



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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KANSAS CITY, KANSAS 66101

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Dear Mr. Adler:

We have completed our review of the Remedial Investigation Report for the St. Louis Site, dated June 1991, and the referenced appendices. The following comments generally begin with the document with the earliest completion date and proceed chronologically through the later documents. Because of the large volume of material reviewed and the fact that in many cases DOE's efforts have been completed for a number of years, our comments focus primarily on those issues we believe have potential implications for the remaining Remedial Investigation/Feasibility Study efforts.

GENERAL COMMENTS

1. The potential for the existence of significant contamination within the building structure on the Futura Coating property has not been adequately assessed. An examination of the Figure 1 of the 1977 report "Radiological Survey of the Property at 9200 Latty Avenue" together with a similar figure in the 1987 "Radiological Characterization Report for the Futura Coatings Site" indicates that substantial portions of the old buildings 1, 2, and 4 have been incorporated into the present-day Futura Coatings buildings. Page 14 of the 1977 report states that smear samples for removable contamination were not quantitative because many were taken on surfaces where dust had accumulated to a thickness of 0.5 to 1 centimeter. Also, no gamma surveys of the interior walls in areas of incorporation of the old buildings have been performed. Finally, because in the 1987 report sampling heights are not given, the nature of activities in the buildings is not discussed, and building compartmentalization and ventilation are not discussed no conclusions can be reached on the extent to which results can be considered representative of conditions in the buildings or representative of exposures to the building occupants.

2. The copy of the 1981 document "Radiological Survey of the Mallinkrodt Chemical Works" provided for our review is missing pages 98, Table 21; 99, Figure 43; 102 Figure 45, and 103 Figure 46. Please forward these missing pages for our review.

3. The 1981 report also states that the Plant 4 and Destrehan properties were released to Mallinkrodt in 1961-62 following decontamination. It is stated that contaminated earth was removed and backfilled by the AEC. What is the current location of this contaminated earth?

4. An ionium pad is identified in the 1981 report as a storage location for thorium-230 and the site of thorium-230 soil contamination. The ionium pad location is described as being "south of Building 708", but its exact location cannot be determined from the information provided. Examination of the contamination zones identified in the 1990 survey report for this site shows no special concentration of boreholes in the area south of Building 708. Thus it appears that the area and depth of thorium-230 contamination at the ionium pad location have not yet been determined.

5. A fairly extensive radon survey of buildings was carried out in the course of the survey activity described in the 1981 report on the Mallinkrodt property. Radon above a nonoccupational guideline of 3 picoCuries per liter (pCi/L) was found in buildings K1E, 52A, and 101. However, in the 1990 report on the SLDS, Building 101 was omitted from the radon survey even though in the 1981 survey it showed an average radon concentration of 6.6 pCi/L and a range of values up to 69 pCi/L. The reason for omitting Building 101 in the 1990 survey appears to be that Building 101 was not used in past uranium processing operations. The 1990 survey report shows elevated external gamma radiation in Building 101, but makes no mention of radon levels in the building and attributes the elevated gamma radiation level to "storing products containing potassium-40." However, Building 101 was built relatively recently on the site of several demolished buildings where pitchblende ore was processed. The reason for elevated radon levels may be subsurface contamination from that earlier activity. In view of the elevated radon levels reported for this building in the 1981 survey report, the later attribution of gamma levels to natural potassium does not appear to be justified based on the available information.

6. Building 81 covers the northern portion of the old Building 400 which was a uranium processing area. It does not appear that Building 81 was evaluated in the 1990 survey. Please clarify.

7. The 1981 describes two waste pits containing high concentrations of uranium located between Buildings 101 and 116 (page 115), and Buildings 100 and 101 (page 124). It does not appear based on the information provided that either of these two pits has been thoroughly investigated.

8. The 1982 "Radiological Survey of the Ditches at SLAPS" included composite sampling of vegetation growing in contaminated areas, and analysis for radionuclides. The result was that no appreciable amounts of radium-226, thorium-232, or uranium-238 had been assimilated by vegetation. However, this survey result does not provide assurance that thorium-230 is not being assimilated by vegetation on site. The absence of an evaluation of the potential presence of thorium-230 in site vegetation may be important to the preparation of the baseline risk assessment.

9. We have several concerns with the observation well installation effort described in the 1985 report:

a) the report lacks a significant amount of data that were reportedly collected;

b) DOE apparently has no construction information on the previously installed wells, while with respect to the new wells there appears to be a preference for upgradient or cross-gradient monitoring well placement, as opposed to true downgradient locations;

c) the suggestion that the unconsolidated sediments below about 30 feet may inhibit the downward movement of ground water does not appear to be supported by the information obtained;

d) well screen placement appears not to be optimal. All well screens were placed 10 feet below the ground water level at the time of installation. The stated purpose was to account for seasonal fluctuations in ground water levels. However, the water levels may well have been at their yearly low since they were installed in December;

e) as detailed in Subsection 5.2, the method used to determine in-situ permeability of the sediments beneath the site was very crude. Considering that rising head tests conducted very carefully using proper protocol are commonly believed to produce accuracy no better than one order of magnitude, the tests reported here are unsuitable for any significant conclusions regarding site hydrogeology.

