UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

JUL 18 2002

Larry Erickson, P.E.
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Missouri Department of Natural Resources
P.O. Box 176
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Dear Mr. Erickson:

This is in response to your letter of April 25, 2002, in which you request guidance from the U.S. Environmental Protection Agency (EPA) on a series of questions related to cleanup standards or criteria in the context of the U.S. Army Corps of Engineers' (USACE) soil cleanup activities at the North County portion of the St. Louis Formerly Utilized Site Remedial Action Program (FUSRAP). The central purpose of your questions is to help establish what level of cleanup will support any land use. As a site on EPA's National Priority List (NPL), the cleanup is subject to the Superfund program expectations as established by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA) and the implementing regulations found in the National Contingency Plan (NCP), as well as EPA policy and guidance. Defining soil cleanup goals that will support any land use is an involved process subject to professional judgement and site-specific interpretation, although there are a number of established guidelines that should be considered. Some of the more relevant guidelines are as follows:

The NCP - Section 300.430(e)(2)(i)(A) establishes that remediation goals shall establish acceptable exposure levels by considering Applicable, or Relevant and Appropriate Requirements (ARARs), and in cases where ARARs are not available or are not protective, site-specific remediation goals are derived through risk assessment. For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} (or, between 1 in 10,000 and 1 in 1,000,000) using information on the relationship between dose and response.

Although the 10^{-6} risk level serves as the point of departure for determining remediation goals, remedial actions that result in residual risks at or below the upper end of the risk range are generally considered protective of public health. (Note: I omitted any discussion on the expectation for systemic toxicants since, at this site, we are principally dealing with carcinogenic effects.)

The NCP - Section 300.430(f)(4)(ii) establishes that a remedial action must result in a condition that allows for "unlimited use and unrestricted exposure", or a periodic review (5-Year Review) must be conducted. This is also generally considered the policy threshold for determining whether a site requires institutional control. Guidelines found in EPA's Land Use Directive, Risk Assessment Guidance (RAGS I Part A), Soil Screening Level Guidance, etc., serve to put some practical definition to what is meant by unlimited use and unrestricted exposure.

Superfund exposure assessments generally classify land use according to three categories: 1) Residential, 2) commercial/industrial, and 3) recreational. Residential land-use assumptions generally result in the most conservative exposure estimates.

It is important to note that "residential cleanup" does not necessarily equate to a cleanup that supports unlimited use and unrestricted exposure. To paraphrase from the most recent EPA guidance on Institutional Controls, two common examples of a site condition that supports residential use, but does not meet the unlimited use and unrestricted exposure threshold are the following: 1) The remediated property overlies a contaminated groundwater plume; and 2) The property is remediated to a depth designed to support residential use, but underlying deep contamination is left in place. In both of these cases, use restrictions would likely be necessary. Note the presumption that, absent the sort of modifying considerations provided in the examples, a cleanup that supports residential use is generally a cleanup that meets the expectation of unlimited use and unrestricted exposure.

With these guidelines in mind, I will address your specific questions in order. Rather than repeat your questions, I have enclosed a copy of your letter for reference. To simplify the discussion I have made the judgement that the criterion for U-238 and the sum-of-the-ratios computation is not the focus of what is at issue. If that is not the case, we can revisit those matters later.

1) The criteria for Ra-226 and Th-230 found in the EE/CAs for the North County Site derive from the soil cleanup standards in 40 CFR 192 promulgated under the Uranium Mill Tailings Control Act of 1978 (UMTRCA). The soil standards found in 40 CFR 192, i.e., 5/15 pCi/g Ra-226, were designed to achieve a "residential" standard.

OSWER Directive 9200.4-25 "Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites" (2/12/98) describes the circumstances under which the standards in 40 CFR 192 may be used as an ARAR for cleanup of a CERCLA site. To summarize, EPA considers the surface standard of 5 pCi/g of radium above background to be a protective, health-based level for sites with conditions sufficiently similar to those found at uranium mill tailing sites. In this context, that is interpreted to mean that it meets a "residential" standard. The subsurface standard of 15 pCi/g is not considered a health-based standard, but rather a technology-based standard that should be used only in circumstances where the nature

and distribution of contamination is sufficiently similar to that found at uranium mill tailing sites, i.e., sites where there is not big expanses of minimally contaminated material in the subsurface. In other words, applying the 15 pCi/g standard should not result in leaving behind a lot of material greater than 5 pCi/g radium. In these circumstances, the 5/15 pCi/g standards may be considered relevant and appropriate for thorium cleanup as well.

