# MACTEC

## engineering and constructing a better tomorrow

April 7, 2010

Mr. Joe Ritchey
S & K Moab TAC Team
S & K Aerospace, Inc.
200 Grand Avenue, Suite 500
Grand Junction, CO 81501

SUBJECT:     Crescent Junction Disposal Cell Average Radon Flux Supplemental Calculation

Reference:    *Evaluation of Insufficient Cover Thickness at Crescent Junction Disposal Cell Edge*,
              2009, Jacobs Engineering, Oak Ridge, Tennessee.

Dear Mr. Ritchey:

Previous assessments performed by MACTEC and detailed in its report entitled, *Assessment of the Design of the Crescent Junction Disposal Cell Cover,* demonstrate that, despite the cover design flaw at the Crescent Junction Disposal Cell edge, no modifications or rework of already placed uranium mill tailings are necessary to meet the EPA's regulatory requirement that the radon flux be less than 20 picocuries per square meter per second ($pCi/m^2s$).  The basis for this conclusion came from the EPA regulation itself, which states that the 20 $pCi/m^2s$ limit applies as an average over the entire surface of the disposal cell.  Despite the design flaw, the constructed portions of the disposal cell edge represent such a small fraction of the total disposal cell area that the higher radon flux through the cover at the edge has almost no effect on the average radon flux from the entire disposal cell.

Following submission of this report, MACTEC was asked to perform another calculation to show whether or not the entire disposal cell could be constructed as designed, with the flaw included, and still not exceed the 20 $pCi/m^2s$ limit.  This calculation was done in the same manner as described in MACTEC's report, *Assessment of the Design of the Crescent Junction Disposal Cell Cover*.  Using the radon flux values modeled by Jacobs Engineering in its report, *Evaluation of Insufficient Cover Thickness at Crescent Junction Disposal Cell Edge*, as well as dimensions provided by DOE to MACTEC, the radon release rate (pCi/s) was calculated for the edge portions of the disposal cell as well as the remainder of the disposal cell area.  These release rates were summed to find the total radon release rate (pCi/s) over the entire cell, which was then divided by the cell's area to find the average radon flux.

