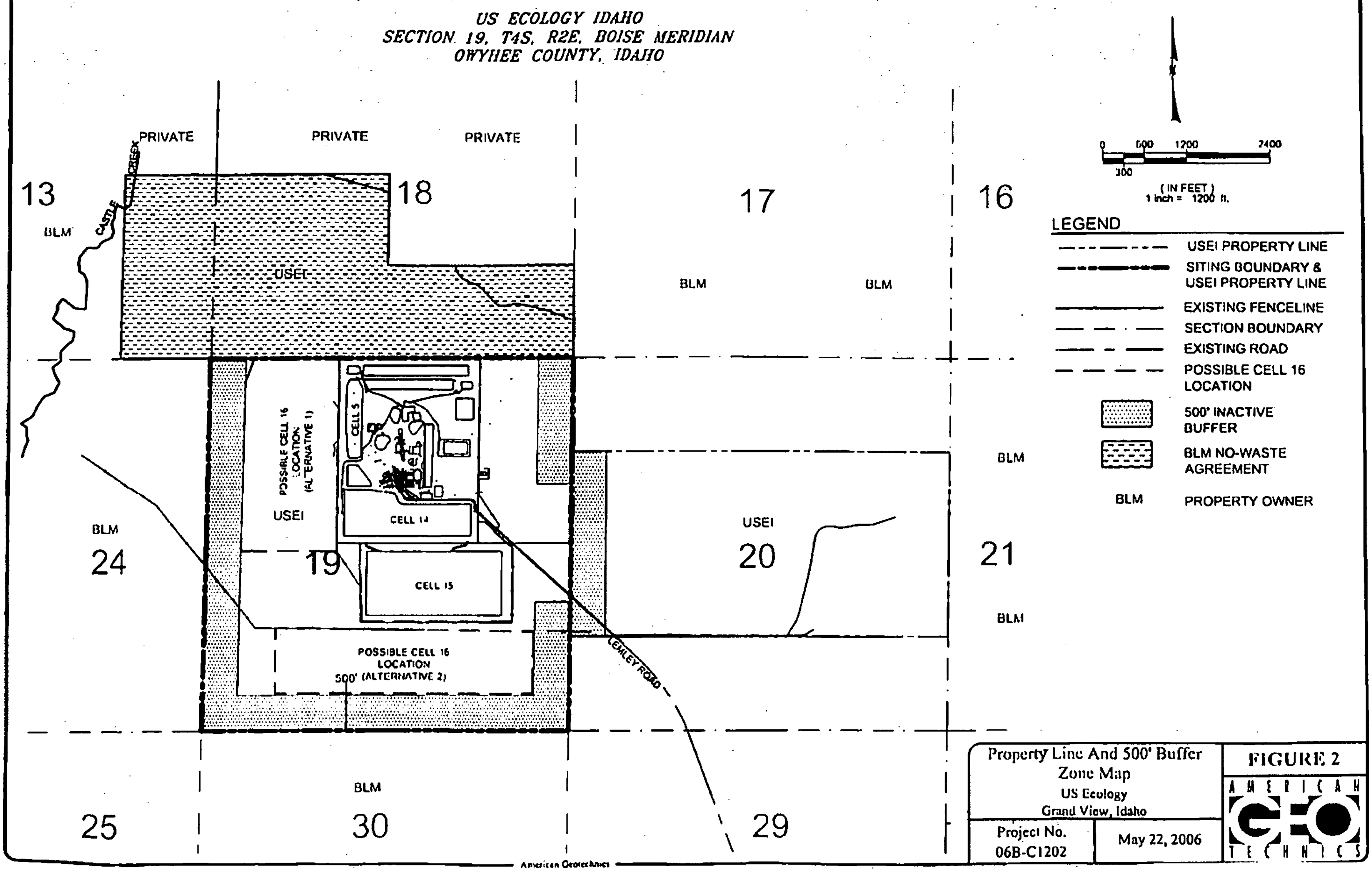


VICINITY MAP
USEI-Cell 15 Phase II
Grand View, Idaho

FIGURE 1

Project No.	Date:
06B-C1201	June, 2006

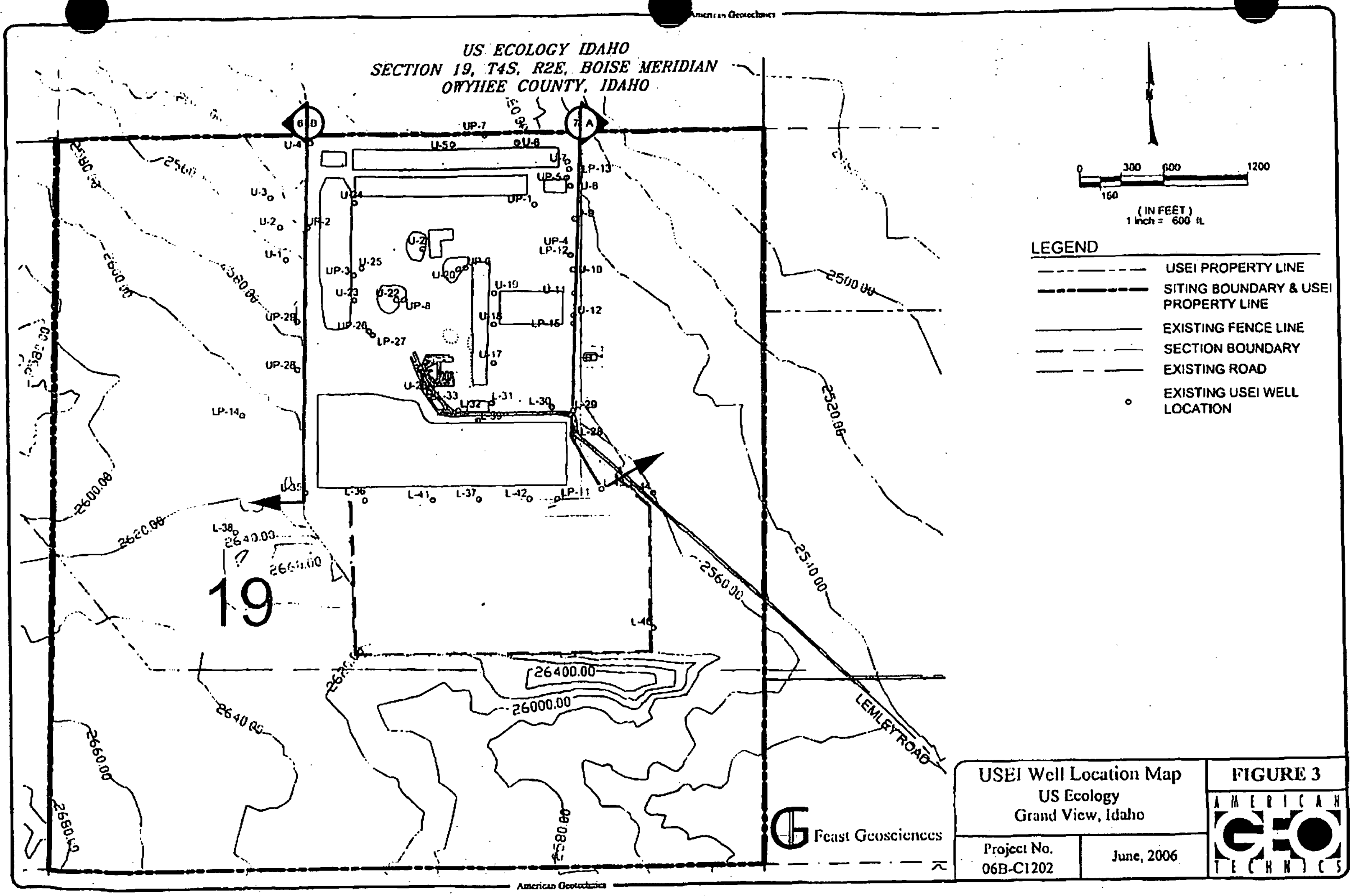
AMERICAN GEO TECHNICS

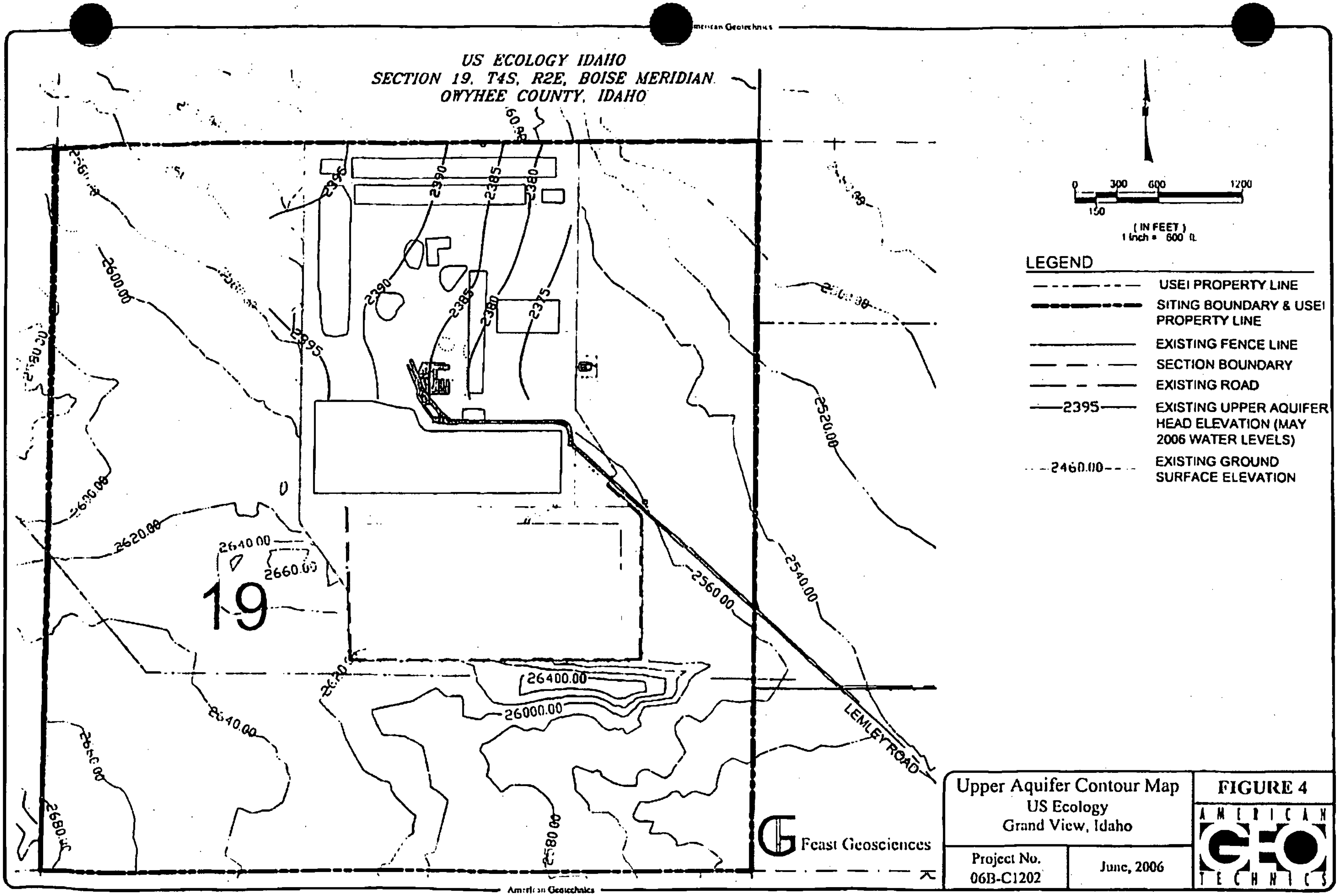


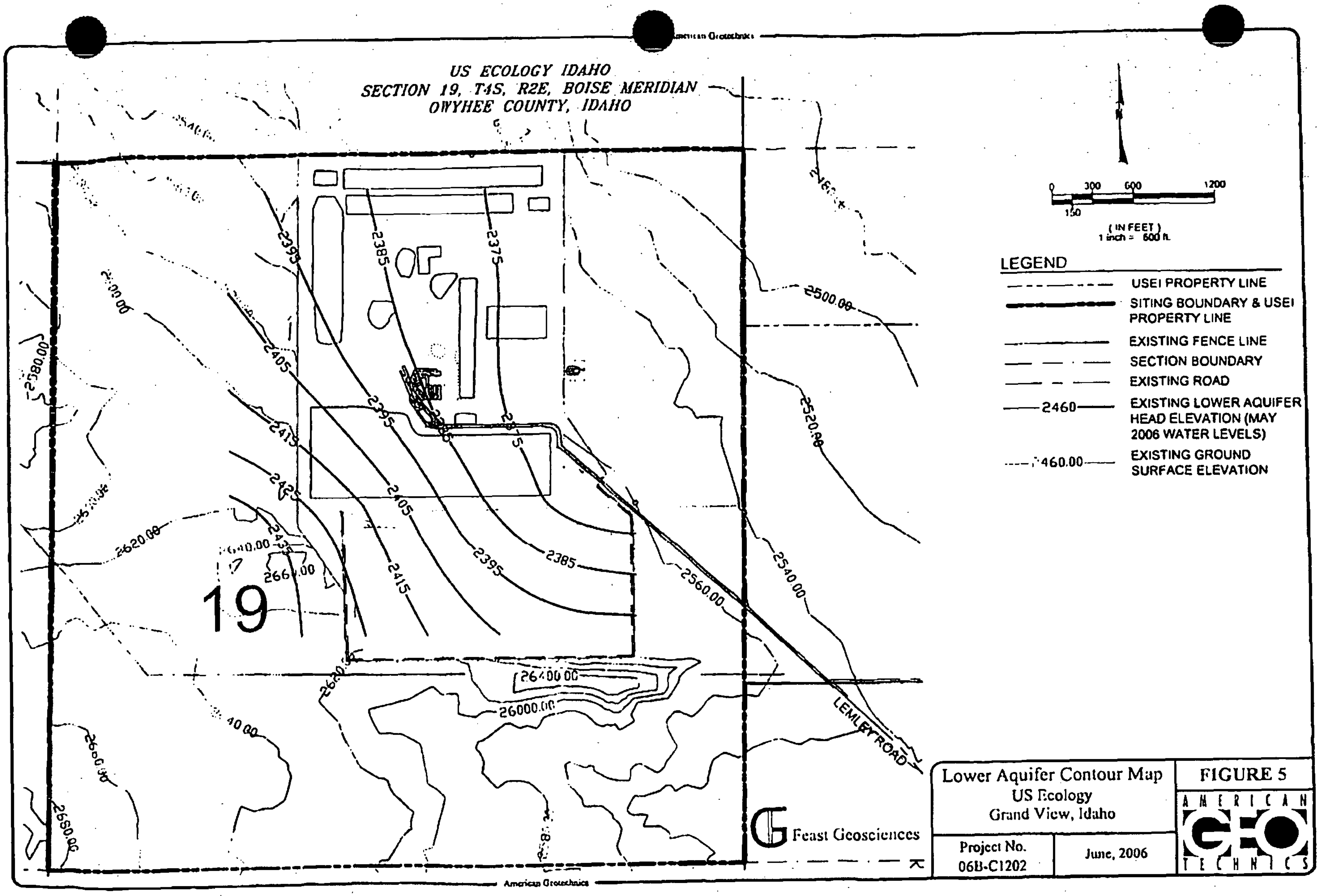
Property Line And 500' Buffer Zone Map
US Ecology
Grand View, Idaho

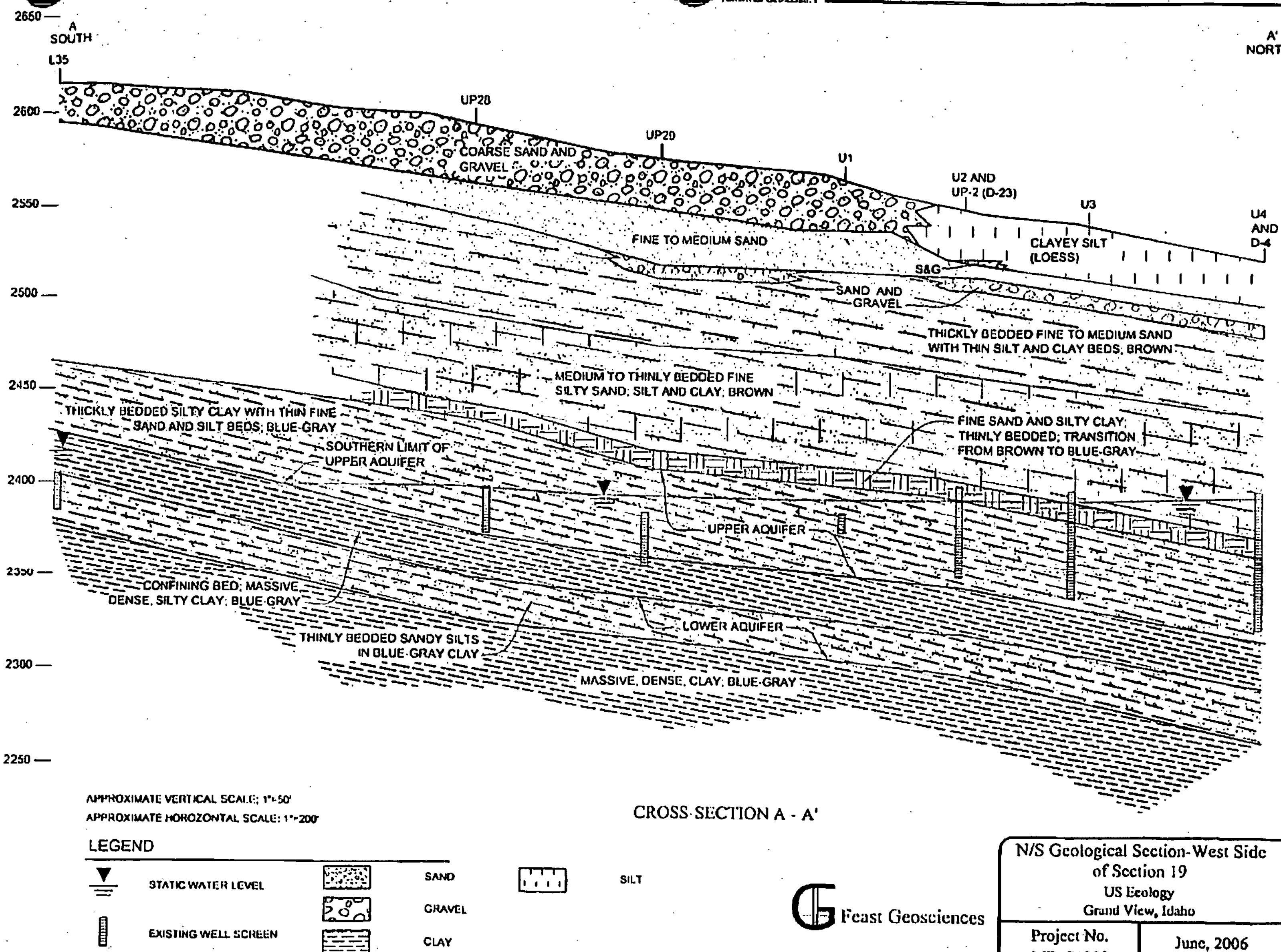
Project No. 06B-C1202	May 22, 2006	FIGURE 2

AMERICAN GEOTECHNICS


US ECOLOGY IDAHO
SECTION 19, T4S, R2E, BOISE MERIDIAN
OWYHEE COUNTY, IDAHO
American Geotechnics
19
LEMLEY ROAD
0 300 600 1200
150
(IN FEET)
1 inch = 600 ft.
LEGEND
USEI PROPERTY LINE
SITING BOUNDARY & USEI PROPERTY LINE
EXISTING FENCE LINE
SECTION BOUNDARY
EXISTING ROAD
EXISTING USEI WELL LOCATION
Feast Geosciences
USEI Well Location Map
US Ecology
Grand View, Idaho
Project No.
06B-C1202
June, 2006
FIGURE 3
AMERICAN GEO TECHNICS