10. It appears that the gamma exposure rates reported in the 1986 report "Results of the Radiation Measurements Taken of Transportation Routes" may be the only such information reported for Haul Roads locations in any of the St. Louis Site documents that have been identified as Appendices to the RI report for the site. The RI summary report should summarize the 1986 gamma exposure rates and reference their location in the appendices.

11. The 1986 report on mobile gamma scanning activities notes a description of "the land use and any observed characteristics which may have influenced the response of the scanning van's

detector system is included". However, no such discussion was found in the 1986 report, and information of this type is missing from the summary report. Also, the 1986 report states that anomalies were not found along Frost Avenue and Eva Avenue. Properties along Frost and Eva Avenues are reported elsewhere to be contaminated, as determined by other survey activities. Any implications of the 1986 results for later mobile scanning results should be discussed.

12. The 1987 letter reports the existence of "reworked natural material" and of a "lined burial pit" at the SLAPS property. Please clarify the nature and exact location of this material and structure.

13. The 1987 "Characterization Report for the HISS" states that the storage pile existing in 1981 was surveyed by Oak Ridge Associated Universities (ORAU) in 1981, in a survey which also included a radiological survey of the northern and eastern boundaries of the property. The ORAU survey was reported in RADIOLOGICAL EVALUATION OF DECONTAMINATION DEBRIS LOCATED AT THE FUTURA CHEMICAL COMPANY FACILITY, 9200 LATTY AVENUE, HAZELWOOD, MISSOURI, Oak Ridge, TN, 1982. That report has not been identified as an appendix to the RI, and in any case subsequent additions to stored waste at the site would not be covered by the 1981 ORAU survey data. Yet the RI report is devoid of information on the waste piles themselves. If specific characterization data exists on the materials in the waste piles, that data should be presented in the RI report.

14. Figure 5-1 of the 1987 HISS report shows the northern (Latty Avenue) end of the property (approximately the present location of the Site Office and vehicle decontamination station) as a zone designated "CLEANED IN 1984." Additional discussion is found in the RADIOLOGICAL CHARACTERIZATION REPORT FOR FUSRAP PROPERTIES IN THE ST. LOUIS, MISSOURI, AREA, August 1990. That document states (pages 1-16 and 1-17) that BNI provided radiological support to the cities of Hazelwood and Berkeley during 1986, in road improvement and drainage system improvement activity, and that materials contaminated in excess of remedial action guidelines based on gamma count rates were removed to storage at the HISS. It has been accepted in each survey that thorium-230 may be found at the St. Louis Site in locations where the gamma count rate is not high, so there appears to be some element of uncertainty as to whether contamination of Latty Avenue has been addressed adequately. This question may arise in the RI/FS process for the St. Louis site, and DOE will need to be able to address it.

15. Subsection 5.1 of the 1987 HISS report gives an average background concentration of lead-210 for the three background locations, as 1.0 pCi/g. No analysis data for lead-210 are given for any of the soil samples, and have not been given for any of the surveys at the St. Louis Site. Lead-210 is in the uranium decay chain, being the first long-lived isotope among the progeny

of Radon-222. As a uranium decay product, lead-210 would be expected in soil onsite in concentrations higher than background. The distribution of lead-210 may be significantly different from the distribution of radium and thorium isotopes in the decay chain because of the mobility of radon gas. The possible significance of lead-210 at the St. Louis Site needs to be addressed.

16. In the 1987 report "Radiological Characterization Report for the Futura Coatings Site" almost no information is given on the air particulate monitoring methods. It is stated (page 19) that fifty air particulate filter samples were collected from September through November. For four monitoring stations, this appears to represent weekly sampling. However, one cannot determine whether samples ran continuously for a week, or if the sampling period (whatever it may have been) was appropriate for the filter type and flow rate and also appropriate for representative conditions in the buildings. As this report is silent on all of these considerations, the reader can reach no conclusion as to whether the results reflect building air activity levels relevant to human health risk.

17. In the 1987 Futura report, the gross alpha results are reported as ranging from below detection limits upward to 0.004 picoCuries per cubic meter of air. No breakdown of data by building or time variation is given. This result is compared to a DOE guideline of 0.08 pCi/m<sup>3</sup> for thorium-230 concentration in air in uncontrolled areas, referencing DOE Order 5480.1A, "Environmental Protection, Safety, and Health Protection Program for DOE Operations. The appropriateness of using the guideline itself for any purpose in the RI/FS process has not been addressed. The derivation or basis of the guideline is not given. If the thorium-230 guideline (0.08 pCi/m<sup>3</sup>) is based on current Dose Conversion Factors, it appears also that under the guideline an individual would receive the basic dose limit of 100 millirems per year after 250 days of exposure during which 20 m<sup>3</sup> of air is inhaled per day.

