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This memorandum is intended to transmit the comments of the EPA Region 2 office concerning *Technical Memorandum, Application of 10 CFR Part 40, Appendix A, Criterion 6(6) and Derivation of Benchmark Doses for the Seaway Landfill Areas A, B, and C, Tonowanda, New York, July 21, 2000*, as submitted for review by your office.

The subject document is intended to present the development of potential cleanup goals for site specific contaminants found at the Formerly Utilized Sites Remedial Action Program (FUSRAP) Seaway site. The cleanup goals are developed using 10 CFR Part 40 Appendix A, I, Criterion 6(6) [henceforth Criterion 6(6)] as a guideline for developing site specific cleanup goals for contaminants of concern on site.

While the document is clear in its intent, we find the underlying assumptions for the use of Criterion 6(6) to be flawed. In addition, my office has determined that the use of the benchmark dose criterion has many flaws in its application in this document. Our major concerns follow.

Elimination of the Surface Water Pathway As An Exposure Pathway

Section 2.2 (*Exposure Pathways*) of the document eliminated the surface water pathway because "There is no surface water (ponds or streams) within the site boundaries. Thus the surface water consumption and fish ingestion pathways are considered to be incomplete." We feel that the surface water pathway was incorrectly eliminated given the existence of drainage swales on the Seaway site and the recent results of water sampling by the New York State Department of Environmental Conservation which detected 10 pCi/l of uranium in Rattlesnake Creek - an indication that uranium is leaching into Rattlesnake Creek from Seaway or one of the other FUSRAP sites in the area. Exposure pathways are not necessarily confined to site boundaries; thus, the surface water pathway should be included in the exposure assessment at Seaway.

The Use of 10 CFR 192 as a Relevant and Appropriate Regulation

Because of the interrelationship between the standards under 40 CFR Part 192 and those under Criterion 6(6), the radium benchmark approach should only be considered after 40 CFR Part 192, the Uranium Mill Tailings Radiation Control Act (UMTRCA), has been determined to be an

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applicable or relevant and appropriate requirement (ARAR) for use at Seaway. It has been acknowledged that the UMTRCA rule is not applicable at the Seaway site since the waste products predate 1978. UMTRCA may still be considered by some to be relevant and appropriate for use at Seaway, however.

The uranium mill tailings standard was developed for the remediation of inactive uranium processing sites. This would appear to make the standard relevant for use at the Seaway landfill site. Under normal circumstances it may. However, according to *Technical Memorandum, Modeling of Radiological Risks from Residual Radioactive Materials Following Implementation of Remedial Alternatives for Seaway Landfill Areas A, B, and C, Tonowanda, New York, June, 2000*, "actinium-227 is present at much higher concentrations than would normally be expected" in the Ashland 1 waste products disposed at Seaway. The elevated levels of actinium-227 are present in equilibrium with protactinium-231 in the Seaway wastes, as modeled by your office.

Actinium-227 and protactinium-231 are both decay products in the uranium-235 decay series. The UMTRCA standard was developed with a markedly different waste product in mind. The standard was designed taking into account the residual radioactivity from the uranium-238 decay series: thorium-230, radium-226 and radon-222.¹

UMTRCA acknowledges the presence of uranium-235 decay products in uranium mill tailings, but they are assumed to be present in insignificant quantities. Within the tailings "there are also radioactive materials from two other decay processes in uranium ore [in addition to those of the uranium-238 decay series], the uranium-235 series and the thorium-232 series, *but these are present in much smaller amounts, and we have concluded that it is not necessary to include them in our analysis* [emphasis added]."²

This is clearly not the case in the uranium process waste materials disposed of at Seaway. Your *Technical Memorandum, Modeling of Radiological Risks from Residual Radioactive Materials Following Implementation of Remedial Alternatives for Seaway Landfill Areas A, B, and C, Tonowanda, New York, June 2000* indicates that uranium-235 decay product concentrations are "high enough to contribute significantly to dose."

The same technical memorandum also indicates that "radium was sometimes recovered as well as uranium, further distorting the natural relative abundances in the uranium chain." This is further proof that any action for dealing with the Ashland 1 wastes at Seaway would be inappropriately addressed by the UMTRCA standard.

It is the view of our office that these points argue against the use of UMTRCA as an appropriate requirement at Seaway. The materials disposed there are clearly not the waste products

¹Final Environmental Impact Statement for Remedial Action Standards for Inactive Uranium Processing Sites (40 CFR 192), Volume I, Chapter 3, Section 3.1.

²Final Environmental Impact Statement for Remedial Action Standards for Inactive Uranium Processing Sites (40 CFR 192), Volume I, Page 15.

envisioned when 40 CFR 192 was drafted and adopted.