US ECOLOGY IDAHO
SECTION 19, T4S, R2E, BOISE MERIDIAN
OWYHEE COUNTY, IDAHO
0
300
600
1200
150
(IN FEET)
1 inch = 600 ft.
LEGEND
USEI PROPERTY LINE
SITING BOUNDARY & USEI PROPERTY LINE
EXISTING FENCE LINE
SECTION BOUNDARY
EXISTING ROAD
2395
EXISTING UPPER AQUIFER HEAD ELEVATION (MAY 2006 WATER LEVELS)
2460.00
EXISTING GROUND SURFACE ELEVATION
19
LEMLEY ROAD
Feast Geosciences
Upper Aquifer Contour Map
US Ecology
Grand View, Idaho
Project No.
06B-C1202
June, 2006
FIGURE 4
AMERICAN GEO TECHNICS
American Geotechnics

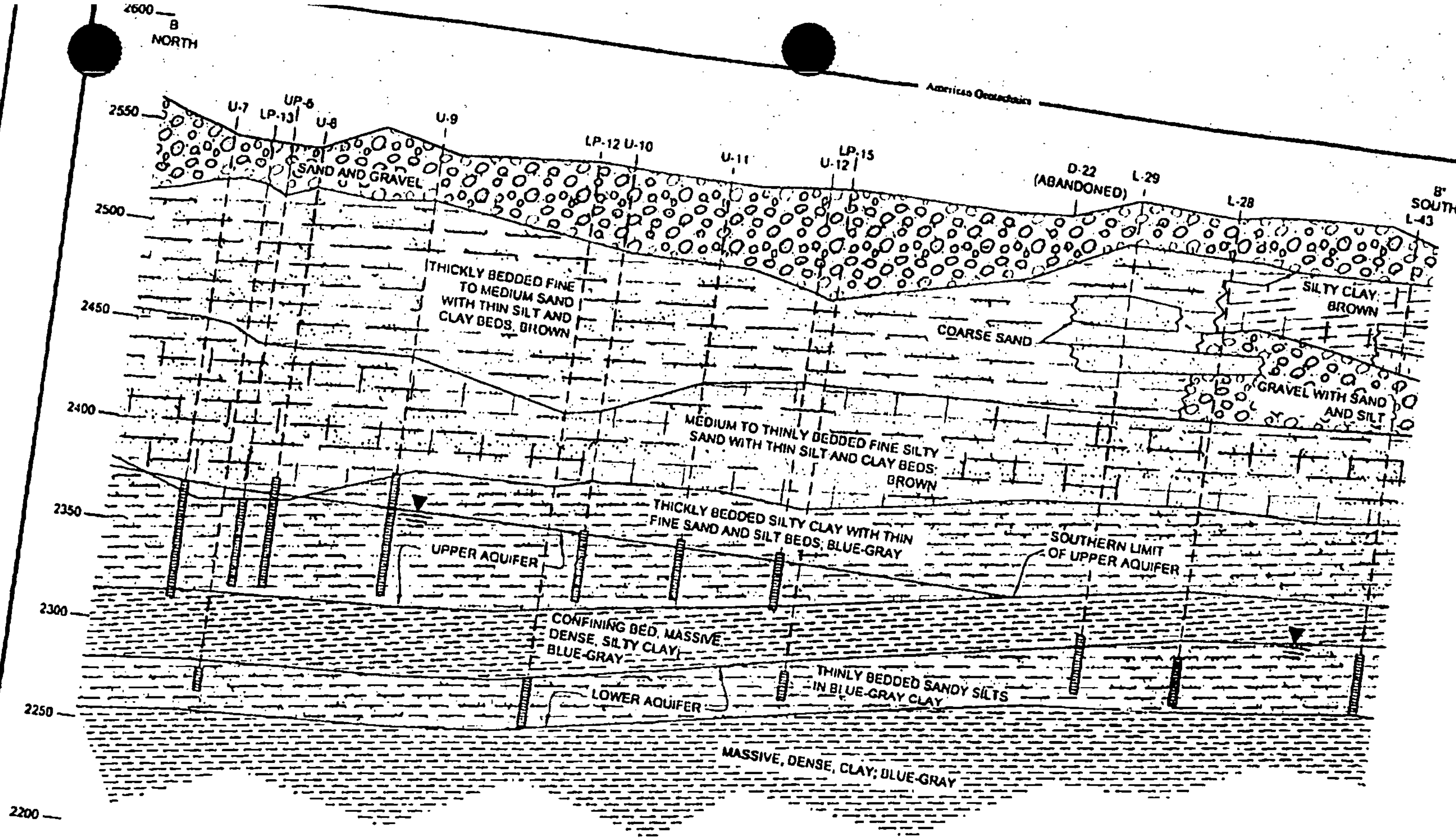

US ECOLOGY IDAHO
SECTION 19, T4S, R2E, BOISE MERIDIAN
OWYHEE COUNTY, IDAHO
0 150 300 600 1200
(IN FEET)
1 inch = 600 ft.
LEGEND
USEI PROPERTY LINE
SITING BOUNDARY & USEI PROPERTY LINE
EXISTING FENCE LINE
SECTION BOUNDARY
EXISTING ROAD
2460
EXISTING LOWER AQUIFER HEAD ELEVATION (MAY 2006 WATER LEVELS)
2460.00
EXISTING GROUND SURFACE ELEVATION
2395
2385
2375
2405
2415
2425
2500.00
2520.00
2540.00
2560.00
2580.00
2620.00
2640.00
2660.00
26400.00
26000.00
2680.00
19
LEMLEY ROAD
Feast Geosciences
Lower Aquifer Contour Map
US Ecology
Grand View, Idaho
Project No.
06B-C1202
June, 2006
FIGURE 5
AMERICAN GEO TECHNICS
American Geotechnics



CROSS-SECTION A - A'

Feast Geosciences

N/S Geological Section-West Side of Section 19 US Ecology Grand View, Idaho		FIGURE 6
Project No. 06B-C1202	June, 2006	AMERICAN GEO TECHNICS



APPROXIMATE VERTICAL SCALE: 1"=50'
APPROXIMATE HOROZONTAL SCALE: 1"=200'

CROSS-SECTION B - B'

LEGEND

STATIC WATER LEVEL

EXISTING WELL SCREEN

SAND

GRAVEL

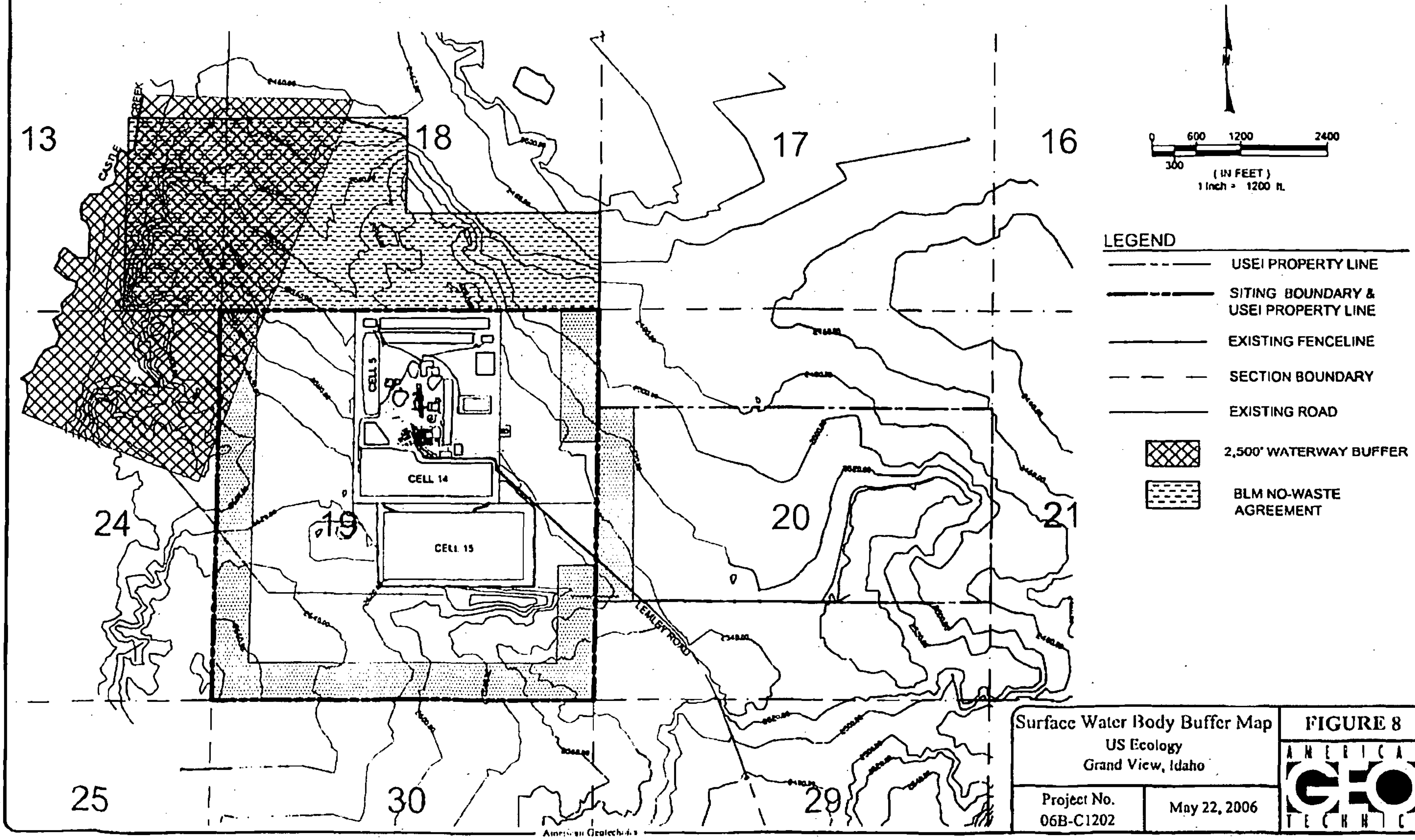
CLAY

SILT

Feast Geosciences

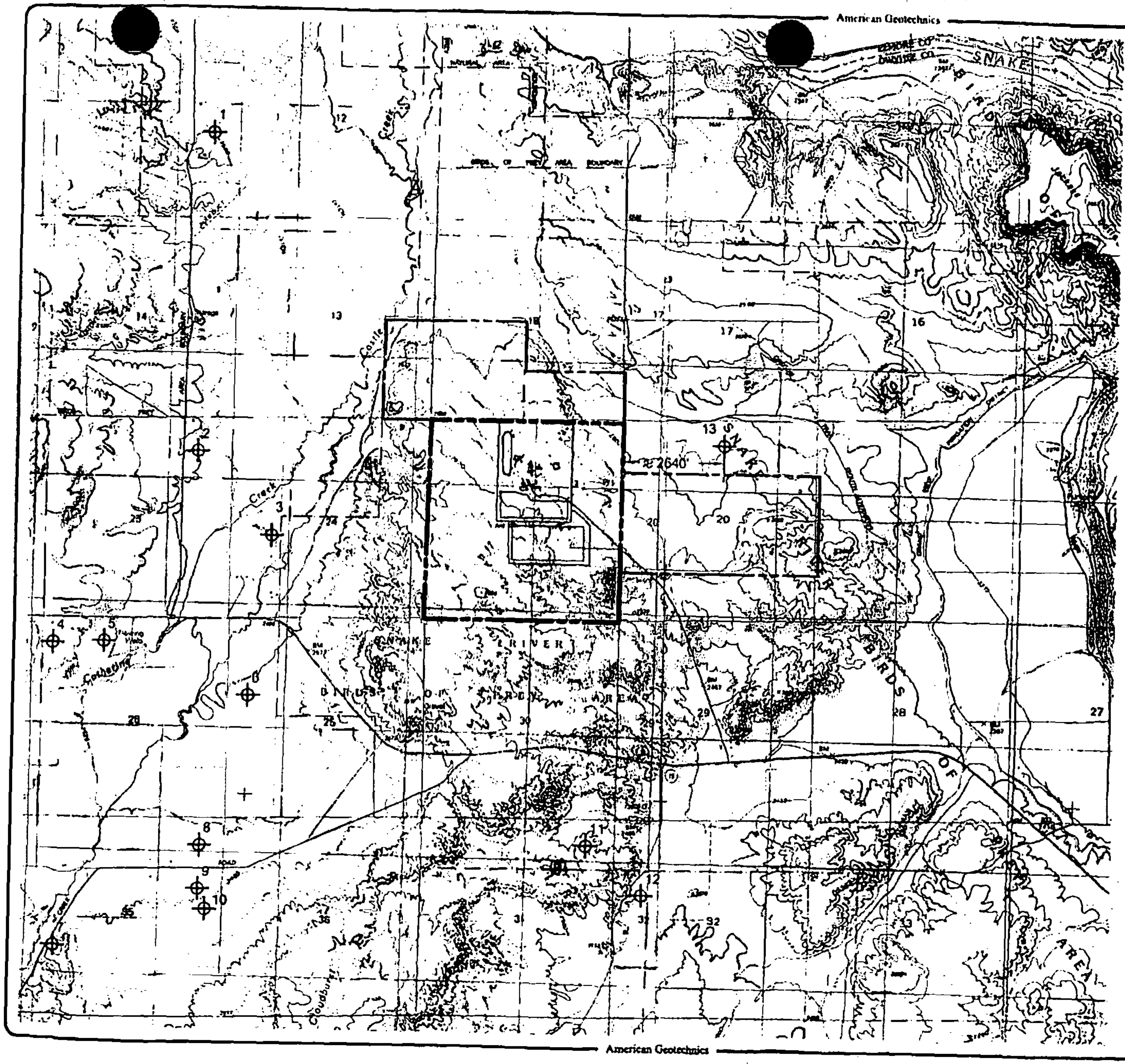
N/S Geological Section-East Side of Section 19 US Ecology Grand View, Idaho		FIGURE 7
Project No. 06B-C1202	June, 2006	AMERICAN GEO TECHNICS

US ECOLOGY IDAHO
SECTION 19, T4S, R2E, BOISE MERIDIAN
OWYHEE COUNTY, IDAHO



Surface Water Body Buffer Map US Ecology Grand View, Idaho	FIGURE 8
Project No. 06B-C1202	May 22, 2006

AMERICAN GEO TECHNICS



0 0.5 MILE 1 MILE

1 inch = 0.5 MILES

LEGEND

- EXISTING WELL LOCATION
- US ECOLOGY PROPERTY LINE
- SITING BOUNDARY & USEI PROPERTY LINE

INDEX OF WELL LOGS

WELL LOG NO.	TOTAL DEPTH (FEET)	USE	DATE DRILLED
1	1,115	D	11/4/1988
2	600	D	12/25/1969
3	200	S	10/20/1992
4	650	D	12/31/1999
5	840	S	1/30/1993
6	600	D	2/2/2004
7	85	I	9/12/1966
8	680	D	6/5/2002
9	460	D	7/20/2002
10	710	D	6/10/2004
11	28	D	3/19/1980
12	420	D	4/1/1987
13	73	D	11/20/1996

NOTES
- D = DOMESTIC
- I = IRRIGATION
- S = STOCK WATER

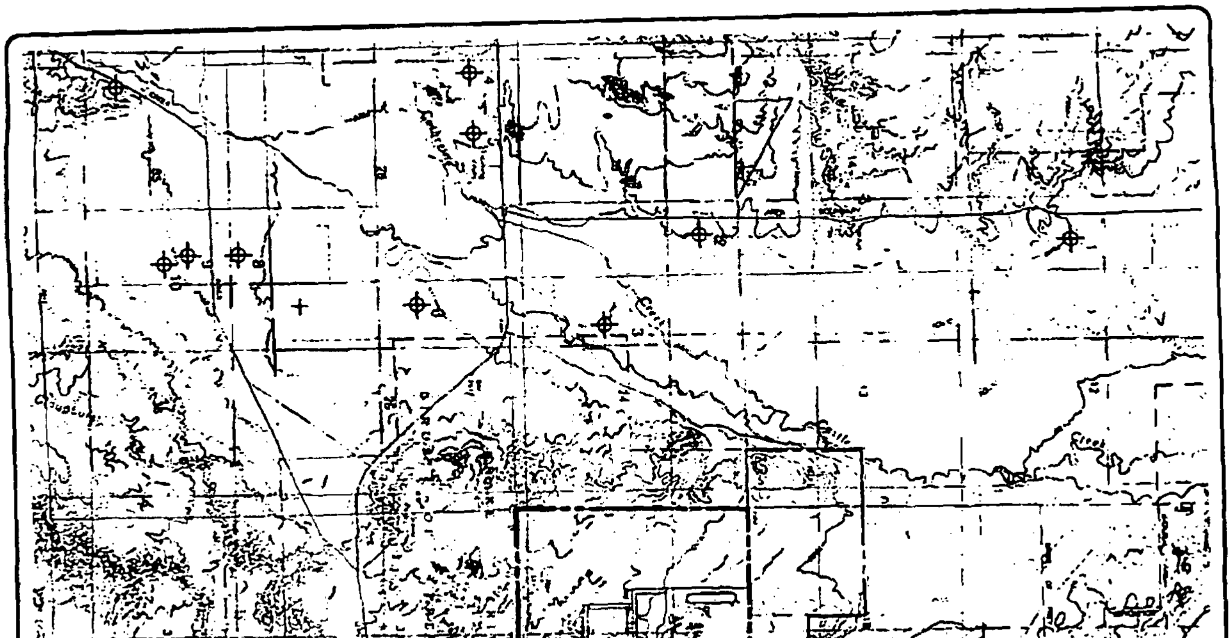
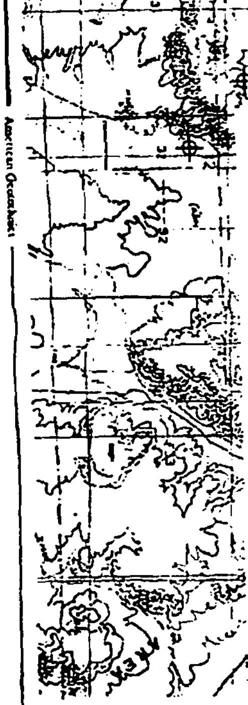
Existing Surrounding Well Location Map

US Ecology
Grand View, Idaho

FIGURE 9

AMERICAN GEO TECHNICS

Project No. 06B-C1202	May 22, 2006

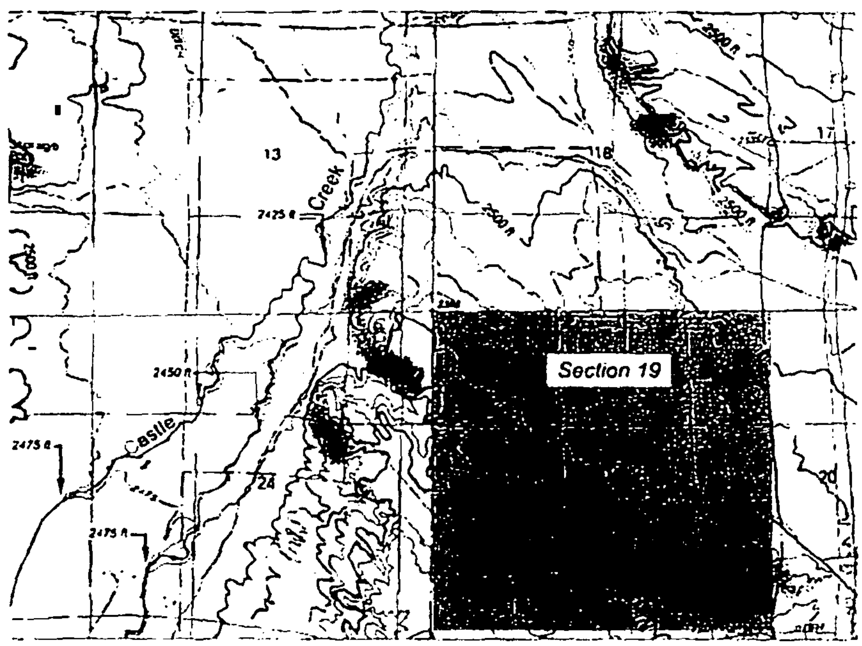
Existing Surrounding Well Location Map
US Ecology
Grand View, Idaho

