

SAFETY INSPECTION REPORT AND COMPLIANCE INSPECTION

1. LICENSEE/LOCATION INSPECTED: Mr. Chris Echterling 11450 Waterson Court Louisville, KY 40299-2389 REPORT NUMBER(S) 15000016/2012002		2. NRC/REGIONAL OFFICE Region III U. S. Nuclear Regulatory Commission 2443 Warrenville Road, Suite 210 Lisle, IL 60532-4352	
3. DOCKET NUMBER(S) 150-00016	4. LICENSE NUMBER(S) 201-605-90 (KY)	5. DATE(S) OF INSPECTION September 19, 2012	

LICENSEE:

The inspection was an examination of the activities conducted under your license as they relate to radiation safety and to compliance with the Nuclear Regulatory Commission (NRC) rules and regulations and the conditions of your license. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector. The inspection findings are as follows:

- ☐ 1. Based on the inspection findings, no violations were identified.
- ☐ 2. Previous violation(s) closed.
- ☐ 3. The violation(s), specifically described to you by the inspector as non-cited violations, are not being cited because they were self-identified, non-repetitive, and corrective action was or is being taken, and the remaining criteria in the NRC Enforcement Policy, to exercise discretion, were satisfied.


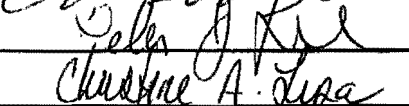
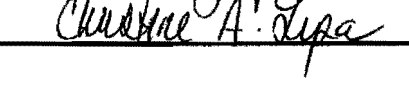
Non-cited violation(s) were discussed involving the following requirement(s):

- ☒ 4. During this inspection, certain of your activities, as described below and/or attached, were in violation of NRC requirements and are being cited in accordance with NRC Enforcement Policy. This form is a NOTICE OF VIOLATION, which may be subject to posting in accordance with 10 CFR 19.11.
(Violations and Corrective Actions)

Title 10 Code of Federal Regulations (CFR) 150.20(b), requires, in part, that notwithstanding any provision to the contrary in any specific license issued by an Agreement State to a person engaging in activities in a non-Agreement State under the general licenses provided in this section, the general licenses provided in this section are subject to all the provisions of the Act, now or hereafter in effect, and to all applicable rules, regulations, and orders of the Commission including the provisions of 10 CFR part 20 of this chapter.

Statement of Corrective Actions

I hereby state that, within 30 days, the actions described by me to the Inspector will be taken to correct the violations identified. This statement of corrective actions is made in accordance with the requirements of 10 CFR 2.201 (corrective steps already taken, corrective steps which will be taken, date when full compliance will be achieved). I understand that no further written response to NRC will be required, unless specifically requested.

TITLE	PRINTED NAME	SIGNATURE	DATE
LICENSEE'S REPRESENTATIVE	Chris Echterling, CHMM		11/9/12
NRC INSPECTOR	Peter J. Lee, Ph.D., CHP		11-6-12
BRANCH CHIEF	Christine A Lipa		11-6-12

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(Continued)

10 CFR 20.1204(e) requires, that If the identity and concentration of each radionuclide in a mixture are known, the fraction of the DAC applicable to the mixture for use in the calculating DAC-hours must be either (1) the sum of the ratios of the concentration to the appropriate DAC value from appendix B to part 20 for each radio-nuclide in the mixture, or (2) the ratio of the total concentration for all radionuclides in the mixture to the most restrictive DAC value for any radionuclide in the mixture.

Contrary to the above, for the University of Missouri-Columbia, Pickard Hall Phase 3 Characterization Survey Report dated October, 2011(ML11353A106), Section 9.2, Air Sampling, the licensee failed to apply 10CFR 20.1204(e)(1) or (2) to determine the fraction of DAC applicable to the mixture of Th-232 and Ra-226 for use in the calculating DAC-hours. The use of the incorrect method would underestimate the doses to the worker by a factor of 237.

The licensee performed corrective actions as described in the letter dated November 1, 2012 (ML12310A127). The inspector determined that the corrective actions were adequate.