18. More discussion is needed concerning the "highly suspect areas" mentioned in the 1987 Futura report. What is the nature of these areas, where are they located, and what evaluation efforts have been undertaken?

19. Subsection 4.1.1 of the 1987 report "Radiological and Limited Chemical Characterization Report for SLAPS" describes calibration of the gamma scintillation instrument used for the walkover survey at SLAPS, designed to relate instrument counts per minute (cpm) to soil surface activity of radium-226 and thorium-232 in picoCuries per gram (pCi/g). A Bechtel internal trip report is referenced. Such a calibration attempt is inappropriate given that thorium-230 is a major contaminant of interest, and that uranium daughters are not present in equilibrium concentrations. However, it appears that a similar calibration or correlation for

the down-hole gamma monitoring probe played a significant role in determining the depth of borings and establishing the depths of contamination reported for the site. In this case, the correlation is that 40,000 counts per minute (cpm) in down-hole gamma monitoring is considered to indicate 15 pCi/g of soil contamination (page 13, top of page). This calibration appears to be based on gamma radiations from radium-226 and thorium-232, and cannot take into account the presence of thorium-230.

20. The 1987 SLAPS report is apparently the source of the 18-ft maximum depth of contamination, which is reported consistently in DOE documents for the SLAPS. This maximum is said to be determined on the basis of down-hole gamma logging readings of 40,000 counts per minute or higher at this level (middle of page 20). However, this reported depth of contamination is not supported by the investigative results. For example, the borehole at East 1005.0, North 1101.0 still shows 73,000 counts per minute (cpm) at 17.5 feet, the maximum depth shown for down-hole gamma logging. Thus the limit of 18 feet for depth of contamination is unsupported by down-hole gamma logging. The analysis for the deepest sample reported for East 1005.0, North 1101.0, at 17.5 ft., showed 29.0 pCi/g of thorium-230 along with "less than" 48.4 pCi/g of uranium-238. Thus the maximum depth of contamination reported is not supported by either sample analysis or down-hole gamma logging.

Other examples of where contamination appears still to be present at the bottom of the borehole, based on either down-hole logging or the sample analysis or both, are:

a) East 1397.5, North 1102.0, showed 123,000 counts per minute (cpm) at maximum reported depth of 14.0 ft. The deepest sampling increment, 13.5-15.0 feet, was not analyzed for thorium-230 and was reported as well under guidelines.

b) East 1600.0, North 1403.0, showed 40,000 cpm at 10.0 feet, the maximum depth reported. The reading at 1.0 ft. was 98,000 cpm, readings between that value and 9.0 feet all being in the range of 19,000 to 29,000 cpm. Thus the 40,000 cpm reading at 10 ft. was at least suggestive of increasing contamination levels with depth at that point. Analytical results are not listed for this borehole below 4.0- 5.0 feet. This location is shown on Figure 5-1, AREAS AND DEPTHS OF RADIOACTIVE CONTAMINATION AT THE SLAPS, as a zone with contamination depth of 2.00 to 3.99 feet.

c) East 1800.0, North 1405.0 showed 56,000 counts per minute at 11.0 feet, the maximum depth reported. The analytical results (page 88) show 250 pCi/g thorium-230 at the deepest depth reported, 10.5- 11.5 feet.

d) East 1897.0, North 1194.0 showed 50,000 counts per minute at 12.0 feet, the maximum depth reported. Analytical results showed 73 pCi/g of radium-226, "less than" 93 pCi/g of uranium-238, and no analysis for thorium-230, at 10.0- 12.0 feet.

e) East 1915.0, North 1500.0 showed 52,000 counts per minute at 15.0 feet, the maximum depth reported. Analysis (page 90) showed 45 pCi/g of thorium-230, others below guideline, at 14.0- 15.0 feet.

f) East 2000.0, North 1500.0, showed 73,000 counts per minute at 12.0 feet, the maximum depth reported. Analysis showed 110 pCi/g of thorium-230 at 10.0- 11.0 feet, 55 pCi/g of thorium-230 at 11.0- 12.0 feet.

g) East 2095.5, North 1098.0, showed 283,000 counts per minute at 7.0 feet, the maximum depth reported. This hole read only 24,000 counts per minute at 6.5 feet and 27,000 counts per minute at 6.0 feet. The analytical results (page 92) shows U-238, Ra-226, Th-232, and Th-230 all below DOE guidelines at 7.0- 8.0 feet.

Consequently, the data overall are unpersuasive in establishing that the maximum depth of contamination at the SLAPS has been determined.

21. Page 23 of the 1987 SLAPS report states that "detailed chemical characterization data are on file". We are unaware of any such detailed data, and request that any such data be forwarded to us for review.