Project No. 06B-C1202	May 22, 2006

FIGURE 9

AMERICAN GEO TECHNICS

American Geotechnics

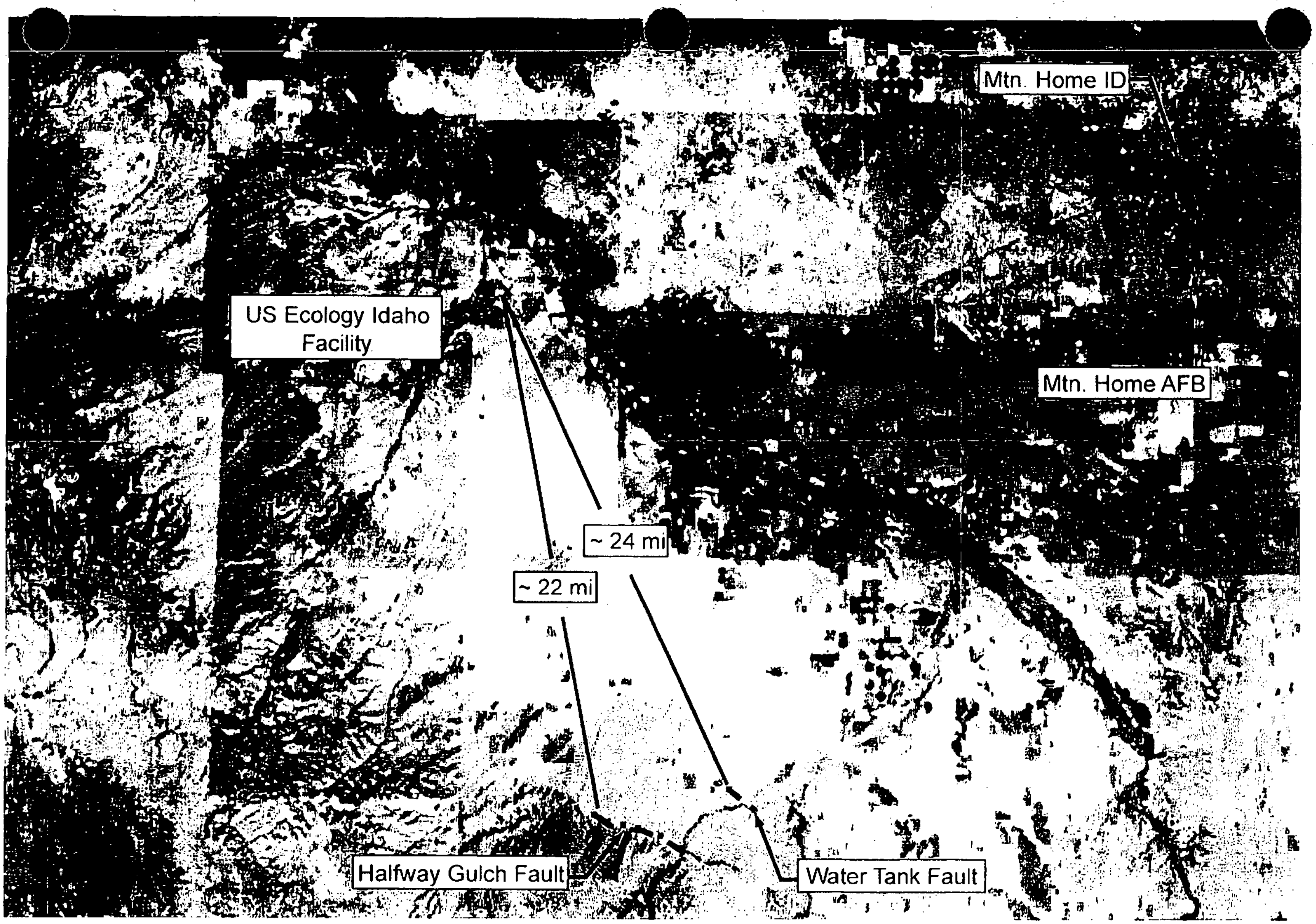


Castle Creek and Section 19 Elevations
US Ecology
Grand View, Idaho

Project No. 06B-C1202	June, 2006

FIGURE 10

AMERICAN GEO

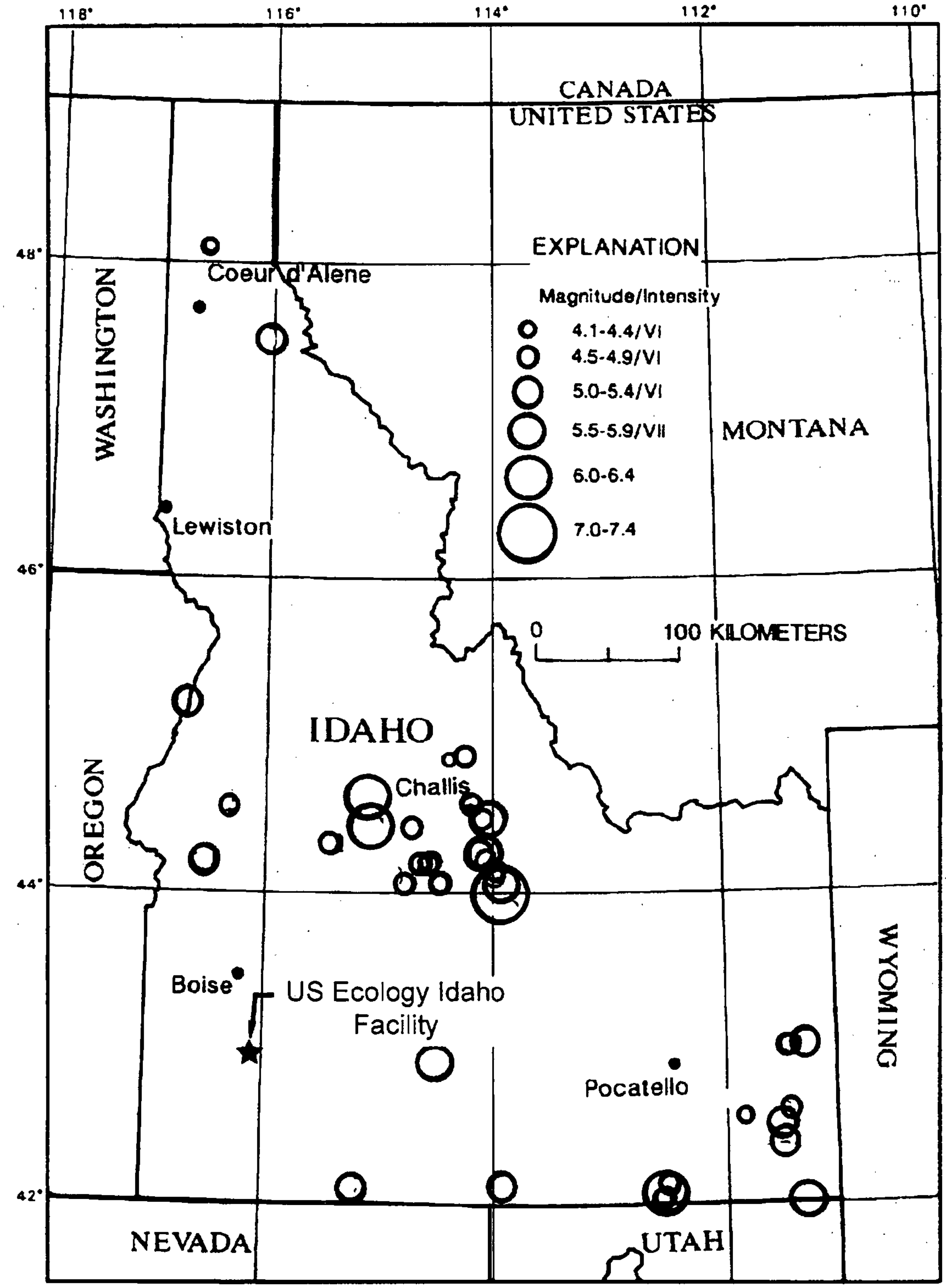


DISTANCES TO FAULTS ACTIVE DURING THE HOLOCENE EPOCH
US Ecology
Grand View, Idaho

Project No. 06B-C1202	March, 2006

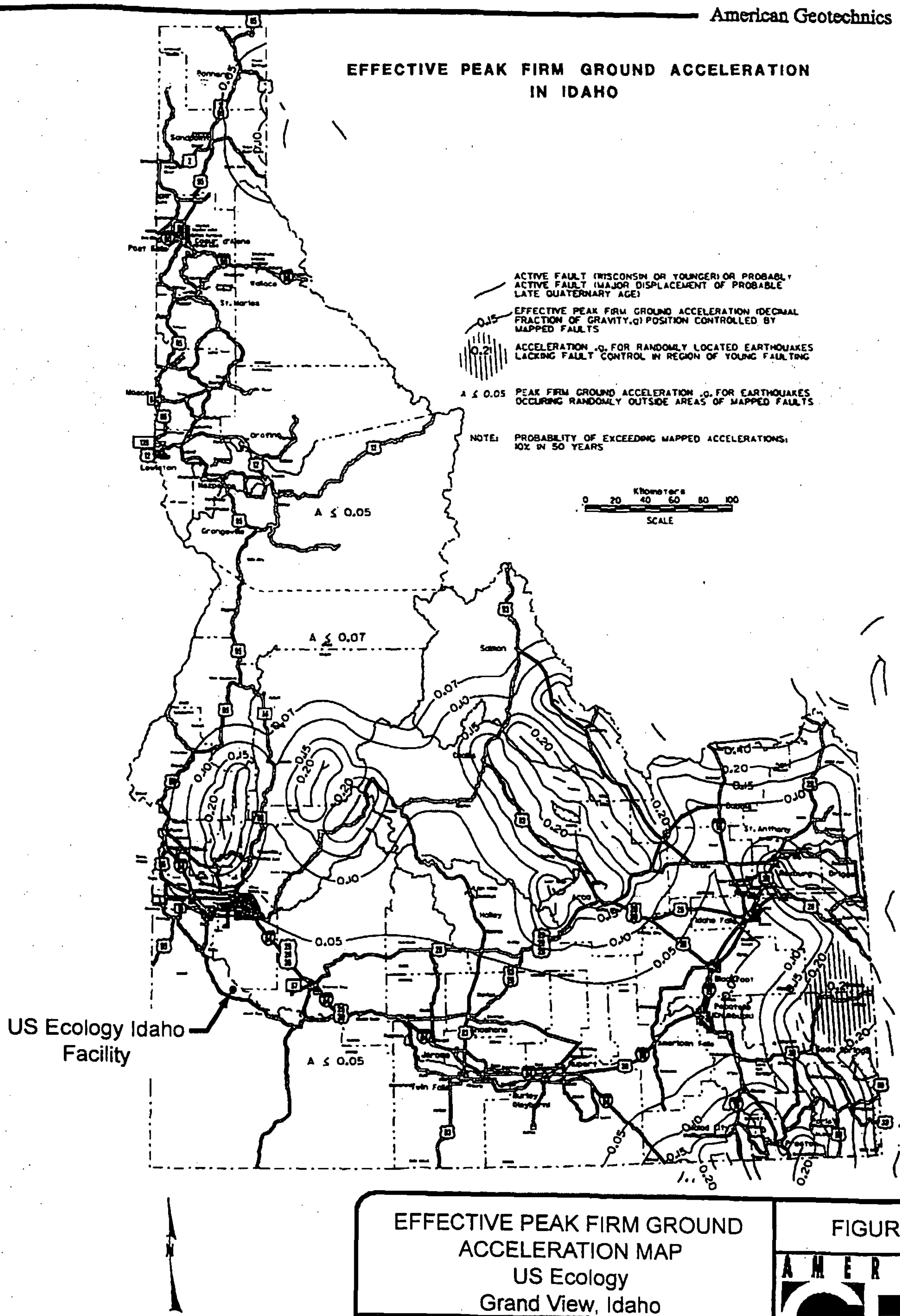
FIGURE 11

AMERICAN GEO TECHNICS

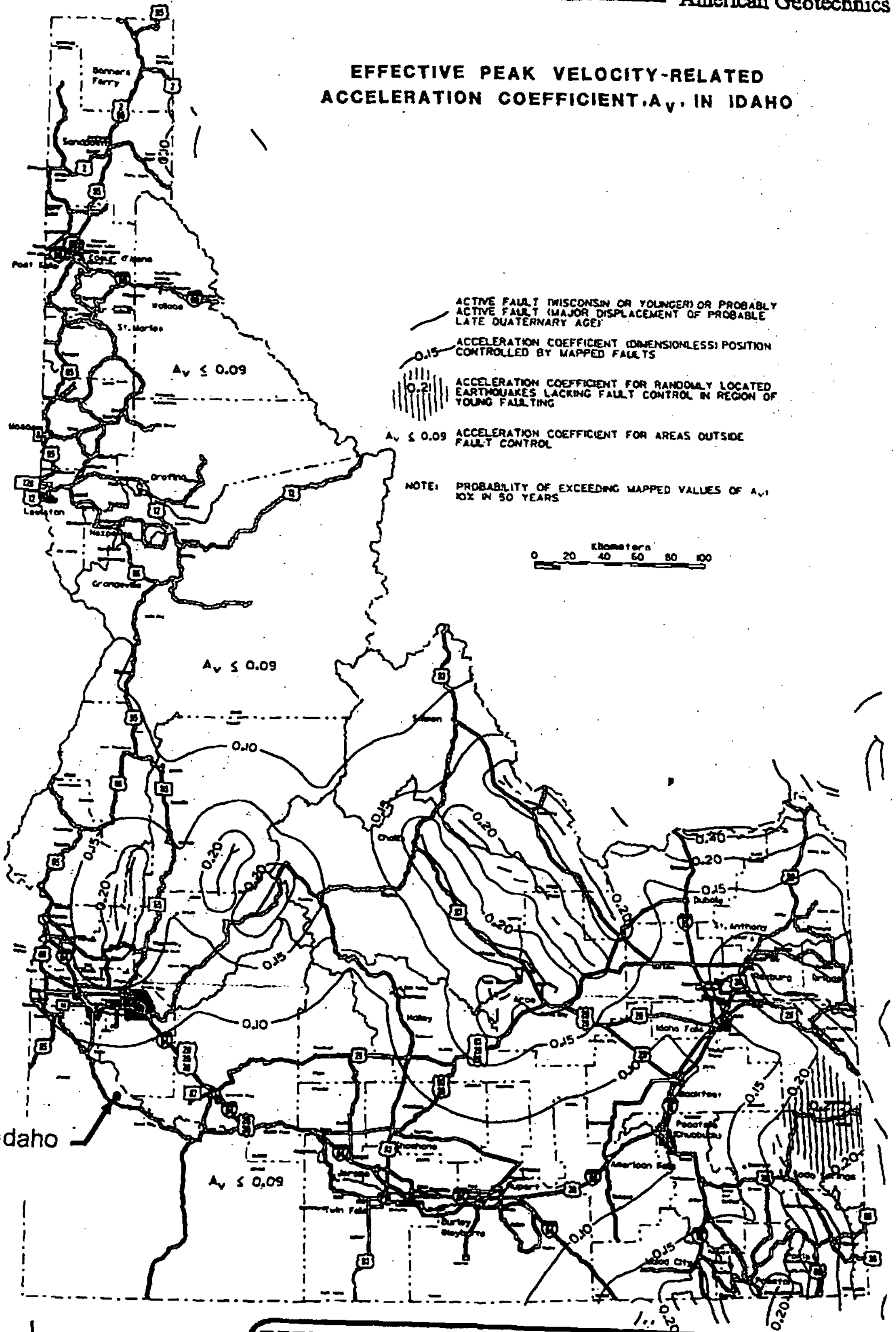


Earthquakes in Idaho with magnitudes ≥ 4.5 or intensity ≥ VI.

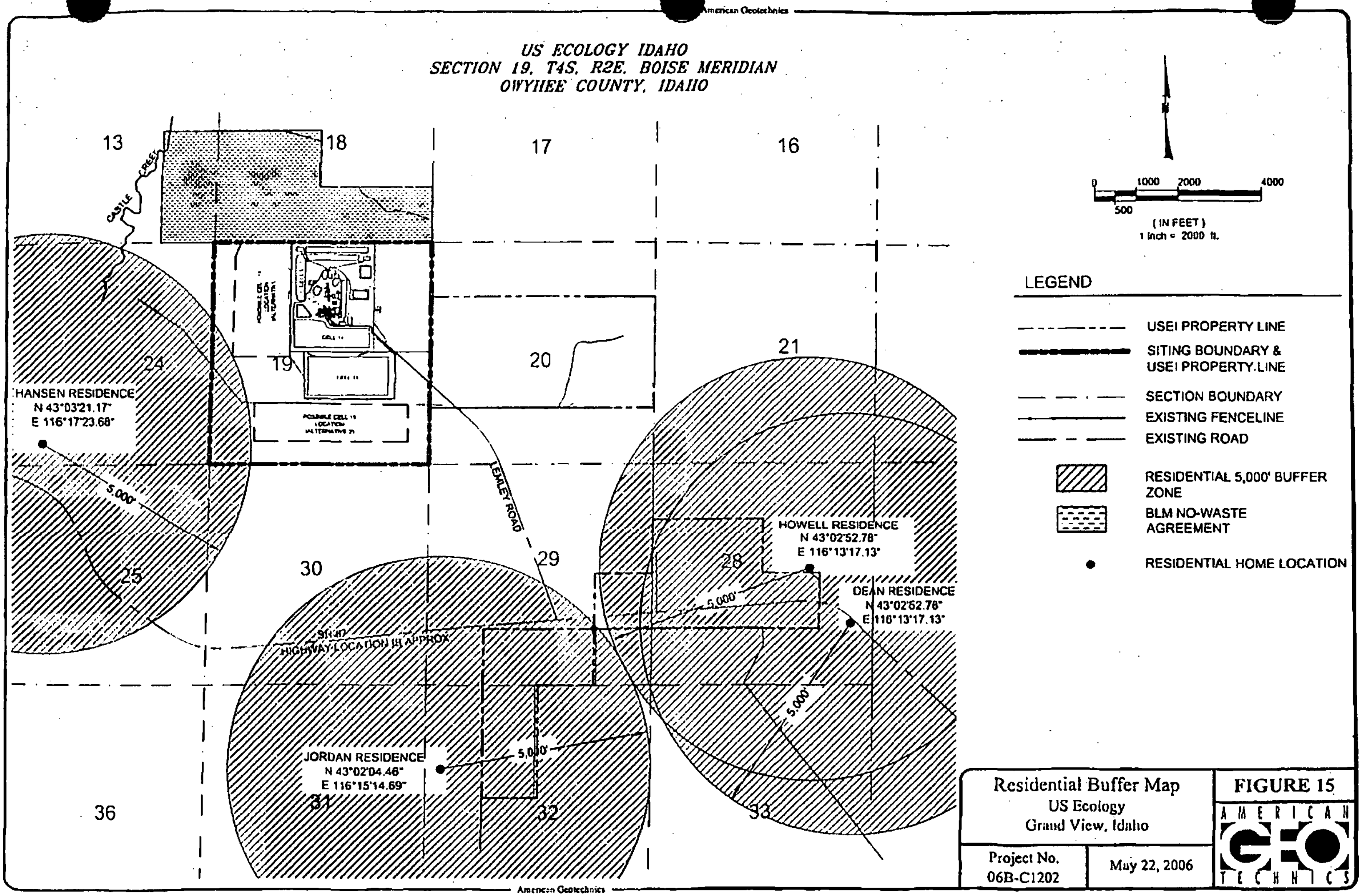
IDAHO HISTORICAL EARTHQUAKE MAP - 1880 TO PRESENT US Ecology Idaho Grand View, ID		FIGURE 12
Project No. 06B-C1202	April, 2006	AMERICAN GEOTECHNICS



EFFECTIVE PEAK FIRM GROUND ACCELERATION MAP US Ecology Grand View, Idaho	FIGURE 13
Project No. 06B-C1202 / March, 2006	AMERICAN GEO TECHNICS



EFFECTIVE PEAK VELOCITY-RELATED ACCELERATION COEFFICIENT US Ecology Grand View, Idaho		FIGURE 14
Project No. 06B-C1202	March, 2006	AMERICAN GEO TECHNICS