If 40 CFR 192 is not an ARAR at Seaway, then what of Criterion 6(6)?

The Criterion 6(6) rule is a supplement to the radium standards of 40 CFR 192. Therefore, when the standards under EPA's UMTRCA rule are not relevant and appropriate regulations, Criterion 6(6) is not relevant and appropriate.

Using the Benchmark Dose Criteria for Surface Soils

If the majority of radiological risks posed by contaminants of concern at a site in soil and structures are the same as those existing at Nuclear Regulatory Commission (NRC) uranium/thorium mills and uranium recovery facilities, then the Criterion 6(6) rules benchmark dose limits may be a relevant and appropriate requirement for those contaminants: radium-226, radium-228, thorium-230, thorium-232, uranium-234 and/or uranium-238.³

The Criterion 6(6) technical memorandum submitted by your office includes benchmark doses for actinium-227, protactinium-231, thorium-230, thorium-232 and total uranium in soil. As stated earlier, the use of Criterion 6(6) implies that UMTRCA is relevant and appropriate for use at Seaway. If this is the case, the combined levels of thorium-230 and thorium-232 should be limited to the same concentration as their radium progeny. To meet a permanent clean-up objective for radium at 5 pCi/g, there needs to be reasonable assurance that thorium-230 (parent of radium-226) and thorium-232 (parent of radium-228) will be cleaned up to the same concentrations. Therefore, whenever the 5 pCi/g and/or 15 pCi/g standards for radium are used as relevant and appropriate requirements at sites with thorium contamination, the same soil standards apply to the combined thorium contamination. So, in this case, it is inappropriate to use radium benchmark doses to develop thorium cleanup goals.

The values shown in Appendix A of the technical memorandum indicate benchmark soil concentrations for thorium-230 which range from 15 pCi/g to 44 pCi/g and thorium-232 levels which range from 3.5 pCi/g to 9.6 pCi/g. In all cases the thorium levels should be combined (Th-230 + Th-232) and should be equal to the radium clean-up level.⁴

Further, it is inappropriate to use Criterion 6(6) to develop soil cleanup goals or standards for actinium-227 and/or protactinium-231, as you have done. Again, these contaminants were not addressed or envisioned by the UMTRCA rule, which Criterion 6(6) supplements.

³For further information regarding this EPA determination, see the memorandum from Stephen D. Luftig titled: "Remediation Goals for Radioactively Contaminated CERCLA Sites Using the Benchmark Dose Cleanup Criteria in 10 CFR 40 Appendix A, I, Criterion 6(6)" (OSWER Directive No. 9200.4-35P).

⁴For further information regarding this EPA determination, see the memorandum from Stephen D. Luftig titled: "Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA sites" (OSWER Directive No. 9200.4-25).

Using the Benchmark Dose Criteria for Subsurface Soils

The 15 pCi/g radium-226 clean-up criterion for subsurface soil as found in Subpart B of UMTRCA is not a health-based standard, but was developed for use as a tool for locating and remediating discrete deposits of high activity tailings in subsurface locations at mill sites and vicinity properties. The criterion for subsurface soil was originally proposed as 5 pCi/g. The criterion in the final rule was changed, *not* because of a reassessment of the level of contamination that would present a threat to public health and the environment, but rather in order to reduce the cost to the Department of Energy (DOE) of locating buried tailings. EPA analysis found that by cleaning up the high activity waste located using the 15 pCi/g finding tool, DOE would achieve essentially the same degree of cleanup as originally proposed under the 5 pCi/g criterion.⁴

With this in mind, the UMTRCA subsurface clean-up level for radium-226 is not an appropriate soil concentration for benchmarking dose levels for other radionuclide contamination and should *never* be used as such. Our office strongly disagrees with the use of the 15 pCi/g radium cleanup level as a basis for benchmarking. Since the NRC's UMTRCA radium standards in 10 CFR 40 are intended as conforming standards to EPA's UMTRCA standards under 40 CFR 192, when conducting a dose assessment to show compliance with the Criterion 6(6) rule as a relevant and appropriate requirement, a concentration of 5 pCi/g should be used as the radium benchmark level for dose calculations.³

Conclusions

We have raised serious technical issues related to the Criterion 6(6) technical memorandum submitted by your office. We believe these issues invalidate your analysis and hence the radionuclide clean up levels you have derived and proposed for this site. Notwithstanding this, we do not feel that the issues are insurmountable. I am confident that our technical staffs will be able to reach an agreement concerning cleanup goals for the Ashland wastes at Seaway if you desire.

Should you wish to discuss these technical issues further, please contact [redacted] (214-637-[redacted]) [redacted] (in [redacted]) of my staff.

Sincerely,

[redacted signature block]

JW Radiation and Indoor Air Branch

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