22. We have a significant degree of concern with the way in which metals "background" levels have been chosen and subsequently used to characterize the St. Louis sites. The earliest discussion of metals background levels appears in the 1989 report on the ball field area. Metals data are referenced to a "background" to determine whether the levels are to be considered "unusual" concentrations. The reference value listed is in fact not a background value for the site, but refers to a range for the particular contaminant in U.S. soils. This report, and all other reports which follow, state that the highest value of the range was used as the limit against which the sample results were compared. Thus, a particular sample must have a higher concentration of a particular metal than is reported for soil anywhere in the United States to be considered an unusual concentration and included in the results presented. One consequence of this approach is that for those metals that have a TCLP limit, the "background" concentration is usually far higher than the TCLP (or EP) extraction limit. As a result, samples containing TCLP metals far above the TCLP limit may be listed in the results with no indication that those metals are present.

Despite the high "background" adopted for metals, in many cases the limit of detection is greater than the "background" value. In these cases a value is entered in the results table together with a footnote "a" denoting that "Elevated sample detection limits were encountered as a result of matrix

interference during analysis. The value given is the detection limit." Entries with this footnote "a" dominate the data table for metals. As a result, the data table contains:

- a) a large number of values that are not results but are limit-of-detection numbers that are above "background";
- b) a smaller number of analytical results that are above the limit of detection and above "background" and;
- c) none of the analytical results that are above their respective detection limits but below the "background" values adopted for them, even though their concentration may greatly exceed the TCLP limit.

A related concern is the way in which the background levels are used to characterize the level of contamination at the sites. The text states that metals concentrations are said to be elevated or "not unusual" based on their relationship to the chosen background concentrations. The result is that levels of metals are dismissed as "not unusual" when:

- a) the calculated mean concentrations range from 2 (antimony) to 490 (thallium) times the highest levels reported for U.S. soil composition; and
- b) maximum concentrations range from 20 to 7000 times the highest levels reported for U.S. soil composition, and their respective TCLP limits.

23. Subsection 4.4.2 of the ball field report states that 33 samples were analyzed for sulfate, nitrate, and fluoride, because these ions are used in uranium processing. These mobile ions were sampled as "indicators of contaminant migration". Results are compared to a "background" range, obtained during a "background soil survey." No detail was found on the background soil survey except for the indication that the "background" used for the Ball Field Area is from sampling at or near the Weldon Spring Site. The Weldon Spring Site is also on the Superfund National Priorities List and is extensively contaminated. More information is needed in order to adequately assess the acceptability of the background locations and results.

Based on the mobile ion results, the report concludes that there is no evidence ". . . that any waste disposed at the ball field is migrating off-site or below older areas of waste disposal." However, there is no indication or suggestion that the Ball Field Area was ever used for disposal of wastes from uranium processing (the basis for mobile ion sampling and analysis). Thus the significance of the mobile ion results is not apparent.

23. The results of volatile and semivolatile organics analysis



described in the ball field report, and subsequent reports, are questionable. The methods used for both volatile organics and semivolatile organics were "modified." The modification in each case was to substitute simple gas chromatography (GC) analysis for gas chromatography coupled with mass spectroscopy (GC/MS). The GC alone does not have the ability of GC/MS to determine the identity of the contaminant. One can only infer the identity of common or suspected contaminants based on their time of elution from the GC. The limitations of the organics analysis as a result of this modification of EPA approved methods, and the implications of these limitations to the RI, need to be addressed.

24. The external radiation background used for the HISS radiation data in the 1989 annual report is different from that used for the Saint Louis Airport Site (SLAPS) elsewhere. In contrast to the three background monitoring locations reported in the parallel external gamma radiation measurements report for the SLAPS, the HISS data list two background locations. Only one location is used in common for the two data sets, a Florissant, MO, location 15 miles to the northeast. The additional background monitoring location used for the HISS data is located at North Hanley Rd., Berkeley, MO, approximately 8 km (5 mi) east of HISS. The 1989 background levels measured for this North Hanley Road location are substantially higher than those at any of the three "background" locations used for the SLAPS report. The net effect is that a higher background is used for HISS than is used for SLAPS. No explanation or justification is given for use of the higher background value for HISS.

25. As with the parallel report for the SLAPS, the 1989 HISS discussion/analysis of the maximally-exposed individual dismisses any exposure pathway involving ingestion of surface water or ground water. The reason given for dismissing ingestion of ground water and surface water from the calculation is unpersuasive for surface water. The locked fence around the HISS is not relevant to the question of surface water ingestion. Surface water would be accessible primarily off the site locations, i.e. ditches and Coldwater Creek. Also, the 1989 HISS report discusses the dose to the population, which "represents the conceptual cumulative radiation dose to all residents within an 80-km (50-mi) radius . . . ". Two paragraphs point out that external gamma radiation levels decrease rapidly as distance from the source of radiation increases, and that radon is known to dissipate rapidly with distance from the radon source. Both textual discussions are inadequate treatments of population exposure which should be avoided in the baseline risk assessment.