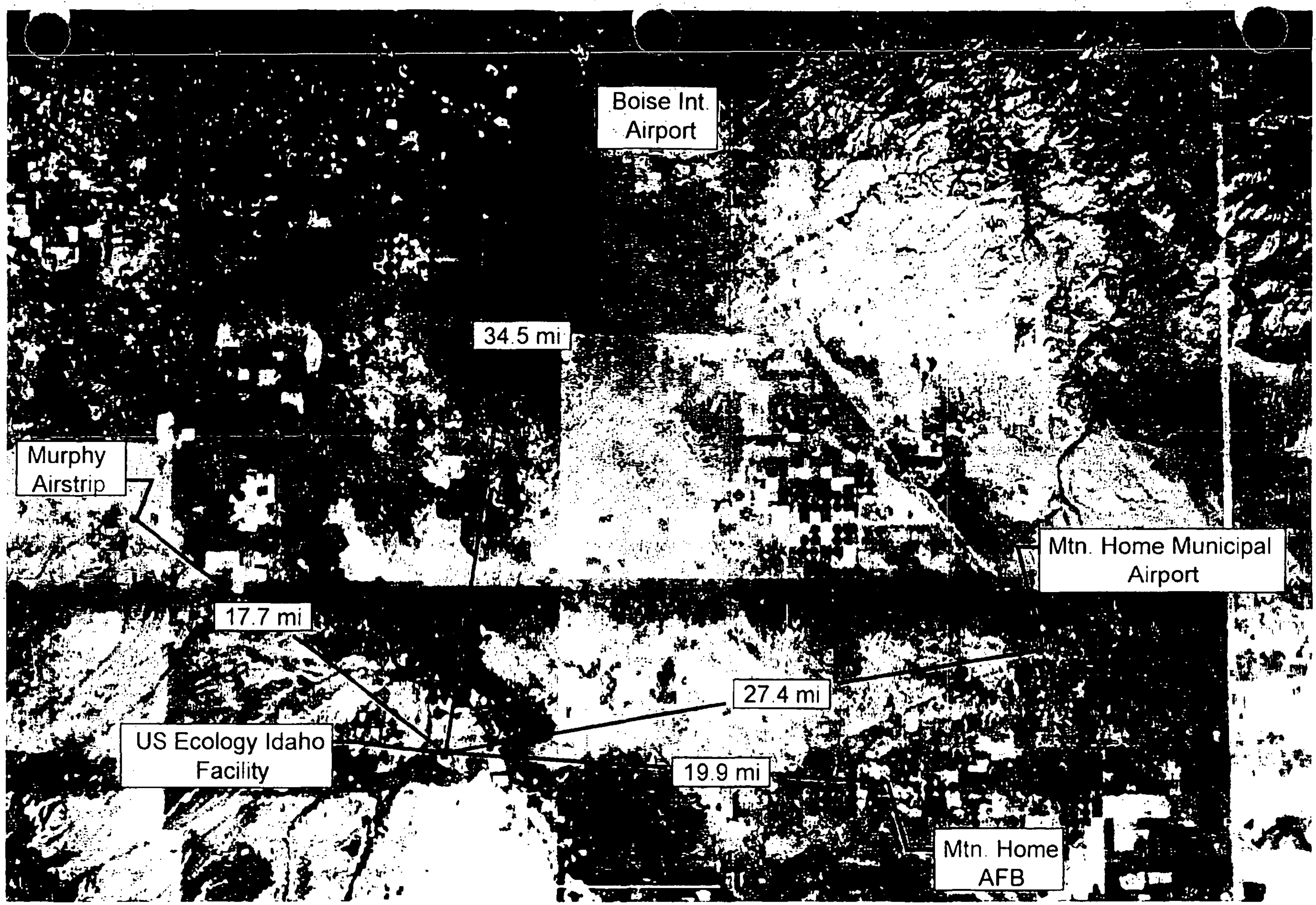


Residential Buffer Map
US Ecology
Grand View, Idaho

FIGURE 15

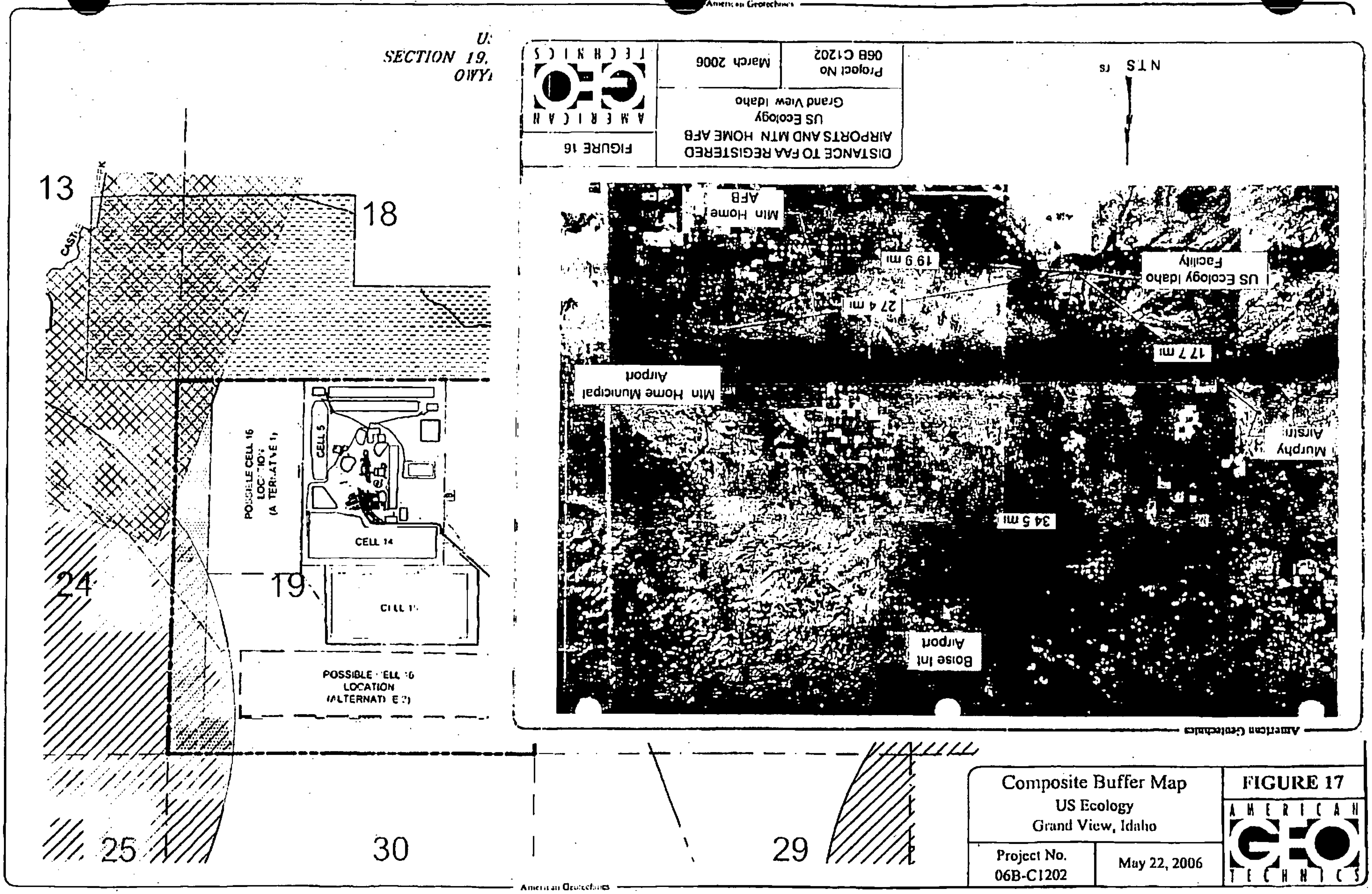
Project No. 06B-C1202	May 22, 2006

AMERICAN GEOTECHNICS



N
N.T.S

DISTANCE TO FAA REGISTERED AIRPORTS AND MTN. HOME AFB US Ecology Grand View, Idaho		FIGURE 16
Project No. 06B-C1202	March, 2006	AMERICAN GEO TECHNICS



Composite Buffer Map
US Ecology
Grand View, Idaho

Project No. 06B-C1202 | May 22, 2006

FIGURE 17

APPENDIX B

DETAILED STRATIGRAPHIC COLUMN FROM ARTESIAN WELL

ESII Part B Renewal Application
EPA I.D. No. IDD073114654
Date: June 12, 1998
Revision No.: 0