The results of Jacobs Engineering's calculations are shown in the figure entitled *Radon Flux at Disposal Cell Edge* (Attachment 1).  A summary of values used in the average radon flux calculation, as well as the result, are shown in the table entitled *Disposal Cell Areas and Fluxes* (Attachment 2).  The calculations result in an average radon flux over the entire disposal cell surface of 19.16 pCi/m$^2$s.  Thus, the disposal cell's designed radon flux, even if the design flaw had not been found, identified, or addressed, does not exceed the EPA's regulatory requirement.
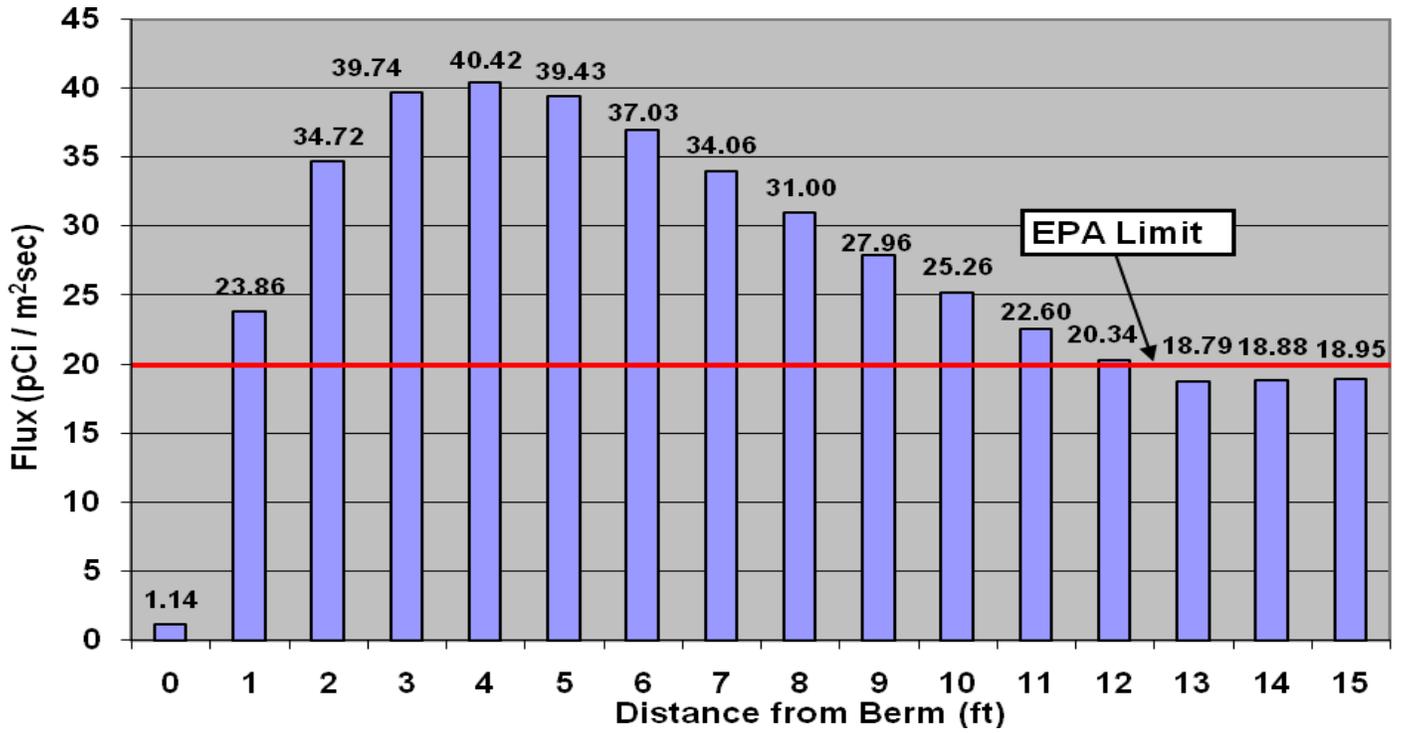
Sincerely,

Jeffrey W. Lively, CSP, RRPT
Senior Principal Health Physicist

JWL/JDD/JED
Attachments:    Radon Flux at Disposal Cell Edge
                Disposal Cell Areas and Fluxes

**Radon Flux at Disposal Cell Edge (Jacobs Engineering, 2009)**

**Disposal Cell Areas and Fluxes**

| Distance from Berm (feet) | Area (m$^2$) | Radon Flux (pCi/m$^2$ s) | Radon Release Rate (pCi/s) |
|---|---|---|---|
| 1 | 1162.40 | 23.86 | 27,734.93 |
| 2 | 1162.03 | 34.72 | 40,345.72 |
| 3 | 1161.66 | 39.74 | 46,164.35 |
| 4 | 1161.29 | 40.42 | 46,939.26 |
| 5 | 1160.92 | 39.43 | 45,774.93 |
| 6 | 1160.54 | 37.03 | 42,974.97 |
| 7 | 1160.17 | 34.06 | 39,515.50 |
| 8 | 1159.80 | 31.00 | 35,953.85 |
| 9 | 1159.43 | 27.96 | 32,417.66 |
| 10 | 1159.06 | 25.26 | 29,277.81 |
| 11 | 1158.69 | 22.60 | 26,186.32 |
| 12 | 1158.32 | 20.34 | 23,560.13 |
| 13 | 1157.94 | 18.79 | 21,757.76 |
| 14 | 1157.20 | 18.88 | 21,847.94 |
| 15 | 791,888.86 | 18.95 | 15,006,293.99 |
| Total Area (m$^2$): 808,128.32 | Average Flux (pCi/m$^2$ sec): 19.16 | | |