26. With respect to the 1989 annual SLAPS report, although four sampling locations appear in the surface water sampling results, Table 3-3 lists only a single location in Coldwater Creek north of McDonnell Boulevard where onsite surface water and sediment samples were obtained. The sampling location number 2 shown on

the data table 3-1 is upstream near where Coldwater Creek enters the airport property. Sampling locations 3 and 4 are far downstream, at the Chain of Rocks water treatment plant on the Mississippi River. This sampling scheme is inadequate, and averaging the value immediately downstream, with two values far downstream and subject to very great dilution, is inappropriate.

27. As shown in Figure 3-1 of the 1989 SLAPS report, radon measurements and external gamma radiation measurements are done at the same sampling stations around the SLAPS fence line. Under the discussion of the external radiation monitoring in Subsection 3.2, EXTERNAL GAMMA RADIATION, it is stated that a correction of the gamma radiation measurement is done for the shielding of the "shelter housing." This shelter housing is not discussed in the report. If the radon detector is contained within a housing that constitutes a significant barrier to free flow of air around the radon detector, e.g., a closed box, an error resulting in erroneously low values for radon is possible. The station and shelter housing should be described and discussed, presumably in the Baseline Risk Assessment for the site.

28. Subsection 3.2, of the 1989 SLAPS report states that the highest radiation level, the level measured at Station 2, is "... due to this station's proximity to a ditch located between the site fence and McDonnell Boulevard." This indicates that the highest gamma level affecting the site data is outside the fence, in the ditch. The level in the ditch can be assumed to be considerably higher than the level at the fence where the dosimeter is located, if the radioactivity in the ditch is the cause of the elevated reading. Consideration should be given to further definition of contamination in the perimeter ditch and subsequent removal of contaminated soils during the proposed interim actions.

29. Page 37 of the 1989 SLAPS report states that volatile organic concentrations and TOX values in the groundwater at SLAPS are "likely tied to industrial activity in the area". Given the downgradient location of the wells exhibiting organic contamination, as well as the presence of radiological contamination in those same wells, we cannot accept DOE's explanation for the presence of organic contamination in the groundwater.

30. The copy of the 1990 report "Radiological, Chemical, and Hydrogeological Characterization for the SLDS" provided for our review is missing a number of figures that would appear to be pivotally important for review. Specifically:

- a) Figure 6-2, Page I-57, "Walkover Gamma Survey Locations" is a blank sheet with a title;
- b) Page I-60, Figure 6-3, "Surface Soil Sampling Locations at SLDS," is missing;

- c) Page I-61, Figure 6-4, "Locations of Phase I and Phase II Boreholes at SLDS," is missing;
- d) Page I-73, Figure 6-12, "Locations of Manholes surveyed at SLDS," is missing;
- e) Page I-74, Figure 6-13, "Locations of Groundwater Monitoring Wells at SLDS," is missing;
- f) Page I-104, Figure 6-36, "Locations of Chemical Boreholes," is missing;
- g) Page I-129, Figure 6-39, "St. Louis Downtown Site Subsurface Profile Section Lines," is missing;
- h) Page I-142, Figure 6-47, "Contours of Groundwater Level Elevations at SLDS 6 May 1988," is missing;
- i) Page I-143, Figure 6-48, "Contours of Groundwater Level Elevations at SLDS 9 June 1989," is missing;

Several of these figures could not be found in either previous or subsequent reports. These figures should be forwarded for our review at this time. If they can be found in other reports, that fact should be clarified.

31. The brief description of walkover gamma survey methodology in subsection 5.2.2 of the 1990 SLDS report states the survey was done "by scanning 15- by 15-m (50- by 50-ft) grid sections and recording the ranges of radioactivity as determined by instrument response." TABLE 6-3 presents results in the form of a Range in counts per minute (cpm) and in microR/h, and a Maximum Reading (again in cpm and microR/h) for each area surveyed. The "Maximum Reading" values given are much higher than the top of the Range in each case, typically 10 to several hundred times higher than the high end of the Range values. The text portion of the data reporting, subsection 6.1.2 gives no explanation of what the "Range" values mean. Clearly the Range values do not represent the range of readings noted, but no explanation of what they DO mean is given. In addition, the uses of the walkover survey data are not made clear by the text discussion of sampling activities. It is not possible to determine whether any subsurface samples were taken in areas of elevated gamma readings identified in the surveys, or whether the boreholes were "biased" entirely on the basis of site history.

32. In the copy of the 1990 SLDS report provided for our review, the data from the 297 surface soil samples cannot be referenced to their site locations by means of their grid coordinates, apparently because the figure containing the grid was not included in our copy of the report.