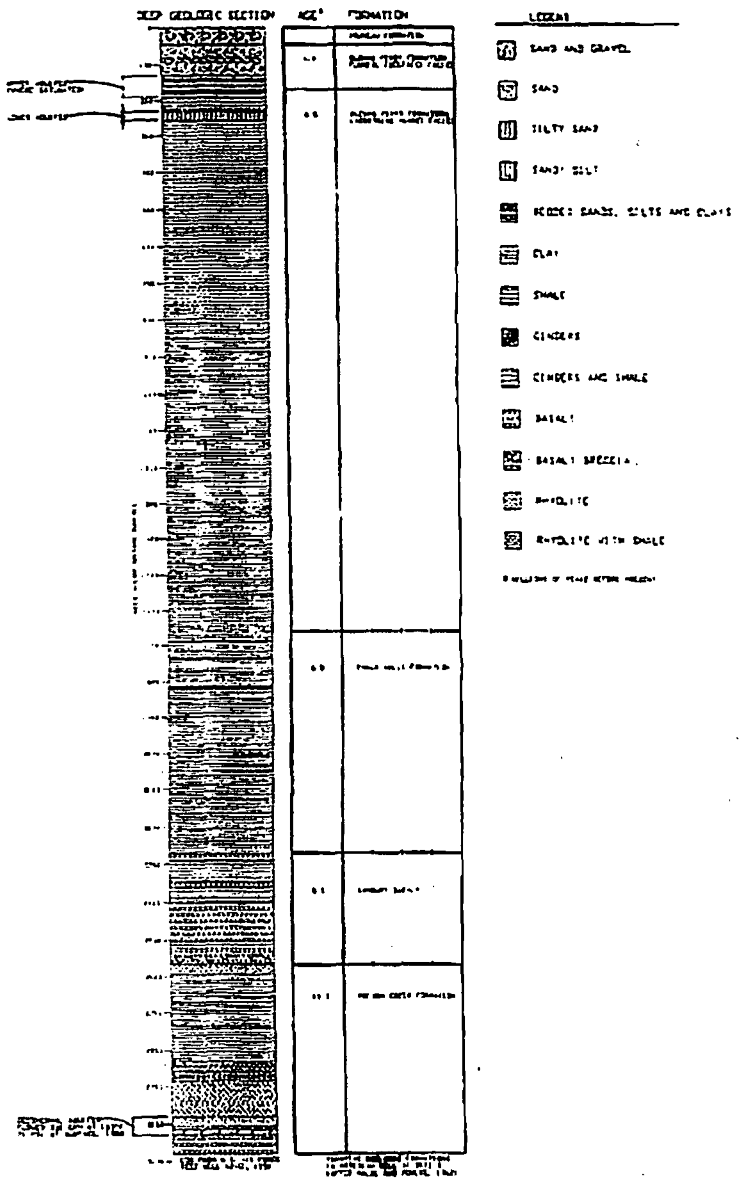


FIGURE E-7
STRATIGRAPHIC COLUMN
FROM ARTESIAN WELL

APPENDIX C

US GEOLOGICAL SOCIETY PROBABILISTIC GROUND MOTION VALUES

USGS
science for a changing world

```
LOCATION                 43.0656 Lat.  -116.2622 Long.
The interpolated Probabilistic ground motion values, in %g,
at the requested point are:
            10%PE in 50 yr   2%PE in 50 yr = 10% IN 250 YRS
   PGA          5.17            11.00
0.2 sec SA     11.68            26.02
1.0 sec SA      4.19             8.78
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

SEISMIC HAZARD: Hazard by Lat/Lon, 2002

AMERICAN GEO TECHNICS

APPENDIX D

MINERAL POTENTIAL REPORT FOR SECTION 19

,80—1)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Serial Number

IDI-28152

MINERAL REPORT

MINERAL POTENTIAL REPORT FOR ENVIROSAFE LAND EXCHANGE UNDER SECTION 206 OF THE FEDERAL LAND POLICY AND MANAGEMENT ACT OF 1976

LANDS INVOLVED

BOISE MERIDIAN, OWYHEE COUNTY, IDAHO

SELECTED LANDS
T. 4 S., R. 2 E.
Sec. 19: Lots 1-4 (inclusive)
E1/2NE1/4, W1/2E1/2NW1/4
E1/2SW1/4, SE1/4
Containing 502.68 acres

OFFERED LANDS
T. 5 S., R. 3 E.
Sec. 14: Lot 8
Sec. 15: Lots 8 and 9
Sec. 22: Lot 3
Sec. 23: Lot 2
Containing 118.16 acres

BUREAU OF LAND MANAGEMENT · U.S. DEPARTMENT OF THE INTERIOR · CERTIFIED · J. C. Harksen · 0067 · MINERAL EXAMINER

Prepared By:

(Signature)

Geologist
(Title)

(Date)

BUREAU OF LAND MANAGEMENT · U.S. DEPARTMENT OF THE INTERIOR · CERTIFIED · Robert E. DeTar · REVIEW 023 · MINERAL EXAMINER

Technical Approval:

Robert E. DeTar
(Signature)

Geologist
(Title)

Nov 4, 1992
(Date)

Management Acknowledgement:

(Signature)

Bruneau Area Mgr.
(Title)

11/5/92
(Date)

☆ U.S. Government Printing Office: 1984-776-009/4879 R8

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The subject lands have no mineral potential for locatable or salable minerals as neither locatable or salable minerals are present in commercial quantities. The subject lands are prospectively valuable for oil and gas as well as geothermal resources. No other leasable minerals occur in the subject area.

It has been determined that surface entry on the lands would not interfere with operations under the mineral leasing laws.

No mining claims are known to occur on the selected lands.

It is recommended that the lands be considered for trade in accordance with the Federal Land Policy and Management Act of 1976 and all other regulations appertaining thereto (43 CFR 2710).

INTRODUCTION

The offered lands are an island in the Snake River (Gold Isle) just east of Grand View, Idaho while the selected lands are located on an arid, rolling upland about seven miles northwest of Grand View, Idaho.

Both the offered and selected lands were identified for trade through a request from Envirosafe Incorporated. This report is prepared in accordance with the Federal Land Policy and Management Act of 1976, Section 206, Exchanges.

The purpose of this report is to present information relative to the potential for salable and locatable mineral development on both the offered and the selected lands. The conclusions reached in this report are limited to only the classification for mineral potential and should not be used for any other purpose.

LANDS INVOLVED

The subject lands are:

SELECTED LANDS
Boise Meridian, Owyhee County, Idaho
T. 4 S., R. 2 E.
Sec. 19: Lots 1-4 (inclusive)
E1/2NE1/4, W1/2E1/2NW1/4
E1/2SW1/4, SE1/4
Containing 502.68 acres.

AMERICAN GEO TECHNICS

APPENDIX E

CULTURAL RESOURCES

April 1, 2006
Project No. 05B-C1202

ID State Historical Preservation Office
210 Main St.
Boise, Idaho 83702

Attention: Suzie Nietzel

SUBJECT: US Ecology Idaho, Section 19 Siting and Historical Preservation
Grand View, Idaho

Dear Suzie:

We recently spoke by phone concerning the expansion of the US Ecology Idaho Hazardous Waste Site in Grand View, Idaho, and the potential effects such an expansion may have on historically sensitive sites. We appreciate your guidance in this regard, and are sending this letter as a formal request for the Idaho Historical Preservation Office to review the expansion plans for any potential affects on historical sites. As you requested, we have attached Figure 2A (Attachment A) indicating the area US Ecology will apply to have approved for future landfills. This area includes all of Section 19, which is located within Township 4S, Range 2E, Owyhee County, Boise Meridian, Idaho. The map shows the current US Ecology Idaho property boundaries. A bold line is shown bounding Section 19 as the area being considered for hazardous waste landfills. We request that you consider all of Section 19 in your review as shown within the bold siting boundary line.

We have also attached several supporting documents that may help you with your review. The second document (Attachment B) includes a cultural resource survey that was commissioned by US Ecology Idaho's predecessor, Envirosafe Inc. The survey was conducted to identify any culturally significant sites within Section 19 that may be damaged or destroyed by landfill activities. Once the survey was completed and reviewed, cultural resource clearance was granted (see Attachment C) by the Bureau of Land Management (BLM). Envirosafe Inc. then acquired the whole of Section 19 through a land exchange.

The cultural resource survey report identifies a site (labeled ES-1 in the report) that may be eligible for the National Register of Historic Places under criterion D.

During our phone conversation you expressed concern over the appearance of landfills in relatively close proximity to the Oregon Trail (~ 1 mile). Recently, US Ecology obtained 309 acres, north of Section 19 in Sections 13 and 18. This property is shown in Figure 2A. As required by the land transaction with BLM, to protect the view shed with the Oregon Trail, US Ecology is in the process of modifying their RCRA Part B Operating Permit, under a Class 2 Modification with the Idaho Department of Environmental Quality (DEQ). The modification guarantees for perpetuity that US Ecology will not build or construct a landfill within these 309 acres with the possible exception of a monitoring well. The modification has been filed with DEQ. As required by law a public meeting was held and a public comment period has been advertised. The comment period will continue through May 6, 2006. Currently, DEQ has not received any public comments regarding the Class 2 Modification.

Additionally, we have included an aerial photograph of the US Ecology Hazardous Waste Landfill in Attachment D to help you analyze the visual aspects both active and capped landfills. All new landfills will be designed to lie softly on the ground, meaning that visual impacts of the finished product are minimized to the extent possible. Capped landfills will have an appearance similar to those shown in cells 5 and 10 of Attachment D. Each landfill is re-vegetated with native plant species to provide natural habitat and blend into the natural terrain as much as possible.

The photograph in Attachment D shows cells 14 and 15 during construction. New landfills will be designed and have an appearance during construction similar to that of cell 15. Each cell is constructed in phases. The active phase of cell 15 is shown in the left side of the cell 15 boundaries. As construction progresses, the active phase will be filled and covered. The next phase will begin with a similar pit being excavated toward the right edge of the cell 15 boundaries. Once construction is complete, the cell will be re-vegetated and have an appearance similar to that of cells 5 and 10.

We hope this information will help you in your assessment of cultural and historical resources that may be affected by the US Ecology Idaho Hazardous Waste Landfill expansion. Please provide a letter indicating the status of any such resources that may be adversely affected by the addition of landfills located within Section 19. For your convenience, you may email a signed copy of a letter in PDF format to either *rhansen@americangeotechnics.com* or *tjohnson@americangeotechnics.com*. Please let us know if there is anything else we can do to help you with your review, and thank you in advance for your efforts on our behalf.

Respectfully submitted,

American Geotechnics

Timothy C. Johnson, EIT
Geotechnical Engineer

Rex W. Hansen, PE
Principal Engineer

Attachment A: Figure 2A Property Line & Section 19 Siting Map

Attachment B: A Cultural Resources Survey of a Proposed Expansion of the Envirosafe Waste Facility

Attachment C: Bureau of Land Management Cultural Resources Clearance

Attachment D: US Ecology Idaho Hazardous Waste Facility Aerial Photograph

Attachment E: John Sullivan (Bureau of Land Management District Manager) Telecon Report

Letter included without attachments unless otherwise noted.

IDAHO STATE HISTORICAL SOCIETY

"The History and Preservation People"

Our mission: to educate through the identification, preservation, and interpretation of Idaho's cultural heritage.

www.idahohistory.net

Dirk Kempthorne
Governor of Idaho

Steve Guerber
Executive Director

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2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 334-2682
Fax: (208) 334-2774

Archaeological Survey of Idaho
210 Main Street
Boise, Idaho 83702-7264
Office: (208) 334-3847
Fax: (208) 334-2775

Historical Museum and
Education Programs
610 North Julia Davis Drive
Boise, Idaho 83702-7695
Office: (208) 334-2120
Fax: (208) 334-4059

Historic Preservation Office
210 Main Street
Boise, Idaho 83702-7264
Office: (208) 334-3861
Fax: (208) 334-2775

Historic Sites Office
2445 Old Penitentiary Road
Boise, Idaho 83712-8254
Office: (208) 334-2844
Fax: (208) 334-3225

Public Archives and
Research Library
2205 Old Penitentiary Road
Boise, Idaho 83712-8250

Public Archives
Office: (208) 334-2620
Fax: (208) 334-2626

Research Library
(208) 334-3556

Oral History
Office: (208) 334-3863
Fax: (208) 334-3198

May 18, 2006

Mr. Timothy Johnson
American GeoTechnics
2300 N. Yellowstone Hwy., Ste. 203
Idaho Falls, Idaho 83401

RE: U.S. Ecology Grandview--Section 19 Siting
Section 106 (Historic Preservation) Review

Dear Mr. Johnson:

Thank you for requesting our views on the need to conduct additional archaeological survey in the area planned for expansion of US Ecology's Hazardous Waste Site near Grand View, Idaho (Section 19, T4S, R2E). As we discussed on the telephone, all of Section 19 has been surveyed for archaeological properties, and no properties were identified that are considered eligible for the National Register of Historic Places. Therefore, expansion of the facility can proceed with no further review from our office. We should be notified immediately, however, if archaeological remains are discovered during construction activities.

We appreciate your cooperation. If you have any questions, please feel free to contact me at 208-334-3847, ext. 107.

Sincerely,

Suzi

Susan Pengilly Neitzel
Deputy SHPO and
Compliance Coordinator

A CULTURAL RESOURCES SURVEY OF A PROPOSED EXPANSION OF THE ENVIROSAFE WASTE FACILITY, OWYHEE COUNTY, IDAHO

by

Ann S. Polk
Staff Archaeologist

Prepared for:

Envirosafe Services of Idaho, Inc.
P.O. Box 16217
Boise, Idaho 83715-6217

Prepared by:

Sagebrush Archaeological Consultants
4263 Monroe Boulevard
Ogden, Utah 84403

Under Authority of Cultural Resources Use Permit No. ID-I-28592-1

Archaeological Report No. 474

August 15, 1991

INTRODUCTION

In July, 1991 Envirosafe Services of Idaho, Inc. of Boise, Idaho (ESII) requested that Sagebrush Archaeological Consultants (Sagebrush) conduct a cultural resources clearance survey of a proposed expansion of their existing waste facility near Grandview, Owyhee County, Idaho. The project was carried out to comply with governing Federal mandates including the Antiquities Act of 1906, the Historic Sites Act of 1935, the Historic Preservation Act (NHPA) of 1966 (P.L. 89-665 as amended by P.L. 96-515), Executive Order 11593 of 1971, the National Environmental Policy Act of 1969 (NEPA), and the Archaeological and Historic Preservation Act of 1974 and other pertinent legislation.

The project will involve expansion of the existing facility onto surrounding Bureau of Land Management (BLM) lands. The project lies in T. 4N., R. 2E., S. 19 on the Castle Butte, Idaho 7.5' USGS Quadrangle (1948; 1976 P.I.)(Figure 1). A total of approximately 438 acres of contiguous land was surveyed on the southern, eastern and western sides of the existing facility and the area surveyed by Sagebrush in 1990 for the initial expansion area.

The survey was conducted by Sean Blaine and the author on August 1 and 2, 1991 under authority of Cultural Resources Use Permit No. ID-I-28592-1 issued by the Idaho State Office of the Bureau of Land Management.

Statement of Objectives

The present project is being undertaken in order to identify and evaluate any prehistoric or historic cultural resources present within the surveyed corridor in order to increase the known data base and protect any identified resources from potential destruction. Should sites be found they will be identified for avoidance or, if that is not possible, additional evaluation and possible mitigative measures. Artifacts collected as part of this project will be deposited at the Southwest Idaho Regional Archaeological Center in Boise, Idaho. Field notes are held on file by Sagebrush.

The survey area is on a broad plain several miles south of the Snake River in low hilly terrain. There are a few shallow arroyos and several deep ones at the western edge of the survey area above Castle Creek drainage and one large one in the southeastern part of the survey area. Vegetation in the area is generally sparse with sagebrush and bunchgrass and shadscale dominant. Because of the arid nature of the area (the nearest permanent water source is Castle Creek located about 660 meters to the west) and the absence of significant lithic resources in the area, it is likely that prehistoric site density is quite low. Evidence of historic activity will likely be absent due to the lack of water and the fact that this area does not lie on any well-traveled corridors through southern Idaho. The South Alternate Route of the Oregon Trail is nearly one mile north and northeast of the survey area. It is likely that no historic remains will be found in the survey area.

Previous Research

Prior to conducting the survey of the project area a search was made of the cultural resources records of the State Historic Preservation Office (SHPO) through Susie Nietzel on August 1, 1991. In 1989, Frank Jenks (BLM, Bruneau Resource Area) surveyed a 0.25 acre well site for ESII in section 19 SENENW and found no cultural resources. In 1990, Sagebrush conducted a cultural resources inventory east, south and west of the existing ESII waste disposal site and found only one isolated artifact in section 19.

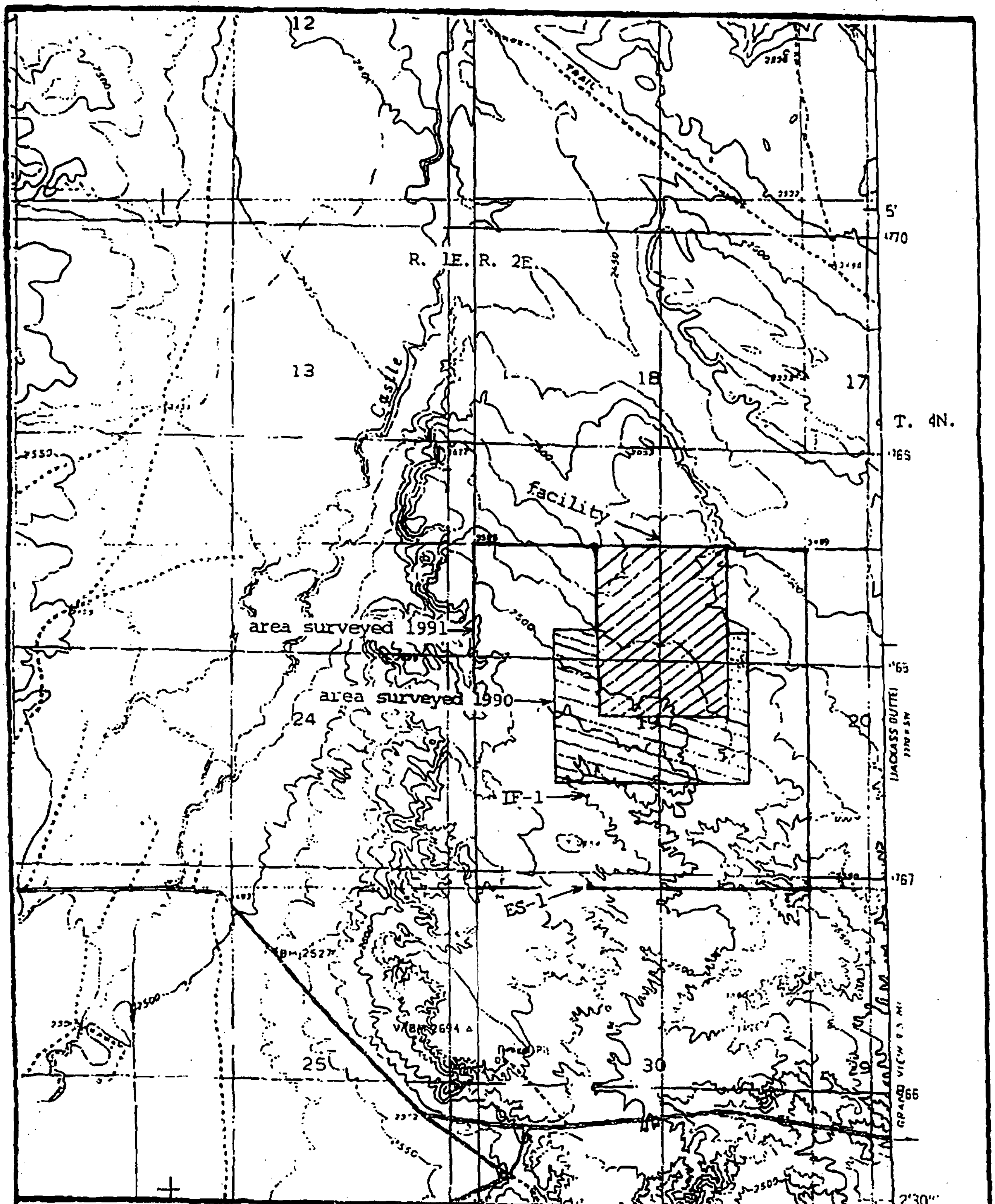


Figure 1. Location of cultural resources survey of proposed expansion of existing waste facility near Grandview, Owyhee County, Idaho. Taken from: USGS Castle Butte 7.5' Quadrangle (1948; P.R. 1976). Note site ES-1 and isolated find IF-1.

A search was also made of the National Register of Historic Places (NRHP) for significant sites in the area. None were found.

ENVIRONMENT

The survey area is located within the Snake River Plain on the south side of the Snake River. Locally, the area consists of low rolling hills and slight to steep slopes. The elevation of the area ranges from 2500 up to 2700 feet a.s.l. There are a few sand ridges in the southwestern part of the area, but most of the soils are silts and sandy silts.

Vegetation in the survey area is sparse (20 percent average) dominated by sagebrush, bunchgrass, shadscale, four-wing saltbush and devil's thorn. Vegetation is even sparser on the north central portion of the survey area where a loose pavement of basaltic pebbles are found.

The nearest permanent water source is Castle Creek located about 660 meters to the west and the Snake River located two miles to the north. There are several shallow and deep arroyos within the survey area, but they seldom carry water.

Natural disturbance in the area includes arroyo cutting, sheetwash erosion and some minor aeolian movement of the sand areas. Cultural disturbance consists largely of the Envirosafe waste facility adjacent to the survey area (which was originally a Titan missile silo area), but also includes the gravelled access road into the facility, a gravelled section line road, several two-track dirt roads and a fence line.

METHODOLOGY

The survey was conducted by Sean Blaine and the author on August 1 and 2, 1991. The survey block was walked in parallel transects spaced no more than 30 meters apart. The outer perimeter of the survey area was marked with stakes. The interior perimeter was marked by the Envirosafe facility fence line, a range fenceline and some old wooden stakes from the previous survey. The ground visibility was excellent. All that obscured the surface was the sparse vegetation and some gravelled access road surface in the eastern part of the survey area.

For the purposes of this project a site was considered to be a locus of human activity at least 50 years old. There had to be five or more artifacts or a feature found within a 50 foot radius. Less than this number of artifacts was considered an isolated occurrance.

RESULTS

One prehistoric site and one isolated artifact were found during the survey of the proposed waste facility expansion area. Site ES-1 is located in the SESWSESW of S. 19 at the lee side of a sand dune and consists of a small obsidian flake scatter with three concentrations of flakes, associated with two concentrations of fire-cracked rock. This may have been a small campsite which contains limited evidence of primary and secondary lithic reduction activity. Shatter and several tertiary flakes were also noted.

IF-1, an isolated patinated obsidian biface midsection, is located in the SESWNESW of S. 19. It was found in a relatively flat area with sandy silt soil. The isolated artifact, which was found on an erosional surface, was not associated with other artifacts or features.

The expected occurrences for prehistoric sites on this survey were confirmed. Only one small site and one isolated artifact were found in the area inventoried. The results for the historic sites were also confirmed: none were found. The limited evidence of prehistoric activity is likely due to the arid nature of the area, but the fact that any artifacts were found is probably because of the occurrence of obsidian nodules in the gravels of the area. These nodules were, no doubt, quarried here and other places as raw material for tool manufacture. The absence of historic sites is, as previously noted, probably due to the absence of water and the fact that the area has never been well-traveled.

RECOMMENDATIONS

Site ES-1 appears to be an ephemeral site. However, because there is loose shifting sand in the dune on the site, it may possess depth and limited intact subsurface cultural deposits. The observable prehistoric activity appears to be limited to some lithic reduction of locally occurring obsidian and limited occupation as evidenced by fire cracked rock on the site. In light of this information, site ES-1 is recommended eligible to the NRHP under criterion d.

This investigation was conducted with techniques which are considered adequate for evaluating cultural resources which could be adversely affected by the project. However, should cultural resources be discovered during construction, a report should be made immediately to the Boise District, Bureau of Land Management, Boise, Idaho.

I certify that I conducted the investigation reported here, that my observations and methods are fully documented, and that this report is complete and accurate to the best of my knowledge.

Signature of Reporter Date

ID-1-93-B-5

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
BOISE DISTRICT OFFICE

CULTURAL RESOURCE CLEARANCE WORKSHEET