To answer your question more directly, EPA would probably approve the 5/15 pCi/g standards as an "any use" remediation goal for radium and thorium at the St. Louis North County sites under the assumption that contaminant distributions in the subsurface are appropriate. I am relying on an evaluation of the post-cleanup confirmation data to examine the validity of that assumption. In addition, post-cleanup dose and risk assessment will be performed as a further check on whether residual risks fall within the acceptable range.

2) The criteria outlined here appear to be what the USACE has indicated is under consideration for the North County Site Proposed Plan. For comment on the Ra-226 criteria and the Th-230 subsurface criterion, see Number 1 above. The net difference between the criteria outlined here and what is contained in the North County EE/CA is the surface criterion for Th-230. My understanding is that the limiting risk consideration for thorium is from ingrowth to radium and that 14 pCi/g thorium is the equivalent of 5 pCi/g radium after a period of 1000 years. This seems to be a sensible rationale, although I have no guidance to rely on here. Whether or not EPA would approve this as an "any use" remediation goal is a judgement call that will be made in consultation with EPA Headquarters.

You ask whether the EPA will be able to "concur with 5 pCi/g, 6.9 pCi/g gross for Ra-226 as appropriate for either a residential or free release (any use) scenario considering cleanup criteria more stringent than 5 pCi/g for Ra-226 are achievable as evidenced by....", followed by a series of site-specific examples intended to support the idea that cleanup more stringent than 5 pCi/g is achievable. Understand that there is no expectation that the cleanup meet the 'most stringent goal achievable', only that it be protective according to the standard outlined in the second paragraph of this letter. I would have to review the instances you cite in detail to understand the site-specific basis before I could comment. On the last point, it is fully expected that the conservatism of design and the mechanics of soil remediation will typically result in over excavation relative to the remediation criteria.

The second bullet under your comment number 2 is apparently intended to point out that 5 pCi/g Ra-226 does not meet the acceptable risk range under a residential scenario. While that is true, it is also misleading. The risk calculation used here is based on a hypothetical condition in which the exposed individual resides on a limitless expanse of contaminated soil with a concentration at the cleanup level. Actual post-cleanup conditions will not resemble this hypothetical scenario, but rather, will more likely be characterized by small, thin, and sporadic occurrences of low concentration residual contamination resulting in negligible exposures to a resident.

Let me point out here, that EPA's ultimate acceptance of the cleanup as one that has met the remedial goal, i.e., no use restrictions, is contingent on the demonstration that residual risks based on actual post-cleanup conditions are acceptable.

3) As explained under number 1 above, EPA is on record that 5 pCi/g above background for radium is a protective standard for CERCLA sites at which it is considered ARAR. Deriving concentrations from dose may provide interesting or useful comparisons, but are subject to the same limitations as described at the end of number 2 above and would not be considered an overriding factor.

4) Perhaps I don't fully understand your point, but the remediation criteria being used or contemplated at the North County sites are intended to result in a final condition that does not need to be maintained in order to be protective. Any contaminated residual that remains should be characterized by small volume, sporadic occurrence, and low concentrations such that the maximally exposed individual would not incur any significant exposure. Hypothetical exposure to the individual through digging or redistributing material are factored into the assessment. Any disturbance of the land through erosion or construction activity should not change this assessment. This is not comparable to a situation where significant levels or volumes of waste or contaminated material are left at depth or capped in a manner that must be maintained and restricted in order be protective.

5) The underlying basis for determining whether or not use restriction is necessary is risk assessment. Every risk assessment will contain a finite set of exposure scenarios and assumptions. Strictly speaking, it is not possible to evaluate "ALL land uses". There will always be potential uses or exposures that go unevaluated, but the program does place some practical expectations on what should be considered. Under CERCLA, the standard for comparison is described as reasonable maximum exposure (RME). Under this scenario, exposure pathways should incorporate all the ways in which it is contemplated that an individual might reasonably be exposed to the contaminated media. Generally speaking and absent any complicating circumstances, a cleanup is considered to meet an unrestricted standard if it achieves a protective condition in cases where RME is characterized by a conservative suburban residential scenario.

If this goal is met, the general expectation is that there would be no need to manage the situation further. The sorts of property management practices you suggest would be more appropriately considered for areas that do not meet this goal.

Many of the key EPA guidances and policies pertaining to cleanup of Superfund radiation sites can found at the following websites:

http://www.epa.gov/superfund/resources/radiation/radarars.htm and
http://www.epa.gov/superfund/resources/radiation/whatsnew.htm

In closing, I hope this provides a start in responding to your questions and will contribute to building a consensus on remediation goals for the North County Site. I look forward to participating in the workshops scheduled for next month.

Sincerely,

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Remedial Project Manager

Enclosure

cc: Ms. Sharon Cotner, USACE
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