33. The principal impact of the chemical characterization sam-

pling and analyses done at the SLDS is the tentative conclusion that wastes to be generated will not qualify as RCRA hazardous waste and therefore will not constitute radioactive mixed waste. The basis for this conclusion is that composite soil samples did not fail the RCRA EP toxicity tests. The mixed waste issue is far from being adequately addressed at this point in time for a number of reasons:

a) The EP Toxicity test has been replaced by the TCLP. It is the TCLP that must be used in the determination of toxicity characteristics under RCRA;

b) Compositing of soil samples within boreholes when evaluating RCRA characteristics may have been excessive. When evaluating RCRA toxicity characteristics, soils from different strata should not be combined;

c) the use of inappropriate metals background concentrations (see comment 22) has resulted in inadequate discussions and evaluations of metals results;

d) page I-148 of the SLDS report states that the objective of the chemical sampling effort was to determine whether chemical contamination was associated with radioactivity in soil. This objective has not been met. It is difficult to determine how much additional chemical characterization work will be necessary because the data presentation does not allow the reader to clearly identify the locations of metals contamination with respect to radiological contamination. DOE needs to clearly identify through the use of data summaries and graphical presentations those areas where metals and radiological contaminants are inter-mixed. Accompanying discussions need to define the boundaries of areas containing mixed waste based on these summaries and presentations, as well the results of TCLP analyses.

34. The surveys of sewers and drains at the SLDS is presented in terms of eighty-four "manholes" surveyed. The method used was to lower the instrument used for downhole gamma monitoring into accessible openings, typically "manholes." The data tables indicate that gamma readings are generally progressively higher and reach a maximum at the greatest depth recorded. The resulting readings can establish that the accessible entry into a sewer or drain is contaminated, but cannot assess the degree or extent of contamination. The report also does not describe the type of system(s) served by the manholes, nor does the report identify whether interior drains were included in the manhole survey. Finally, page I-141 indicates that the "questionable integrity of utilities underlying the site" may be having an impact on groundwater beneath the site. A significant effort is needed to determine the extent to which radiological contamination has migrated through and outside of the SLDS drainage and utility system.

35. Why were plants 3, 4, 8, and 9 omitted from the soils inves-

tigation and discussion presented in Chapter 6 of the 1990 SLDS report? We also note that the figure to which the reader is referred for borehole locations (Figure 6-4) was omitted from our copy of the report.

36. We take exception to the generalized statement on page I-117 of the 1990 SLDS report that during remedial action enough surrounding soil will be mixed with RCRA toxic soils so that sufficient dilution will take place such that the soils will not require management as a hazardous or mixed waste. Such a practice will not be acceptable during the remedial action.

37. The placement of groundwater monitoring wells at the SLDS is not sufficient to adequately characterize groundwater beneath the site. The groundwater sampling results indicate that both radiological and chemical contamination is present in the shallow groundwater wells in the western portion of the site. However, the wells installed downgradient of the site are screened too deeply to intercept contamination migrating beneath the site.

38. Page I-134 of the SLDS report indicates that boring in location B16W10 was stopped due to high methane concentrations encountered during drilling. More explanation of this incident is necessary.

39. Page I-146 of the SLDS report states that contaminated buildings have been omitted from the estimate of waste quantity at the site. Completion of an adequate Feasibility Study will require that contaminated building materials be addressed.

40. The 1990 report "Radiological Characterization Report for FUSRAP Properties" notes that Lindbergh Boulevard was never surveyed or sampled. The lack of supporting documentation for the position that Lindbergh was not use as a haul road is a significant omission in the data.

41. The zones of contamination defined in the 1990 FUSRAP report do not meet any particular standard of accuracy, nor is any established methodology for defining the zones of contamination presented. For example, page 2-7 states the "the depth to which each borehole was drilled was based on guidance from the geologist onsite and the radiological support representative". The criteria on which these two professionals were basing their guidance should be explained. The lack of such explanation makes the reader question circumstances such as exist on Latty property 1 where contamination at 14 feet is surrounded by contamination at only 1 foot. With respect to the horizontal extent of contamination, the report repeatedly states that a conservative approach is used. The information presented in the report (i.e., the lack of scientific justification of the grid size, the scale of the figures, etc.) does not allow a rigorous verification of the conservatism of the approach. One extreme example is property 38, where there appears to be no documentation of the size of the

identified "hot spots". In general, however, at those vicinity properties where contamination boundaries have been estimated, the contamination appears to be at least roughly defined to the point where general conclusions regarding the extent of contamination can be drawn, and an adequate Feasibility Study can be prepared. However, at the time of any removal or remedial activity a much more rigorous effort to define and bound specific areas of contamination, and to verify the removal of contamination, will need to be undertaken.

42. We note that many properties do not have contamination boundaries identified in the figures, and the accompanying text indicates the need for additional sampling to define those boundaries. The lack of even rough boundary definition at those properties stands as a significant omission at this time. Following are those locations stated in the 1990 FUSRAP report to require additional sampling in order to define the extent of contamination:

- a) Latty Avenue Property 1 (page 3-2, 2nd paragraph);
- b) Latty Avenue Property 6 (no Figure was included to show areas and depths of contamination, See page 3-5);
- c) Norfolk and Western Railroad Property Adjacent to Coldwater Creek (page 4-4, 3rd paragraph);
- d) Norfolk and Western Railroad property adjacent to Hazelwood Avenue and south of Latty Avenue page 4-5, 2nd paragraph);
- e) Haul Roads Properties 9 (page 5-8); 12 (page 5-9); 13 (page 5-9); 14A (page 5-10, 3rd paragraph); 32 (page 5-16); 46 (page 5-23); 56 (page 5-27, top); 57 (page 5-27); 63A (page 5-29);
- f) Coldwater Creek (page 6-2, last line on page); Coldwater Creek Properties 1 (page 6-3); 3 (page 6-4); 5 (page 6-5); 8 (page 6-7); 9 (page 6-7);
- g) Haul Roads Property 18 east of Eva Avenue.