1. Project Title and/or Case Number
Envirosafe Land Exchange - IDI-28152

2. Project/Action Description (Type of action, size, location, etc.)
The project is a land exchange involving 502 acres of BLM lands contiguous to the Envirosafe Waste Treatment Facility.

3. Individual and Organization Conducting Inventory Michael R. Polk, Principal Investigator Sagebrush Archeaological Consultants	4. Date of Inventory 8/17/90, 8/15/91, 4/20/92

5. Legal Location of Inventory/USGS Quad
T4S, R2E, Section 19, as shown on map / Castle Butte 7.5' USGS

6. List Site Numbers and Results of Evaluation
IF-1 - 8/17/90 & IF-1, ES-1 (10OE3821) - 8/15/91
ES-1 was determined eligible and required testing for mitigation.

7.* [X] Full Clearance [ ] Conditional Clearance [ ] Negative Clearance

8. Mitigation or Special Stipulations Needed to Protect Cultural Resource Values
The project area has been inventoried to current standards. Site 10 OE 3821 has been tested and evaluated. No further cultural work is needed. Project may proceed as planned.

Signature	Date
9. Cultural Resource Specialist Lois M. Palmgren	12/9/92
10. Area/District Manager John C. Sullivan	12-9-92

* Cultural resource clearance will indicate that an action has no impact upon cultural resources, or that impacts have been satisfactorily resolved. A conditional or negative clearance will indicate that cultural resource problems are not resolved and further steps must be taken to mitigate the impact. Copies of completed clearance worksheet must be submitted to the State Historic Preservation Officer.

AMERICAN GEO TECHNICS

TELECON REPORT

		DATE:	April 19, 2006
TO:	John Sullivan	TIME:	9:00 a.m.
LOCATION:	Bureau of Land Management Field Manager 384-3338 john_sullivan@blm.gov	PROJECT NO.:	06B-C1202
From	Tim Johnson	DISTRIBUTION:	John Sullivan Rex Hansen Tim Johnson
LOCATION:	American Geotechnics, Boise Office		
SUBJECT:	**US Ecology Section 19 Siting: BLM mineral potential and cultural resources reports**		

Item:

As Stated by Tim

"John and Tim spoke by concerning US Ecology Idaho's plan to expand their facility. Tim asked John about obtaining cultural resource and mineral potential clearance for the expansion, including all of Section 19. John explained to Tim that no such clearance was necessary, because Section 19 is owned by US Ecology Idaho and is therefore private land. John explained that cultural resource and mineral potential studies were completed when the previous owner of US Ecology Idaho Hazardous Waste Site (Envirosafe) obtained Section 19 from BLM. John explained that BLM clearance concerning cultural resources and mineral potential in Section 19 was granted prior to the sale to ensure the protection of any sensitive areas."

As stated by John through email (exactly)

"John Sullivan informed Tim Johnson that the portion of Section 19 located outside of US Ecology's current Hazmat Facility was acquired by Envirosafe Services of Idaho. Inc.(predecessor to US Ecology) through a land exchange with BLM. The land exchange process included a cultural inventory and a mineral potential report to verify that no significant cultural or mineral resources existed on the lands being transferred to Envirosafe. However, now that Section 19 is in private ownership, BLM has no further management or regulatory interest in the property. US Ecology need only concern themselves with whatever regulatory requirements exist from EPA, DEQ, or other state or local agencies."

Tim Johnson

APPENDIX F

PARKS AND RECREATION

AMERICAN GEO TECHNICS

April 18, 2006
Project No. 05B-C1202

Idaho Department Parks and Recreation
PO Box 83720
Boise, Idaho 83720-0065

Attention: Richard Novotny

SUBJECT: US Ecology Idaho, Section 19 Siting Application and Reserved Areas
Grand View, Idaho

Dear Richard,

We recently spoke by phone concerning the expansion of the US Ecology Idaho Hazardous Waste Site in Grand View, Idaho, and the potential effects such an expansion may have on reserved, scenic, or natural use lands. We appreciate your guidance in this regard, and are sending this letter as a formal request for the Idaho Department of Parks and Recreation to identify any state or national park, or land reserved for scenic or natural use that may be affected. These lands include, but are not limited to, wild and scenic areas, national monuments, wilderness areas, historic sites, recreation areas, preserves, and scenic trails. As you requested, we have attached a map indicating the area US Ecology will apply to have approved for future landfills. This area includes all of Section 19, which is located within Township 4S, Range 2E, Owyhee County, Boise Meridian, Idaho.

The map shows the current US Ecology Idaho property boundaries. A bold line is shown bounding Section 19 as the area being considered for hazardous waste landfills. We request that you consider all of Section 19 in your review as shown within the bold siting boundary line.

Please provide a letter indicating the existence and/or status of any reserved or withdrawn areas that may be adversely affected by the addition of landfills located within Section 19. For your convenience, you may email a signed copy of a letter in PDF format to either *rhansen@americangeotechnics.com* or *tjohnson@americangeotechnics.com*. Please let us know if there is anything else we can do to help you with your review, and thank you in advance for your efforts on our behalf.

Respectfully submitted,

American Geotechnics

Timothy C. Johnson, EIT
Geotechnical Engineer

Rex W. Hansen, PE
Geotechnical Engineer

Attachment: Figure 2, Property Line & Section 19 Siting Map, US Ecology, Grandview, Idaho. April 2006.

Letter included without attachments unless otherwise noted.

DIRK KEMPTHORNE
governor

Robert L. Meinen
director

Dean Sangrey, Administrator
operations division

David Ricks, Administrator
management services division

IDAHO DEPARTMENT OF
PARKS AND RECREATION

p.o. box 83720
boise, idaho 83720-0065

(208) 334-4199

fax (208) 334-3741

tdd 1-800-377-3529

street address
5657 Warm Springs Avenue

www.parksandrecreation.idaho.gov

May 24, 2006

Rex W. Hansen, PE Geotechnical Engineer
American Geotechnics
5620 Chinden Blvd.
Boise, ID 83714

RE: US Ecology Idaho Hazardous Waste Site Expansion

Dear Mr. Hansen:

This letter is in response to your letter regarding US Ecology Idaho Hazardous Waste Site Expansion sent to Richard Novotony, Staff Engineer. US Ecology proposes to expand its hazardous waste site in Owyhee County. You requested that the Idaho Department of Parks and Recreation (IDPR) identify any state or national park or land reserved for scenic or natural use that may be affected.

Thank you for including a map of the proposal. The map made our analysis easier.

The nearest IDPR facility is Bruneau Dunes State Park that is located 30 miles southeast of the site. The nearest National Conservation Area is the Snake River Birds of Prey. Contact the John Sullivan, NCA Manager at (208) 384-3300 for more information on impacts to the NCA. Note: The NCA is not located in Section 19.

Thank you for the opportunity to comment on this proposal. If you have any questions about these comments, please contact me at (208) 334-4180 ext. 230.

Sincerely,

Jeff Cook

Jeff Cook, Outdoor Recreation Analyst
Comprehensive Planning, Research, and Review

AMERICAN GEO TECHNICS

April 17, 2006
Project No. 05B-C1202

Snake River Birds of Prey National Conservation Area
Bureau of Land Management
Four Rivers Field Office
3948 Development Ave.
Boise, Idaho 83705

Attention: John Sullivan, NCA Manager

SUBJECT: US Ecology Idaho, Section 19 Siting: Snake River Birds of Prey Area
Grand View, Idaho

Dear John:

We recently spoke by phone concerning the expansion of the US Ecology Idaho Hazardous Waste Site in Grand View, Idaho, and the potential effects such an expansion may have on the Snake River Birds of Prey National Conservation Area. We appreciate your guidance in this regard, and are sending this letter as a formal request for your review of the proposed expansion and comments concerning any potential adverse effects the expansion may have on the Birds of Prey Area. We have attached a map indicating the area US Ecology will apply to have approved for future landfills. This area includes all of Section 19, which is located within Township 4S, Range 2E, Owyhee County, Boise Meridian, Idaho.

The map shows the current US Ecology Idaho property boundaries. A bold line is shown bounding Section 19 as the area being considered for hazardous waste landfills. Landfills will not be placed on US Ecology Idaho property in Section 20 to the east. Nor will landfills be placed on US Ecology Idaho property in Section 18 to the north or Section 13 to the northwest. The property in Sections 18 and 13 was acquired by US Ecology Idaho from the Bureau of Land Management under the agreement that the land would be protected as a buffer zone. We request that you consider all of Section 19 in your review as shown within the bold siting boundary line.

Please provide a letter indicating any adverse effects that additional hazardous waste landfills within Section 19 may have on the Snake River Birds of Prey National Conservation Area. For your convenience, you may email a signed copy of a letter in PDF format to either *rhansen@americangeotechnics.com* or *tjohnson@americangeotechnics.com*. Alternatively, you may fax your response to our office at (208) 658-8703. Please let us know if there is anything else we can do to help you with your review, and thank you in advance for your efforts on our behalf.

Respectfully submitted,

American Geotechnics

Timothy C. Johnson, EIT
Geotechnical Engineer

Rex W. Hansen, PE
Geotechnical Engineer

Attachment: Figure 2, Property Line & Section 19 Siting Map, US Ecology, Grandview, Idaho. April 2006.

Letter included without attachments unless otherwise noted.

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Boise District Office
3948 Development Avenue
Boise, Idaho 83705
http://www.id.blm.gov/offices/lsrd

TAKE PRIDE IN AMERICA

In Reply Refer To:
6230

May 26, 2006

Timothy C. Johnson
American Geotechnics
5260 Chinden Blvd.
Boise, ID 83714

Dear Mr. Johnson:

I am in receipt of your April 17, 2006 letter requesting a review of US Ecology Idaho's proposed landfill expansion in Section 19, T. 4 S., R. 2 E., Boise Meridian, Idaho. Section 19 is bordered by BLM-administered public lands in the Snake River Birds of Prey National Conservation Area (NCA). As you probably know, the original approximate 100-acre landfill was previously surrounded by BLM land. In 1994, US Ecology Idaho's predecessor (Envirosafe) acquired from BLM the remaining lands in Section 19 through a land exchange. US Ecology Idaho acquired the lands in Sections 13 and 18 from BLM in a subsequent (2005) land exchange.

Prior to the 1994 land exchange, Envirosafe constructed several monitoring wells on BLM land in Section 19. As part of the permit for the current landfill expansion proposal, we would request DEQ and/or EPA to require setbacks from adjacent property of sufficient width to accommodate construction of future monitoring wells wholly within US Ecology Idaho's existing property. This would preclude additional impacts to the NCA's raptor and raptor prey habitat from construction and maintenance of well pads and access roads. It would also preclude associated off-site impacts resulting from increased recreational use of the access roads.

Thank you for the opportunity to comment on the proposed landfill expansion. Please contact me at 384-3338 if you have any questions.

Sincerely,

John Sullivan

John Sullivan
NCA Manager

RECEIVED

MAY 19 2006

AMERICAN GEO TECHNICS

TELECON REPORT

		DATE:	June 1, 2006
TO:	John Sullivan	TIME:	11:45 a.m.
LOCATION:	Bureau of Land Management Manager 384-3338 john_sullivan@blm.gov	PROJECT NO.:	06B-C1202
From	Tim Johnson	DISTRIBUTION:	John Sullivan Rex Hansen Tim Johnson
LOCATION:	American Geotechnics, Boise Office		
SUBJECT:	US Ecology Section 19 Siting: Birds of Prey National Conservation Area		

Item:
Prior to this conversation, John submitted a response letter to American Geotechnics discussing possible effects additional hazardous waste landfill cells within Section 19 could have on the Birds of Prey NCA area. In the letter, John requested that the Idaho Department of Environmental Quality and/or the Environmental Protection Agency "require setbacks from adjacent property of sufficient width to accommodate construction of future monitoring wells wholly within US Ecology Idaho's existing property. This would preclude additional impacts to the NCA's raptor and raptor prey habitat from construction and maintenance of well pads and access roads. It would also preclude associated off-site impacts resulting from increased recreational use of the access roads."

Tim called John for clarification on this issue. Tim asked John if the purpose of his letter was to ensure that monitoring wells and associated access roads would not need to be placed on BLM lands. John concurred. Tim then explained to John that a 500 foot inactive buffer zone was required for the siting application, and that no active cells would be constructed within 500 feet of any Section 19 boundary. Tim then asked John if he (John) felt that a 500 foot boundary would be sufficient for the purposes stated in his (John's) letter. John stated that a 500 foot boundary would be sufficient, as long cell construction and operation did not require monitoring wells or access roads to be constructed on Bureau of Land Management property.

Tim Johnson

AMERICAN GEO TECHNICS

APPENDIX G

TRANSPORTATION CONTINGENCY PLAN

STEVE FORLER TRUCKING, INC.

TRANSPORTER CONTINGENCY PLAN

TABLE OF CONTENTS

CONTINGENCY PLAN

1. **EMERGENCY ACTION:** In the event of an emergency or hazardous waste spill during transportation, the transporter must take appropriate immediate action as per 40CFR part 263.30 to protect human health and the environment. In accordance with 40CFR part 263.32 the transporter must also clean up any hazardous waste discharge that occurs during transportation or take such action as may be required or approved by Federal, State or local officials so that the hazardous waste discharge no longer presents a hazard to human health or the environment.

1.1 Driver Procedures:

1.1.1. Immediately contact the local police and/or fire department by calling 911.

1.1.2. Immediately contact the company Owner and Idaho Operations Managers at the numbers listed below and report the incident to them. It is their responsibility to immediately implement the Transporter Contingency Plan Notification Procedures.

Owner/WA Ops.:	Steve Forler	Work- (360) 893-6230 Cell- (253) 209-0826
Idaho Operations:	Lyle Hanks	Cell- (208) 599-1891

1.1.3. Containment: The critical problem is to prevent the escape of any spilled liquid or solid into the ground or into the storm or sanitary sewer. A barrier will be erected immediately to prevent escape of spilled material/waste liquids, using whatever material is at hand, even a dirt curb to prevent spreading of the spill. Containment of solids will be dependant on wind and weather conditions. Using the tarpaulin in the vehicle, or visqueen in spill kit, if conditions are wet and/or windy.

1.1.4. Remain with the unit and warn pedestrians and motorists to stay away from the spill area, pointing out to them the danger involved.

1.1.5. Upon the arrival of the police and/or fire department, the driver will inform them of what kind of material has been spilled and request the area be blocked off to pedestrians and vehicles to prevent property damage or any serous personal injury.

1.1.6. The driver will notify Chemical Transportation Emergency Center to request information regarding the hazardous material that was spilled: **CHEMTREC 800-424-9300**

1.2. Emergency Coordinator Transporter Contingency Plan Notification Procedures:

1.2.1. The Emergency Coordinator will immediately notify the National Response Center and Director of the Office of Hazardous Material Regulation, Material Transportation Bureau, Department of Transportation, in the event of:

- A person is killed or requires hospitalization due to injuries
- Carrier or property damage exceeds $50,000.
- Notification caused by continuing danger of life
- Incidents requiring evacuation of the general public for one or more hours
- If the major transportation artery or facility is slowed or shutdown for one or more hours
- Fire, breakage, spillage, or suspected contamination occurs involving shipments of infectious substances
- There has been a release of a marine pollutant in a quantity exceeding 450 L (119 gallons) for liquid or 400 kg (882 lbs) for solids
- A situation exists of such a nature (eg. A continuing danger to life exists at the scene of the incident) that, in the judgment of the carrier, it should be reported to the National Response Center even though it does not meet the criteria of paragraph (a) 1,2 or 3 of section 49CFR part 171.15

1.2.2. Steve Forler Trucking must also contact the National Response Center and give notice for hazardous wastes as required under 40CFR 263.30(c) (1).

1.2.3. Call the proper State Authority using the telephone numbers listed under Part 3 of the Contingency Plan.

1.2.4. Follow the Emergency Coordinator Transporter Contingency Plan Notification Procedure.

1.2.5. Follow all the procedures from Part 2 through Part 11 that follows:

2. EMERGENCY REPORTING:

2.1. In the event of an emergency or a hazardous waste spill during transportation, the Emergency Coordinator will gather the following information from the driver and relay it to the National Response Center and the Department of Public Safety (see phone numbers in Section 3).

- Name of person reporting the incident
- Name, address, and I.D. Number of the transporter
- Phone number where person reporting can be reached
- Date, time and location of the incident
- The extent of injuries, if any
- Classification, name and quantity of hazardous materials/ wastes involved.
- Type of incident and nature of hazardous material/waste involved and whether a continuing danger exists at the scene

- For each waste product involved provide:
    - ♦ Name and I.D. number of generator
    - ♦ Product shipping name, hazard class, and ID number (UN or NA number)
    - ♦ Estimated quantity of material spilled
    - ♦ If possible the extent of contamination to land, water or air
- Shipping name, hazard class and the U.N. number of any other material carried.

2.2 In the event of an emergency or a hazardous waste spill during the transportation, the transporter will immediately notify the affected municipality of the occurrence and the nature of the spill, along with the local fire and police departments.

2.3 The generator of the hazardous waste will be notified:
Bill Hague, Honeywell at (973) 455 - 2175

2.4 The transporter will submit a report of the incident in writing within 30 days to the Director, Office of Hazardous Material Registration, Materials Transportation Bureau, Department of Transportation, Washington, D.C.. 20590, send a copy to the Idaho Department of Environmental Quality at 1410 North Hilton, Boise, Idaho 83706, and send another copy of the report to the generator.

2.5 Additional follow-up is also required by 40 CFR part 263.30 (c)(2) stating that a written report for hazardous waste incidents must be sent to the Director, Office of hazardous Materials Regulation, Materials Transportation Bureau, Department of Transportation, Washington, DC 20590.

3. EMERGENCY RESPONSE NUMBERS
    - STEVE FORLER TRUCKING 253-209-0816
    - CHEMTREC 800-424-9300
    - Idaho Emergency Communication Center (IECC) 1-800-632-8000
    - U.S. COAST GUARD/USEPA NATIONAL RESPONSE CENTER
      800-424-8802 OR 202-426-2675

4. EMERGENCY CORRDINATORS AND CONTACTS:
    1. STEVE FORLER
       19827 150th Avenue East
       Graham, WA 98338
       Or P.O. Box 1479
       Orting, WA 98360
       Office # 800-406-1173
       Cell-253-209-0816
    2. LYLE HANKS

P.O. Box 1029