Continued from Part 3

Based on secular equilibrium, number of alpha per Th-232 decay is 5.4. The actual number of alpha collected in the filter per Th-232 decay will be less than 5.4 due to the particulate filter cannot catch Rn-220, also short-lived Rn-220 daughters will decay away before the filter counting. Because of that, the actual number of alpha per Th-232 in the filter should be 3. Also, the actual number of alpha per Ra-226 in the filter should be about 1.8, due to Rn-222, and short-lived daughters from Rn-222. Then, the modified gross alpha DAC will be about 4 E-12 uCi/ml .

The dose to the worker, based on the DAC-hours, will be underestimated by a factor of 237 due the the incorrect gross alpha DAC.

Docket File Information**SAFETY INSPECTION REPORT AND COMPLIANCE INSPECTION**

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6. INSPECTION PROCEDURES USED

87104

7. INSPECTION FOCUS AREAS

Decommissioning/Characterization

SUPPLEMENTAL INSPECTION INFORMATION

1. PROGRAM CODE(S)

2. PRIORITY

3. LICENSEE CONTACT

Mr. Chris Echterling

4. TELEPHONE NUMBER

(865) 481-8801

☐ Main Office Inspection

Next Inspection Date: _____

☐ Field Office Inspection _____

☒ Temporary Job Site Inspection University of Missouri-Columbia, Pickard Hall

PROGRAM SCOPE

The inspector reviewed the University of Missouri-Columbia, Pickard Hall Phase 3 Characterization Survey Report and determined the gross alpha DAC of 9.5 E-10 uCi/ml, stated in section 9.2, Air Sampling, is incorrect. Based on the methodology stated in 10CFR 20.1204(e)(1), the gross alpha DAC should be about 4.0 E-12 uCi/ml.

The gross alpha DAC from decay chains of Th-232 and Ra-226 is derived as follows:

$$1/\text{DAC} = \frac{(\text{fraction of gross alpha from Th-232 decay chain}) / (\text{number of alpha per Th-232 decay} \times \text{DACTh-232})}{+ (\text{fraction of gross alpha from Ra-226 decay chain}) / (\text{number of alpha per Ra-226 decay} \times \text{DACRa-226})}$$

Based on Chase characterization survey report:

Mixture of contamination: 75% Ra-226, 25%Th-232,

Number of alpha per Th-232 decay: 5.4,

Number of alpha per Ra-226 decay: 4.2,

$$\text{Fraction of gross alpha from Th-232 decay chain} = (0.25 \times 5.4) / (0.25 \times 5.4 + 0.75 \times 4.2) = 0.3$$

$$\text{Fraction of gross alpha from Ra-226 decay chain} = (0.75 \times 4.2) / (0.25 \times 5.4 + 0.75 \times 4.2) = 0.7$$

$$\text{DACTh-232} = 5 \text{ E-13 uCi/ml,}$$

$$\text{DACRa-226} = 3 \text{ E-10 uCi/ml,}$$

Then, the derived gross alpha DAC is 9.0 E-12 uCi/ml.

Continued to Part 2



Waste Management and Remediation Services

Peter Lee, Ph.D., CHP
Region III
U.S. Nuclear Regulatory Commission
2443 Warrenville Road, Suite 210
Lisle, IL 60532-4352

November 1, 2012

RE: Corrective Actions for Incorrect DAC Calculation

Dr. Lee

Chase Environmental Group has implemented the following corrective actions in response to the finding of an incorrect DAC calculation;

- Chase has issued a non-conformance report per Chase's Quality Assurance and Quality Control procedures.
- Chase has reviewed previous projects to determine the extent of the incorrect calculation. Chase has discovered that the same calculation error was made on one other project for the University of Missouri.
- Chase is correcting affected reports.
- Chase has reviewed dosimetry records to ensure that the correct dose has been documented for employees in 2011. Chase has discovered that there is no change to dosimetry records due to the calculation error. Per 10 CFR 20.1502, Chase was not required to perform individual monitoring of external and internal occupational dose of the Chase employees on the University of Missouri projects.
- Chase will perform training on DAC calculations per the methods in 10 CFR 20.1204.

I trust that you will find these actions sufficient to ensure that the same error is not repeated. If you have any questions or concerns, please feel free to contact me at 865-481-8801 or cechterling@chaseenv.com.

Thank you,

A handwritten signature in black ink, appearing to read 'Chris Echterling', written over a horizontal line.

Chris Echterling
Radiation Safety Officer