43. Explanation should be provided for the reason significant areas on contamination are found on the southern portion of Latty properties 2, 3, and 5 away from the known haul road. Similarly, the presence of this contamination identifies a need for additional sampling in the area south of the southern Latty properties but north of properties 21 through 24. The northern portions of those properties should also be sampled to ensure that contamination is not present there. Is it possible that Seeger Industrial Drive, or a forerunner, was used as a haul road?

44. Figure 3-9 of the 1990 FUSRAP report identifies two large areas of contamination in the southern portion of property 3 to a depth of 1 foot, yet only surface soil sampling appears to have

been done there.

45. No Figure 5-122 showing soil sampling locations in property 63A was included in our copy of the 1990 FUSRAP report.

46. Page 4-1 and Figures 4-1 to 4-3 identify widespread areas of contamination west of the HISS, with Th-230 concentrations up to 26,000 pCi/g. Page 4-4 and Figures 4-9 and 4-10 seem to contradict these results in virtually this same area. Clarification is needed.

47. What was the rationale for not sampling Byassee Drive and portions of properties adjacent to it?

48. The portion of property 56 adjacent to Coldwater Creek should be sampled.

49. One vital field activity, the Source Term Analysis that will provide radionuclide concentration data for all site radiation risk assessment, appears not to be mentioned at all in the 1991 RI summary report. That activity has been discussed in Appendix C of the draft Work Plan for the site, but is missing from the RI report.

50. Appendix B of the 1991 RI report is entitled "Composition of Soils," but is not about the composition of soils at the St. Louis Site, and in fact is not about the composition of soils anywhere. The 2-page appendix is essentially a table from Bowen, H.J.M., 1966, Trace Elements in Biochemistry, Academic Press, London. The table lists reported concentrations of 52 selected elements in soils around the world. Again, the approach of the RI investigations has been to compare metals concentrations in soil with this reported range of values for soils in general. A given soil sample concentration that does not exceed this range is considered not above "background" and therefore of no consequence. This practice is inappropriate and can be misleading. For example, at the middle of page 3-45 is the statement, "Barium exceeds the background level in only 5 of the 90 samples . . ." In fact, the "background" referred to is 0.3% -- the highest level reported, for soil anywhere in the world, in the above-named reference. Also, a soil concentration may be well within this "background" range of values for that element found in soils around the world, and still be indicative of serious site contamination. We reiterate that TCLP limits for several metals are far below the upper limit of the cited range for metals in soils. Because concentrations that do not exceed the range for soils are not reported in this RI, it is possible that concentrations elevated far above the true background for the site may escape any mention in the reporting of results for the site.

51. Subsection 5.2 of the RI report states that the objective of the RI, to delineate the boundaries of contamination at the St. Louis site, was fulfilled. It states further that "During the RI

the extent and depth of contamination in soil at the St. Louis Site were examined thoroughly; therefore, no further soil sampling is necessary". We disagree with this assessment. Also, this statement is unsupported and in conflict with statements in the supporting documents. For example, the reference BNI 1990d, Radiological Characterization Report for FUSRAP Properties in the St. Louis, Missouri, Area, DOE/OR/20722-203, identified numerous properties as requiring additional samples to define boundaries more precisely.

52. Subsection 2.1 of the RI summary report states "No ground-water or surface water and sediment investigations were conducted at Futura Coatings because the results of these investigations at HISS also apply to Futura Coatings because of its proximity to HISS." This statement appears to be unsupportable. The historical record is that the contaminating activities appear to have been concentrated more on the Futura Coatings (western) side of the Latty Avenue properties (all buildings being located there), and construction activities likely to have buried contamination also are concentrated there. Depths of contamination reported for the Futura side are substantially greater than those reported for the HISS. Further, it is not clear just what meaning for the Futura property DOE is inferring from ground water results at the HISS. The HISS results are that well HISS 6 shows uranium contamination. This well is among the closest to the Futura Coatings side of the property. No data have been obtained to present a credible idea of ground water conditions downgradient from well HISS 6.

53. It is noted also that the RI report is internally inconsistent about HISS ground water data. The SUMMARY AND CONCLUSIONS section states, "Five other wells exhibit concentrations that slightly exceed the background levels for total uranium." On the other hand, Subsection 3.6.2 states in its opening paragraph, "In general, analytical results from quarterly sampling of the monitoring wells indicate that the radionuclides in the groundwater are at background levels..". DOE should clarify whether it believes the levels are "at background" or "slightly exceed" background.