Mountain Home, ID 83647
208-599-1891

5. EMERGENCY CONTRACTOR:

1. Environmental Management Solution
   5111 Alworth, Suite G
   Boise, ID 83714
   208-939-0154 office
   208-841-1952 cell

6. EMERGENCY MEDICAL RESPONSE

Phone Numbers:

Grand View EMT 800-632-8000
Elmore Memorial Hospital (208) 587-8401

Directions to Elmore Memorial Hospital:

From USEI Site:	Turn Left (East) on Highway 78 to Grand View Turn Left (North) on Highway 67 towards Mountain Home
From Simco / RTF:	South on Simco Road to Highway 67 Turn Left (East) on Highway 67 towards Mountain Home
	Turn Left (north) onto Highway 51 Turn Left (north) on North 2nd Street East Turn Right onto East 4th Street North Turn Left onto North 6th Street East Turn Right on East 9th Street North

7. EXTERNAL COMMUNICATIONS

The only means of communication the driver will have in the truck will be a citizens band radio and/or a cell phone.

8. ROUTINE DECONTAMINATION PROCEDURES

8.1. A truck or trailer exposed to a spill or leak will be decontaminated at the site in order to prevent any further release to the extent that it can be transported (or move under its own power) to an authorized facility capable of further decontamination, if necessary.

8.2. Equipment will be decontaminated in the following manner: Each Item used will be placed in an open head container and thoroughly rinsed with a compatible solvent or cleaning compound. The residue or wash water will then be drained into a tight head container, sealed and disposed of in accordance with Federal and State Regulations at an authorized disposal site.

8.3. Contaminated clothing will be placed with the clean up residue and disposed of in accordance with Federal and State regulations at an authorized disposal site. If clothing is re-usable, then it will be decontaminated properly and the residue added to the other waste

9. TRAINING

9.1. The emergency coordinator will train and instruct all personnel in the following areas:

- 24 hour OSHA Training
- Yearly 8 hour refresher OSHA Training
- General maintenance of all equipment
- Inspection and Reporting Procedures
- Response to Emergencies
- Contingency Plan Implementation
- Operation and use of Respirator

10. SAFETY, SPILL CONTROL AND EMERGENCY EQUIPMENT

Each tractor carries the following emergency equipment, stored in a sturdy aluminum box or over-pack drum:

- Gloves
- Goggles
- Slicker Suit
- Boots
- Respirator
- Hazorb
- Shovel
- Hard hat
- DOT Emergency Response Guidebook
- Skin and Eye Neutralization Solution
- Emergency reflective triangles (3)

Each tractor also carries:

- First Aid Kit
- Ten (10) pound ABC fire extinguisher

11. MAINTENANCE

Trucks and trailer are on a regimented maintenance schedule set up by Steve Forler Trucking Inc. Drivers do a pre-trip check before leaving the yard. All other maintenance is done by qualified mechanic with the exception of major repairs. All equipment will be tested and maintained as necessary to ensure its proper operation.

12. FOLLOW UP PROCEDURES

12.1.1. Decontamination: A truck or trailer exposed to a spill or leak will be decontaminated at the site in order to prevent any further release to the extent that it can be transported (or move under its own power) to an authorized facility capable of further decontamination, if necessary. Equipment will be decontaminated in the following manner: Each Item used will be placed in an open head container and thoroughly rinsed with a compatible solvent or cleaning compound. The residue or wash water will then be drained into a tight head container, sealed and disposed of in accordance with Federal and State Regulations at an authorized disposal site. Contaminated clothing will be placed with the clean up residue and disposed of in accordance with Federal and State regulations at an authorized disposal site. If clothing is re-usable, it will be decontaminated properly and the residue added to the other waste.

12.1.2. Notification: As previously stated in this plan the following will be notified in case of an incident: The Department of Transportation, Director, Office of Hazardous Materials Registration, Materials Transportation Bureau, Washington D.D. 20590, by written notice of the spill and nature of the incident

12.1.3. Cleanup: Spilled material will be cleaned up by the contractor or cleanup contractor in accordance with Local State and Federal Regulations.

APPENDIX H

ECONOMIC IMPACT REPORT

AN ANALYSIS OF THE ECONOMIC AND FISCAL IMPACTS OF AMERICAN ECOLOGY CORPORATION'S IDAHO OPERATIONS

Prepared by:

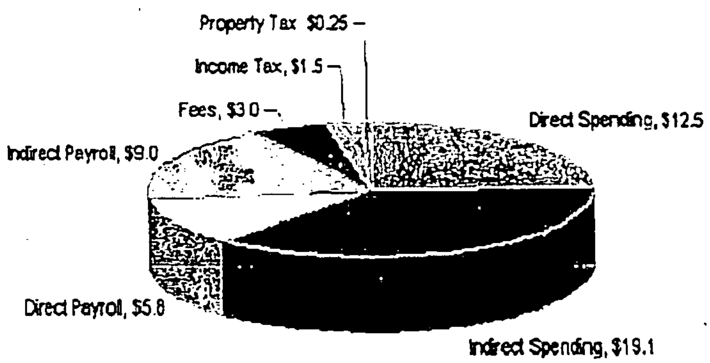
Don Reading, PhD
Consulting Economist
Ben Johnson Associates, Inc.
6070 Hill Road
Boise, Idaho 83703

February 2006

- American Ecology and its employees added $51 million to the Idaho economy in 2005.

- Direct and indirect annual Idaho impacts include:
  - 250 jobs
  - $14.8 million in payroll
  - $31.6 million in additional spending
  - $4.75 million in taxes and fees

2005 Economic Impact ($51 million)



- Founded in 1952, American Ecology is the oldest company in the waste management industry and is headquartered in Boise. Its largest treatment and disposal facility is located near Grand View and operates as "US Ecology Idaho."

- US Ecology Idaho is the largest property taxpayer in Owyhee County and the largest taxpayer in the Bruneau-Grand View School District (15% of the District's total tax revenue).

- With 67 current employees, US Ecology Idaho is Owyhee County's largest private non-agriculture employer. Its average hourly wages are 39% higher than the average wage in Owyhee County. The company provides full health coverage and other benefits after 30 days of hire.

- The Company contributes $15,000 to $20,000 annually to local schools and community service organizations, including the Future Farmers of America, meals-on-wheels, other senior center programs, and educational projects.

American Ecology is Growing
American Ecology Corporation is a growing company. Revenues have grown from $42 million in 2000 to over $54 million in 2004. The company's stock price has also risen in five years from about $2 per share to its current value of about $17 dollars.[1] The Company's stock has outperformed industry averages over the past five years (See Figure 1).

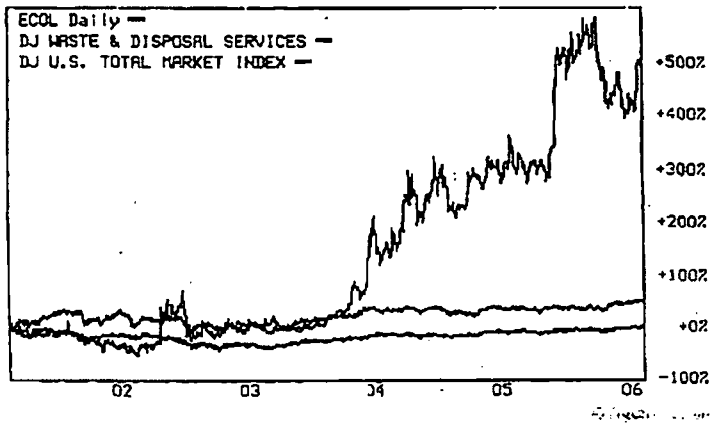


Figure 1: American Ecology's five-year stock performance

A key to the Company's success is the company's US Ecology Idaho operations. Business growth in Idaho fueled the increased in-state employment, spending, and tax and fee payments which are the subject of this report.

Economic Impact Extends Statewide
Economic impact to a region is more than just direct expenditures by a Company or the wages paid to workers. Workers spend a portion of their income in the community which in turn becomes sales to other firms. US Ecology purchases goods and services from other companies, who in turn purchase goods and services from their suppliers, and so on. The sums of the spending, employment, and personal income associated with these inter-industry transactions are called *indirect impacts*. This positive impact is known as the multiplier effect.

The multiplier is the indicator of how many times this spending turns over in the economy. Economic studies of the waste disposal industry have shown multipliers that range from 2.0 to 2.7 depending on the location and the type of multiplier. There are a variety of multipliers that depend on the economic measure of interest. Multipliers are calculated based on revenue, jobs, payroll, etc. Beck and Chartwell found multipliers for the waste disposal industry of 2.58 for

[1] AEC is a publicly traded ("ECOL") provider of radioactive and hazardous waste services. The Company operates four disposal facilities through its US Ecology subsidiaries. These include Grand View, Idaho; Robstown, Texas; Beatty, Nevada and Richland, Washington.

jobs, 2.56 for payroll, and 2.23 for revenue. These are the values used in this report.[2]

To illustrate how a multiplier works: The jobs multiplier of 2.58 would mean that for each employee of American Ecology, an additional 1.58 jobs is created (for a total of 2.58 jobs).

Company Services

US Ecology Idaho provides treatment and disposal services for PCB, hazardous, and non-hazardous wastes. Customers include steel mills, medical and academic institutions, refineries and chemical manufacturing facilities. In addition, the facility accepts certain naturally occurring and accelerator-produced radioactive materials and low activity radioactive material exempted from regulation by the U.S. Nuclear Regulatory Commission. Substantial waste volumes are received under a contract with the U.S. Army Corps of Engineers.

Company's Economic and Fiscal Impact is Significant

American Ecology's corporate headquarters have been located in Boise since 1995. As of January 2006, 30 people worked at its offices in the Park Center area of southeast Boise. Most of these employees reside in Ada County.

The US Ecology Idaho facility currently employs 67 people from the Grand View/Mountain Home area. The facility and surrounding buffer zone occupies 1,100 acres of Company-owned land 60 miles southeast of Boise and an additional 120 acres at a rail transfer facility located on Simco Road in Elmore County. The Grand View facility is regulated under permits and regulations of the Idaho Department of Environmental Quality and the U.S. Environmental Protection Agency.

The jobs provided by the Company in Idaho cover a wide range of skills from the corporation's executive management group to professional chemists, health and safety and environmental specialists, heavy equipment operators, accountants, information technology and computer professionals, and support staff. The Company's economic contribution is especially important to Owyhee (population 10,998) and Elmore counties (population 28,878).

Employment

US Ecology employment in Idaho has grown 54% in the past five years. Current statewide employment stands at 97. US Ecology is now Owyhee County's largest non-agricultural private sector employer. Growth of Company employment and the job creation multiplier associated with US Ecology is depicted in Figure 2:

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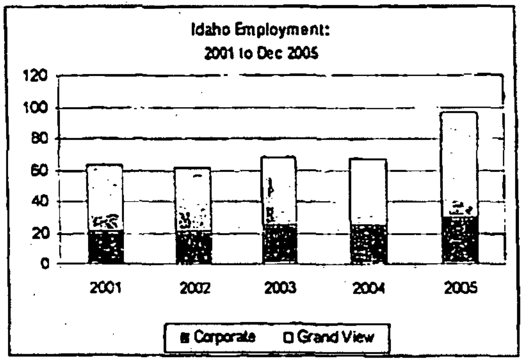
[2] R.W. Beck and Chartwell Information Publishers (2001), 'Size of the United States Solid Waste Industry.' Sponsored by the Environmental Research and Education Foundation, Washington D.C.



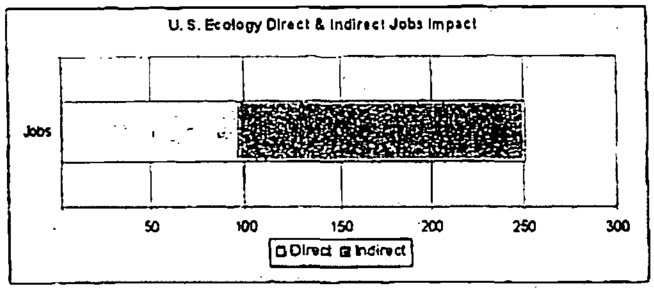


Figure 2: Company growth in employment, and total job impact using a multiplier.

Payroll and Benefits

The Company payroll for the Idaho waste facility and headquarters was $5.8 million in 2005. The current average hourly wage of all 97 Idaho workers is $20.42. The average wage for US Ecology Idaho employees is currently $15.13 per hour.[3] This figure excludes corporate employees and exceeds the average wage in Owyhee County ($10.89 per hour) by 39%. In addition, employees add 13% on average to their wages by working overtime. See Figure 3:

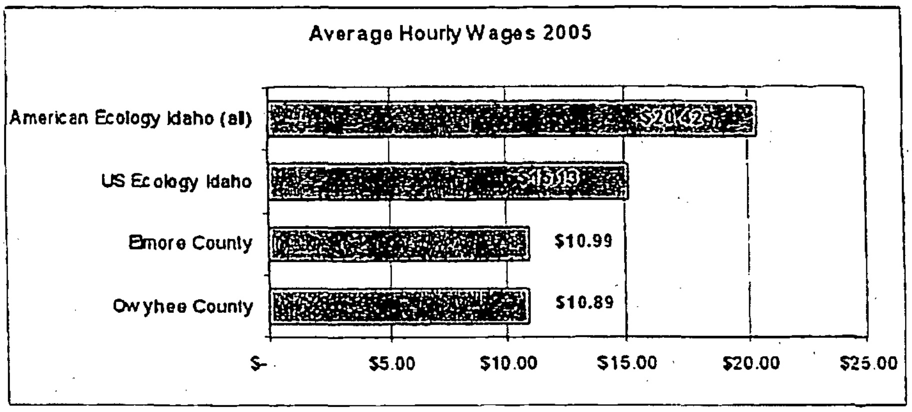


Figure 3: US Ecology jobs pay more than the Owyhee and Elmore County average.

All American Ecology employees including subsidiary US Ecology Idaho receive full benefits equal to an average of 30% of payroll after 30 days of hire. The benefits include a complete range of health insurance and retirement coverage, as well as mandatory social security and workers compensation coverage.

US Ecology's average wages compare favorably against other industries in the state, and other new jobs being created in Idaho[4] and exceed many jobs in the high tech industry. See Figure 4:

3 Non-corporate employee wage current as of December 2005.
4 Idaho Dept. of Commerce Idaho Occupational Employment and Wage Survey for 2005 – January 2006 edition

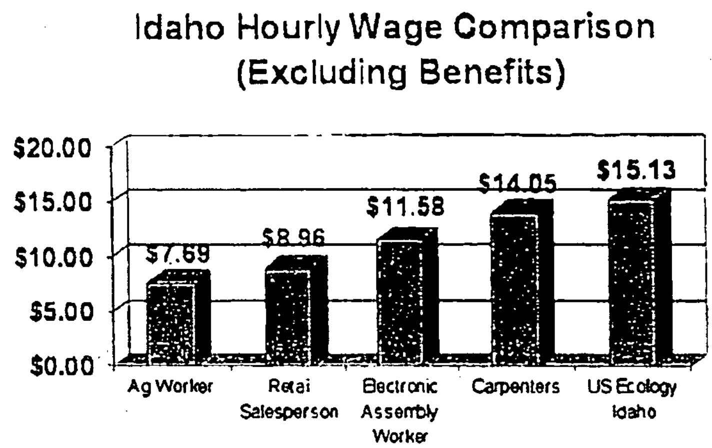


Figure 4: US Ecology jobs pay more than many other Idaho jobs.

Capital Spending

Over the past five years US Ecology Idaho has spent a total of $13.3 million for facility improvements and capital equipment. Of those expenditures, 75% or $10.6 million have been spent through Idaho firms. See Figure 5:

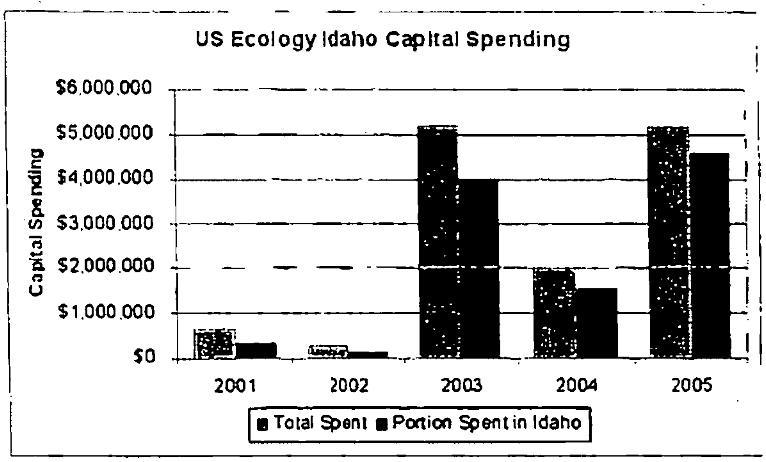


Figure 5: US Ecology capital spending and share spent with other Idaho companies.

Vendor Purchases in Idaho

In addition to capital spending, US Ecology also purchases goods and services from Idaho vendors to support ongoing operations. During 2005 the Company purchased $10.7 million in goods and services from Idaho construction and trucking companies, reagent suppliers, consulting firms, and law and accounting firms. With the multiplier effect, this spending adds another $13.2 million to the Idaho economy. See Figure 6:

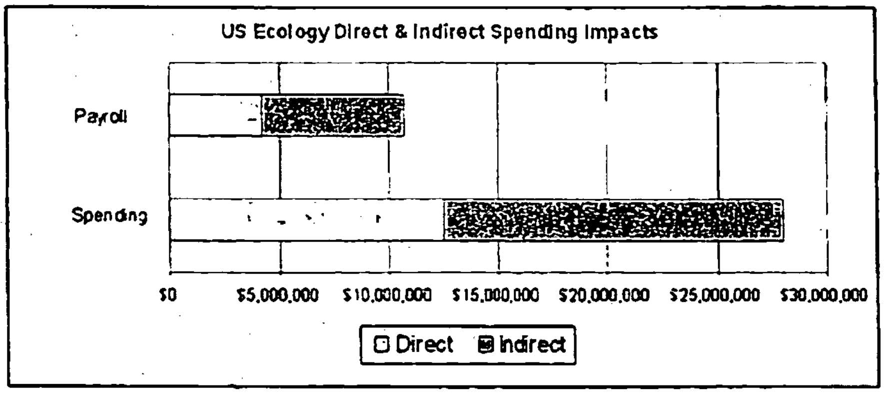


Figure 6: Total payroll and spending impact.

Government Fiscal Support

In 2005, the Company paid nearly $5 million to state and local government in general taxes and tipping fees for waste disposal. Over the past 5 years tipping fee payments to the State General Fund have been over $9.1 million and nearly $481 thousand to Owyhee County. These fee payments have increased each year for the last five years due to increased business activity (See Figure 7). In 2005, tipping fees reached nearly $3 million. Unlike taxes, fees create a multiplier effect, resulting in an additional $3.7 million in Idaho spending in 2005.

In Owyhee County, tipping fees paid by US Ecology are used for emergency preparedness and response projects such as:

- Funding over 75% of the County's 911 system
- Purchasing ambulances and fire engines
- Training and equipping emergency response teams
- Contributing to Homedale Airport pesticide clean-up
- Supplying video cameras for police & emergency responders

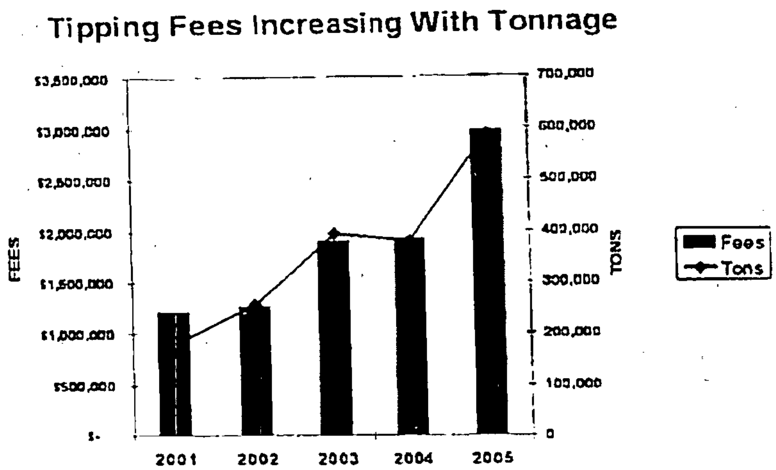


Figure 7: State and County fees increase

The Company also pays property taxes to Elmore and Owyhee counties. Assessed taxes for 2006 for Elmore County are over $31 thousand, and over $218 thousand in Owyhee County. In Owyhee County the company accounts for 4% of county tax revenues. Of the company's annual property taxes, $103 thousand goes directly to the Grand View – Bruneau School District, providing 15% of the District's property tax revenues. The Company is the School District's largest property taxpayer.

In addition, during 2005 the Company paid just under $1.4 million in sales and income taxes to the State of Idaho. Figure 8 depicts US Ecology Idaho's 2005 property and sales and income taxes:

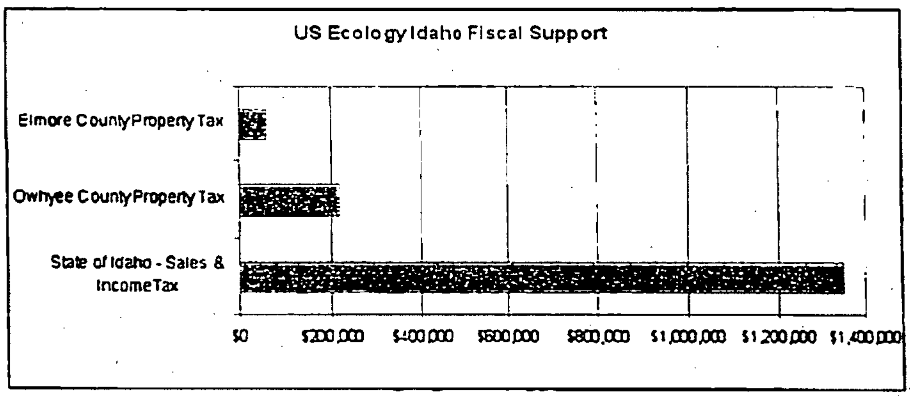


Figure 8: Support to local and state government via property, sales, and income taxes.

Charitable Contributions

US Ecology Idaho maintains an annual charitable contribution program, and donates $15,000 to $20,000 annually to worthwhile causes in the community. A panel of local community leaders helps choose projects to fund. Contributions have included support for the Owyhee County Museum, Little League, FFA classes, elementary school computer program, senior citizen centers and meals-on-wheels programs, and dozens of other worthwhile causes. 2005 donations included:

Grand View American Legion	Funds toward roof repair
Eastern Owyhee County Library	Sagebrush InfoCenter Automation Program & Tech Support to network the schools with the library
Grand View Lions Club	In-kind contribution to help fill the ditch next to Hwy 67 in Grand View for pedestrian and vehicle safety
Grand View Little League	Equipment
Homedale FFA	LCD projector for classes and demonstrations
Homedale High School	Material to build 12 bat houses for insect control
Homedale Public Library	Audio books
Homedale Senior Center	Commercial two-door freezer
Marsing Elementary	Computers for classroom, ESL and after-school programs
Marsing Resource Center	Copier and cartridges for after-school program
Marsing Senior Center	Commercial freezer and ice machine
Oreana Community Hall	Funds toward new furnace
Owyhee County Probation Dept.	After school program resources
Rimrock Jr-Sr High School	Centrifuge and spectrophotometer for science class
Silver City Fire & Rescue, Inc.	In-kind contribution for helipad

US Ecology also provides personnel and equipment for annual Household Hazardous Waste Clean-up events in Mountain Home and Glenns Ferry. Over 50 barrels of household hazardous waste are collected and disposed by the company annually. This will be the company's 12th year of providing this service.

Road Paving Project

In 2004, US Ecology Idaho teamed up with the Simplot Company and the Mountain Home Highway District to pave the 12 remaining gravel miles of Simco Road in Elmore County from Interstate-84 south to Highway 67. The improved road benefits the operations of Simplot and US Ecology Idaho, as well as the Mountain Home Air Force Base, residents of Grand View and Owyhee County, and recreational users of CJ Strike Reservoir. As a result of this paving project, use of the road has increased from 300 vehicles per day in 2004 to an average of 900 vehicles per day in February 2005, a 300% increase. Road paving positive externalities (or positive side benefits) include reduced travel times, increased safety, increased real estate values in the vicinity of the road and lower air pollution from dust. See Figure 9:

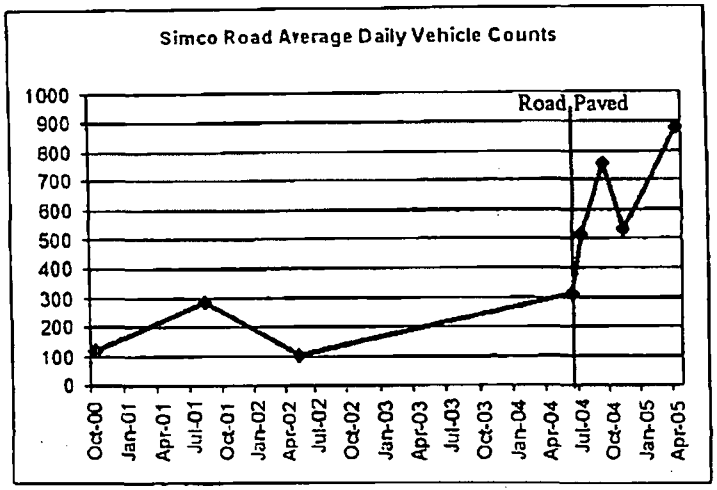


Figure 9: Traffic has increased dramatically on Simco Road following 2004 paving.

Economic Impact Summary

The Company's employment of 97 people creates an additional 153 jobs in Idaho.

The annual payroll of \$5.8 million generates an additional payroll of \$9.0 million as the spending turns over in the Idaho economy.

The purchase of \$12.5 million in goods and services in Idaho in 2005 causes an additional \$15.4 million in spending.

Payment of nearly \$5 million in taxes and fees provides significant support to local governments and contributes significantly to overall state revenues. An economic impact multiplier is calculated for tipping fee payments of \$3 million, adding another \$3.7 million to the Idaho economy.

Conclusion

Idaho-based American Ecology Corporation's financial strength has been aided by the growth of its in-state waste treatment and disposal business. Employment, revenue, spending on goods and services, taxes and fees have all increased as its Idaho business has grown. The overall economic impact of the company to the state is significant, with a combined direct and indirect impact of 250 jobs, \$14.7 million in payroll, and \$31.6 million in additional spending. State and local governments accrued nearly \$5 million in additional tax and fee payments. See Figure 10:

2005 Economic Impact ($51 million)

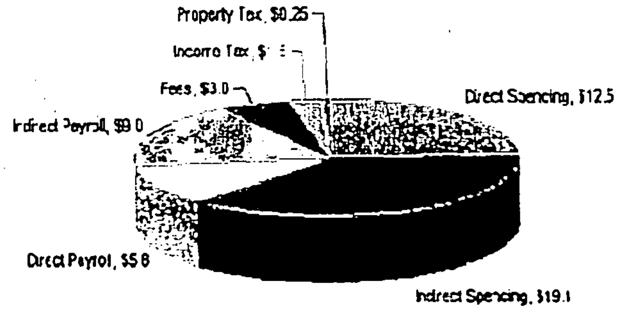


Figure 10: American Ecology added $51 million to Idaho's economy in 2005.

Author's Biography

Don Reading, PhD has more than 20 years of experience in the field of economics. He received his B.S. in Economics from Utah State University, an M.S. in Economics from the University of Oregon, and a PhD in Economics from Utah State University. In his career, Dr. Reading has worked for Ben Johnson Associates, the Idaho Public Utilities Commission and as an educator in Tennessee, Idaho and Hawaii. A Boise resident, Dr. Reading consults for several Idaho companies, including Idaho Power, Amalgamated Sugar, and J.R. Simplot Company. He is one of four economists providing yearly forecasts of statewide personal income to the State of Idaho for purposes of establishing state personal income tax rates. Dr. Reading has also prepared economic forecasts for the Southeast Idaho Council of Governments and the Revenue Projection Committee of the Idaho State Legislature. He has been a member of the several Northwest Power Planning Council Statistical Advisory Committees and is currently vice chairman of the Governor's Economic Research Council in Idaho.

Boise Office:
Ben Johnson Associates, Inc. 6070 Hill Road Boise, Idaho 83703
Ph: (208) 342-1700 Fax: (208) 384-1511 email: dreading@mindspring.com

AMERICAN GEO TECHNICS

APPENDIX I

AREA SCHOOLS, HOSPITALS, AND CHURCHES

AMERICAN GEO TECHNICS

Public and Private Schools near US Ecology Idaho Hazardous Waste Landfill Facility

School		Distance to USEI (straight line)
Grand View Elementary School 205 1st Street Grand View, ID. 83624	(208) 834-2775	~ 10.2 miles
Rimrock Jr-Sr High School 39678 State Highway 78 Bruneau, ID 83604	(208) 834-2260	~16.7 miles
Desert View Christian School 33386 Mud Flat Road Grand View, ID. 83624	(208) 834-2802	~45.9 miles
Liberty Elementary School 200 Main Street Mtn. Home AFB, ID. 83648	(208) 832-4665	~20.8 miles
Bruneau Elementary School 28541 Benham Ave. Bruneau, ID. 83624	(208) 845-2492	~26.6 miles
Mtn. Home AFM Primary School 100 Gunfighter Ave. Mtn. Home AFB, ID. 83648	(208) 832 4651	~20.6 miles
West Elementary 415 W 2nd Street Mtn. Home, ID. 83647	(208) 587-2595	~28.0 miles
Melba Elementary 520 Broadway Ave. Melba, ID. 83641	(208) 495-2500	~25.7 miles

AMERICAN GEO TECHNICS

Hospitals near US Ecology Idaho Hazardous Waste Landfill Facility

Hospital		Distance to USEI (straight line)
Mtn. Home AFB Medical Facility 90 Hope Drive Bldg. 6000 Mtn. Home AFB, ID. 83648	(208) 834-2775	~ 20.5 miles
Elmore Memorial Hospital 895 North 6th East Mtn. Home, ID 83647	(208) 587-8401	~29.6 miles
Mercy Medical Center 1512 12th Ave Nampa, ID. 83686	(208) 463-5000	~36.7 miles

AMERICAN GEO TECHNICS

Churches near US Ecology Idaho Hazardous Waste Landfill Facility

Churches		Distance to USEI (straight line)
Knight Community Church 630 Idaho Street Grand View, ID. 83624	(208) 834-2415	~ 10.3 miles
Grand View Mennonite Church Grand View, ID 83624	(208) 834-2039	~unlisted location
Valley Christian Fellowship P.O. Box 661 Grand View, ID. 83624	(208) 834-2655	~13.3 miles
Church of Jesus Christ of Latter-Day Saints 359450 State Highway 78 Grand View, ID. 83624	(208) 832-2181	~13.5 miles
Faith Tabernacle Mission Lane Murphy, ID. 83650	(208) 495-2718	~17.7 miles
Church of Jesus Christ of Latter-Day Saints Bldg. 156 Airbase Road Mtn. Home, ID. 83647	(208) 832 4211	~20.6 miles
Jesus Name Tabernacle 4940 Airbase Road Mtn. Home, ID. 83647	(208) 587-0788	~21.1 miles
Emmanuel Baptist Church 3850 Airbase Road Mtn. Home, ID. 83647	(208) 587-5207	~21.1 miles

AMERICAN GEO TECHNICS

APPENDIX J

ENDANGERED OR THREATENED SPECIES

AMERICAN GEO TECHNICS

April 17, 2006
Project No. 05B-C1202

US Fish and Wildlife Service
1387 South Vinnell Way, Suite 368
Boise, Idaho 83709-1657

Attention: Becky Baker

SUBJECT: US Ecology Idaho, Section 19 Siting and Endangered Species
Grand View, Idaho

Dear Becky:

We recently spoke by phone concerning the expansion of the US Ecology Idaho Hazardous Waste Site in Grand View, Idaho, and the potential effects such an expansion may have on endangered species. We appreciate your guidance in this regard, and are sending this letter as a formal request for the US Fish and Wildlife Service to review the endangered species and habitat that may be affected. As you requested, we have attached a map indicating the area US Ecology will apply to have approved for future landfills. This area includes all of Section 19, which is located within Township 4S, Range 2E, Owyhee County, Boise Meridian, Idaho.

The map shows the current US Ecology Idaho property boundaries. A bold line is shown bounding Section 19 as the area being considered for hazardous waste landfills. We request that you consider all of Section 19 in your review as shown within the bold siting boundary line.

Please provide a letter indicating the existence and/or status of any endangered species or habitat that may be adversely affected by the addition of landfills located within Section 19. For your convenience, you may email a signed copy of a letter in PDF format to either *rhansen@americangeotechnics.com* or *tjohnson@americangeotechnics.com*. Please let us know if there is anything else we can do to help you with your review, and thank you in advance for your efforts on our behalf.

April 17, 2006
Project No. 05B-C1202

Page 2

Respectfully submitted,

American Geotechnics

Timothy C. Johnson

Timothy C. Johnson, EIT
Geotechnical Engineer

Rex W. Hansen

Rex W. Hansen, PE
Geotechnical Engineer

Attachment: Figure 2, Property Line & Section 19 Siting Map, US Ecology, Grandview, Idaho. April 2006.

RECEIVED

MAY 0 3 2006

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Snake River Fish and Wildlife Office
1387 S. Vinnell Way, Room 368
Boise, Idaho 83709
Telephone (208) 378-5243
http://IdahoES.fws.gov

MAY 0 2 2006

Timothy C. Johnson EIT & Rex W. Hansen PE
American Geotechnics
5260 Chinden Blvd.
Boise, Idaho 83714

Subject: Proposed Hazardous Waste Site – Section 19, Grand View, Owyhee County, Idaho – Species List
File #970.3800 SL 06-0548

Dear Mr. Johnson and Mr. Hansen:

The Fish and Wildlife Service (Service) is providing you with a list of endangered, threatened, proposed, and/or candidate species, and proposed critical habitat which may occur in the area of the proposed Section 19 Hazardous Waste Site. You requested this list by letter on April 17, 2006. This list fulfills the requirements for a species list under section 7(c) of the Endangered Species Act of 1973 (Act), as amended. If the project decision has not been made within 180 days of this letter, regulations require that you request an updated list. Please refer to the species list (SL) number shown above in all correspondence and reports.

Section 7 of the Act requires Federal agencies to assure that their actions are not likely to jeopardize the continued existence of endangered or threatened species. Federal funding, permitting, or land use management decisions are considered to be Federal actions subject to section 7. If the proposed action may affect a listed species, consultation with the Service is required. Formal consultation must be initiated for any project that is likely to adversely affect a threatened or endangered species. If a project involves a major construction activity and may affect listed species, Federal agencies are required to prepare a Biological Assessment. If a proposed species is likely to be jeopardized or if proposed critical habitat will be adversely modified by a Federal action, regulations require a conference between the Federal agency and the Service. A Federal agency may designate, in writing, you or another non-Federal entity to represent them in an informal consultation.

If you have any questions about your responsibilities under section 7 of the Act, or require further information, please contact the Snake River Fish and Wildlife Office at (208) 378-5243. Thank you for your continued interest in endangered species conservation.

Sincerely,

for Jeffery L. Foss, Field Supervisor
Snake River Fish and Wildlife Office

AMERICAN GEOTECHNICS – SECTION 19 HAZARDOUS WASTE SITE
OWHYEE COUNTY, IDAHO
SPECIES LIST 06-0548

LISTED SPECIES	COMMENTS
Snake River physa snail *(Physa natricina)*	LE
Idaho springsnail *(Pyrgulopsis idahoensis)*	LE
Snake River physa snail *(Physa natricina)*	LE
Bliss Rapids snail *(Taylorconcha serpenticola)*	LT
Utah valvata *(Valvata utahensis)*	LE

PROPOSED SPECIES/CRITICAL HABITAT	
Slickspot peppergrass *(Lepidium papilliferum)*	PE

CANDIDATE SPECIES[1]

None

[1] Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

May 2006

AMERICAN GEO TECHNICS

April 17, 2006
Project No. 05B-C1202

Idaho Department of Fish and Game
3101 South Powerline Rd.
Nampa, Idaho 83686

Attention: Eric Lietzinger

SUBJECT: US Ecology Idaho, Section 19 Siting: Endangered Species and Habitat
Grand View, Idaho

Dear Eric:

We recently spoke by phone concerning the expansion of the US Ecology Idaho Hazardous Waste Site in Grand View, Idaho, and the potential effects such an expansion may have on endangered species. We appreciate your guidance in this regard, and are sending this letter as a formal request for the Idaho Department of Fish and Game to review the endangered species and habitat that may be affected. As you requested, we have attached a map indicating the area US Ecology will apply to have approved for future landfills. This area includes all of Section 19, which is located within Township 4S, Range 2E, Owyhee County, Boise Meridian, Idaho.

The map shows the current US Ecology Idaho property boundaries. A bold line is shown bounding Section 19 as the area being considered for hazardous waste landfills. Landfills will not be placed on US Ecology Idaho property in Section 20 to the east. Nor will landfills be placed on US Ecology Idaho property in Section 18 to the north or Section 13 to the northwest. The property in Sections 18 and 13 was acquired by US Ecology Idaho from the Bureau of Land Management under the agreement that the land would be protected as a buffer zone. We request that you consider all of Section 19 in your review as shown within the bold siting boundary line.

Please provide a letter indicating the existence and/or status of any endangered species or habitat that may be adversely affected by the addition of landfills located within Section 19. For your convenience, you may email a signed copy of a letter in PDF format to either *rhansen@americangeotechnics.com or tjohnson@americangeotechnics.com*. Please let us know if there is anything else we can do to help you with your review, and thank you in advance for your efforts on our behalf.

Respectfully submitted,

American Geotechnics

Timothy C. Johnson, EIT
Geotechnical Engineer

Rex W. Hansen, PE
Geotechnical Engineer

Attachment: Figure 2, Property Line & Section 19 Siting Map, US Ecology, Grandview, Idaho. April 2006.

Letter included without attachments unless otherwise noted.

IDAHO DEPARTMENT OF FISH AND GAME
SOUTHWEST REGION
3101 South Powerline Road
Nampa, Idaho 83686

Dirk Kempthorne/Governor
Steven M. Huffaker/Director

May 16, 2006

Timothy Johnson
American Geotechnics
5260 Chinden Blvd.
Boise, Idaho 83714

Subject: U. S. Ecology Waste Site Expansion

Dear Mr. Johnson:

The Idaho Department of Fish and Game (Department) has reviewed your request for the identification of any federally listed endangered or threatened species in the area of the proposed U. S. Ecology Waste Site just north of Highway 78 in Owyhee County.

According to the Conservation Data Center (CDC) database and CDC staff, there are no federally listed endangered or threatened species on or near the project site.

Slickspot peppergrass (*Lepidium papilliferum*), which is proposed to be listed as an endangered species, does not occur in or near the project area. CDC staff (Michael Mancuso, botanist) informed us that the habitat necessary to support slickspot peppergrass does not exist in the project area. Also, according to a slickspot peppergrass distribution map prepared by the U. S. Fish and Wildlife Service, the project site is outside the known range of the species. Therefore, surveys for slickspot peppergrass are not warranted.

In 2000, the project area was surveyed and several Bureau of Land Management sensitive plant species were found on the property. These were:

Desert pincushion (*Chaenactis stevioides*)
Spreading gilia (*Ipomopsis polycladon*)
White-margined wax plant (*Glyptopleura marginata*)

These plants are all annuals that bloom in the spring and are difficult to see or identify by mid summer. Because they are annuals their distribution is somewhat ephemeral, meaning their exact locations may vary from year to year. These plants were also located on adjacent Bureau of Land Management property.

Surveys for these sensitive plants are also not warranted because we already know they exist in the area. The seed sources on adjacent property together with the ephemeral distribution of these plants make it possible for them to recolonize the area after disturbance or continue to exist in areas that won't be disturbed.

Thank you for the opportunity to comment. If you have any questions, please contact Eric Leitzinger in the Southwest Regional Office at 465-8465.

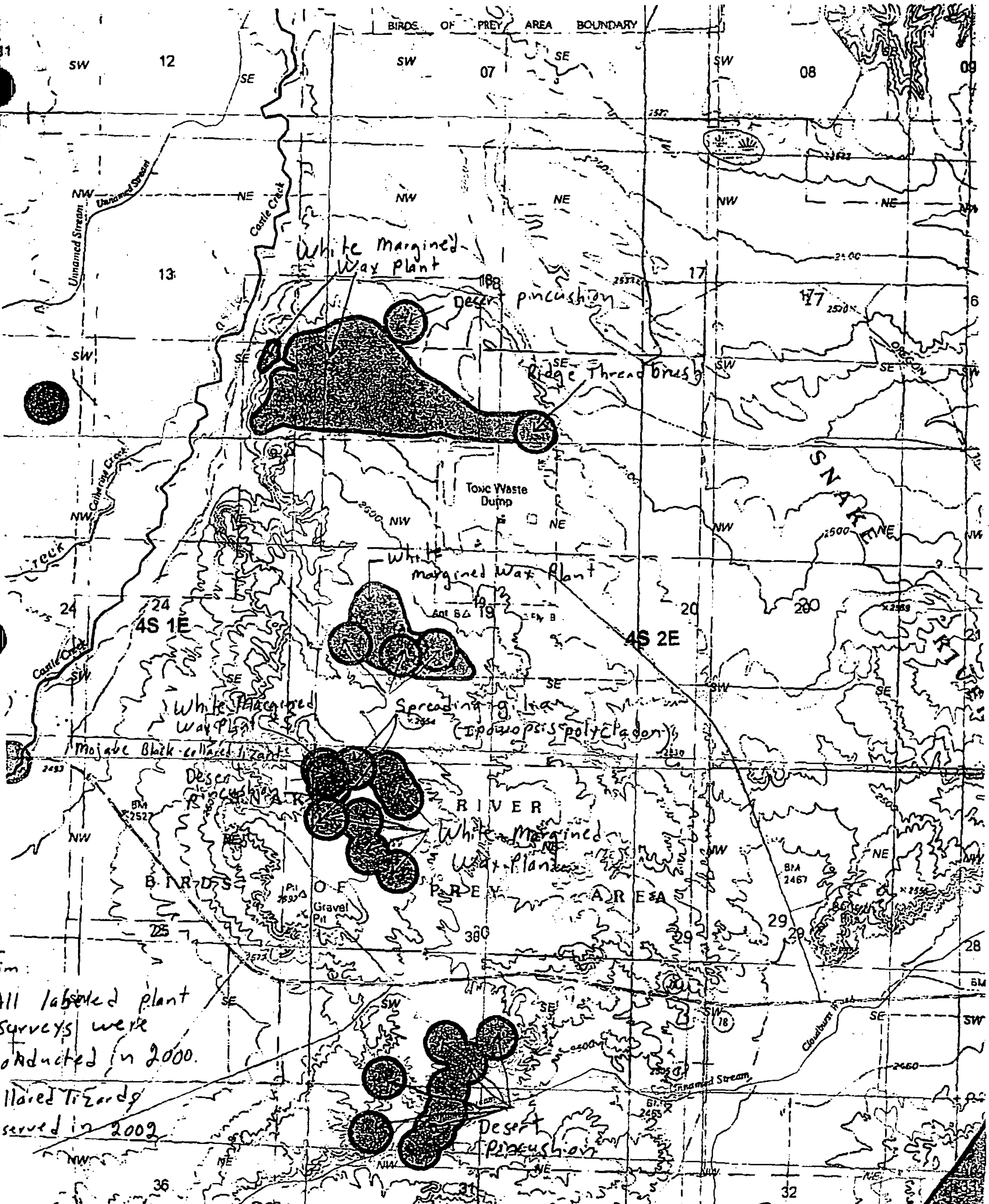
Sincerely,

Eric Leitzinger
for

Al Van Vooren
Southwest Regional Supervisor

AV/el

Cc: NRPB



BIRDS OF PREY AREA BOUNDARY
White Margined Wax Plant
Desert pincushion
Ridge Threadbrush
Toxic Waste Dump
White margined Wax Plant
4S 1E
4S 2E
White Margined Wax Plant
Spreading gilia (Ipomopsis polycladon)
Mojave Black-collared lizards
Desert pincushion
SNAKE RIVER
White Margined Wax Plant
BIRDS OF PREY AREA
Gravel Pit
Castle Creek
Unnamed Stream
Cloudburst Wash
Desert pincushion
Tim:
All labeled plant surveys were conducted in 2000.
Collared lizards observed in 2002

BIONOMICS

May 22, 2006

Timothy Johnson
American Geotechnics
5260 Chinden Blvd.
Boise, ID 83714

Re: USEI Section 19 Landfill Siting
Threatened and Endangered Snail Species

Dear Mr. Johnson,

This letter is in response to your request concerning threatened and endangered snails and the USEI expansion plan in Section 19. On May 3, 2006, you and Mr. Rex Hansen received a letter from the US Fish and Wildlife Service listing the endangered, threatened, proposed, and candidate species potentially occurring in the location of the proposed Section 19 hazardous waste site. This list included four species of snails known to occur in Owyhee County, Idaho, the Snake River physa, Idaho springsnail, Bliss Rapids snail, and Utah valvata. The range of each of these species is restricted to the Snake River. Since the river is approximately 2.25 miles north of Section 19, it is my professional opinion that these species do not occur in the Section 19 landfill siting area.

Specific information on habitat for these snail species follows:

Utah Valvata Snail
The Utah valvata snail lives in deep pools adjacent to rapids or in perennial flowing waters associated with spring complexes. The species avoids habitats with heavy currents or rapids. The snail prefers well-oxygenated habitats of non-reducing calcareous mud or mud-sand substrate among beds of submergent aquatic vegetation. The species is absent from pure gravel-boulder bottoms. Distribution of this species is limited to a few springs and mainstem reaches in the Middle Snake River from American Falls Reservoir to the Hagerman Valley. There has been one recent collection of the Utah valvata snail from the Big Wood River drainage, but it is not known if this observation represents a relict population or recent colonization from irrigation returns via canals originating from locations of existing populations.

Snake River Physa Snail
The Snake River physa snail occurs on the underside of gravel-to-boulder size substrate in swift currents in the main stem of the Snake River. The species requires free flowing, turbulent, cold, well oxygenated waters. The Snake River physa snail has been found on boulders in the deepest accessible part of the river at the margins of rapids. Its distribution is limited to only a few locations in the Snake River, mostly in the Hagerman and King Hill Reaches.

Bliss Rapids Snail
The Bliss Rapids snail lives only in well-oxygenated coldwater in the gravel and boulders of swift currents, usually just below canyon segments of the Snake River, in rapids or on boulder bars just below rapids. It is found in a few isolated colonies, mainly in the Hagerman Valley in Idaho. Its

distribution is limited to a few locations in the main stem of the Snake River from King Hill to Banbury Springs.

Idaho Spring Snail
The Idaho spring snail is only found in the permanently flowing waters of the main Snake River. This species feeds on plant debris and microorganisms as it glides along the river bottom. It occurs only in a few mainstem Snake River sites near C.J. Strike Reservoir upstream to Bancroft Springs.

Due to the lack of perennial streams in Section 19, no suitable habitat exists in the proposed landfill siting to support these four species of snails.

Do not hesitate to call our office at (208) 939-1022 if you require any additional information.

Sincerely,

Rebecca Thompson
Wildlife Biologist
Bionomics Environmental, Inc.

AMERICAN GEO TECHNICS

APPENDIX K

US ARMY CORPS OF ENGINEERS WETLAND DELINEATION

AMERICAN GEOTECHNICS

April 17, 2006
Project No. 05B-C1202

US Army Core of Engineers, Regulatory Division
204 N 8th St., Rm 140
Boise, Idaho 83702

Attention: Greg Martinez

SUBJECT: US Ecology Idaho, Section 19 Siting Application
Grand View, Idaho

Dear Greg,

We recently spoke by phone concerning the expansion of the US Ecology Idaho Hazardous Waste Site in Grand View, Idaho, and the potential effects such an expansion may have on regulated entities in the area. We appreciate your guidance in this regard, and are sending this letter as a formal request for the US Army Core of Engineers to identify any regulated items under their jurisdiction that may be affected or have an effect on future landfills. These items include, but are not limited to, wetlands and flood plains. As you requested, we have attached a map indicating the area US Ecology will apply to have approved for future landfills. This area includes all of Section 19, which is located within Township 4S, Range 2E, Owyhee County, Boise Meridian, Idaho.

The map shows the current US Ecology Idaho property boundaries. A bold line is shown bounding Section 19 as the area being considered for hazardous waste landfills. We request that you consider all of Section 19 in your review as shown within the bold siting boundary line.

Please provide a letter indicating the existence and/or status of any regulated items that may be adversely affected by the addition of landfills or may adversely affect landfills located within Section 19. For your convenience, you may email a signed copy of a letter in PDF format to either *rhansen@americangeotechnics.com* or *tjohnson@americangeotechnics.com*. Please let us know if there is anything else we can do to help you with your review, and thank you in advance for your efforts on our behalf.

Respectfully submitted,

American Geotechnics

Timothy C. Johnson, EIT
Geotechnical Engineer

Rex W. Hansen, PE
Geotechnical Engineer

Attachment: Figure 2, Property Line & Section 19 Siting Map, US Ecology, Grandview, Idaho. April 2006.

Letter included without attachments unless otherwise noted.

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA, WASHINGTON 99362-1876

REPLY TO
ATTENTION OF

May 9, 2006

Regulatory Division

SUBJECT: NWW No. 060600050

Mr. Rex W. Hansen, P.E.
American Geotechnics
5260 Chinden Boulevard
Boise, Idaho 83714

Dear Mr. Hansen:

This is in response to your April 17, 2006 letter requesting our comments on U.S. Ecology Idaho's proposed expansion of their hazardous waste site near Grand View, Idaho. Based on our review of the information provided with your letter, the project will have no effect on navigation, flood control, or any Federal projects administered by the Corps of Engineers.

Regarding our regulatory responsibilities, Section 404 of the Clean Water Act (33 U.S.C. 1344) requires a Department of the Army permit be obtained for the discharge of dredged or fill material into waters of the United States. Castle Creek is a water regulated under Section 404. Activities regulated under Section 404 include excavation and mechanized landclearing activities which result in the discharge of dredged material and destroy or degrade waters of the United States.

Based on the information provided, it appears the proposed project will not involve work in areas subject to our jurisdiction and a Department of the Army permit will not be required. If you have any questions concerning these regulatory matters, please contact Mr. Greg Martinez at 208-345-2154, fax 208-345-2968.

Sincerely,

A. Bradley Daly

A. Bradley Daly
Chief. Regulatory Division

ENCLOSURE 1

"Envirosafe Services of Idaho, Inc., Grand View, Idaho, ESII Site B, Site Characterization and Groundwater Monitoring Program, February 1986, Volume IA - Text"

ENCLOSURE 2

CD labeled, "Envirosafe Services of Idaho, Inc., Grand View, Idaho, ESII Site B, Site Characterization and Groundwater Monitoring Program, February 1986, Volume I Appendix A to E and Volume II Appendix F"