54. It is evident that some site survey activities were guided by assumptions about the distribution of contamination and then were used to confirm the assumed distribution. For example, the Haul roads discussion starting on page 2-44 states, "The contamination tends to be concentrated along the edge of the property directly adjacent to the haul roads. Based on this, sampling was concentrated on the areas adjacent to the roads at intervals of approximately 15.2 m (50 ft), with additional samples being collected approximately 15.2 and 45.7 m (50 and 150 ft) away from the edges of the roads to determine the extent of contamination." Clearly, the sampling was concentrated along the roads based on the belief that contamination would be or should be concentrated there. Less concentrated sampling was carried out away from the



road. DOE does not address the question of whether the sampling away from the road is adequate to establish the extent of contaminated area. However reasonable the expectation may be, that contamination will be concentrated along the road, the RI report fails to address adequately the question of whether it really is.

55. The general practice in this RI report is to report soil and other concentrations of U-238, Ra-226, Th-230, and Th-232, which are sometimes referred to as "indicator" contaminants. It appears that no mention at all is made of the actinides, protactinium-231 and actinium-227. These U-235 decay products have been reported at surprisingly high levels in some of the various survey activities on site. Early survey activity at the Latty Avenue property (before recognition of the dominance of Th-230 contamination on site) reported these actinides at unusually high levels in contamination that is presumably now present in the storage piles at the HISS. Levels of these U-235 decay products commonly exceed the levels of Th-232 on site. DOE has recognized in discussion of other draft documents that the contribution of these radionuclides to site contamination must be treated quantitatively. However, that recognition is not apparent in the draft RI report. It is not appropriate to discuss the nature of site contamination without mentioning these contaminants, until such time as a quantitative risk assessment has shown them to be not significant.

56. Section 5 of the RI summary report states that during drilling at SLDS, volatile "toxic" vapors were detected at several borehole openings. Slightly elevated "readings" were recorded in the atmosphere and breathing zone. Boreholes C-149, R-108, C-119, R-107, C-127, R-116, C-115, C-114 in bldg 51A; C-105 in bldg K1E; C-103 and C-139 in bldg. 706; C-128; and B16W09 are listed. Further, PPE was used until effective engineering controls were able to reduce ambient vapor levels in the breathing zone to acceptable ranges. No information is given on any of the aspects of this air contamination that are relevant to the RI/FS activity. Information should be provided on (1) the basis for knowledge that vapors of some kind were present, (2) what is known about the identify of the vapors said to be present and their presumed source or possible sources. Describing unknown or suspected vapors as "toxic" does not provide information useful to the site characterization or RI/FS process.

57. A paragraph in Subsection 3.4.1 Surface and Subsurface Soils at SLAPS, at the middle of page 3-45, refers to the location (Borehole R20) of the highest barium concentrations, and states, "... this location corresponds closely with the known disposal area of barium sulfate cake." If correct, this statement needs an explanation, as disposal of barium sulfate cake at SLAPS has not been described previously in site documents.

58. Throughout the report, site contamination concentrations are referenced to RCRA hazardous waste characteristic levels. In

addition, concentrations of other site contaminants (VOCs, BNAEs, metals) are arbitrarily designated as "low". The RI/FS process does not use RCRA characteristic levels or "low" designations in its decision-making process. Rather, the risk posed by these contaminants is the primary determining factor as to whether remedial action is required. In addition, the characterization that "except for metals, chemicals at the property do not appear to be MED/AEC related" is irrelevant to the process. Any contamination that presents a risk must be addressed irrespective of its source.

59. The RI report does not address the possibility of contamination along the haul routes from the SLDS to SLAPS.

60. As we have previously stated, there appear to be many areas of the SLDS that have not yet been examined. Also, many areas of contamination there do yet appear to have been bounded. Also, the identification of contamination in the Mississippi River was not discussed in the RI report.

61. In general geological and hydrogeological efforts to date have been inadequate. The importance of this situation depends largely on the proposed remedy. Therefore, we will reserve further comment on those efforts until the remedial alternatives evaluation process.

62. The extent of contamination at the Mallinkrodt vicinity properties has not yet been adequately determined.

#### SPECIFIC COMMENTS ON THE RI SUMMARY VOLUME

p. 1-18 Our review of the RI report has been for CERCLA compliance, only.

p. 2-12 It remains unclear how the exact walkover gamma scanning activities were conducted (i.e., was the entire area of a facility scanned? Only selected grid points?) A clarification is needed. If in fact entire facility areas were scanned, a summary of the effectiveness of those scans should be presented. For example, an isopach map of scanning results would be informative.

p. 2-12 Compositing of entire boreholes for RCRA hazardous waste characteristics may not be appropriate, depending on the circumstances. Future characterization activity should ensure that an accurate picture of TCLP toxicity is obtained.

p. 2-20 Were any walkover gamma scans conducted at the SLDS vicinity properties?

p. 2-30 The text states that samples were collected from 16 on-site wells. Earlier reports suggest that there may be as many as 35 wells onsite. Please clarify.

p. 2-33 As stated previously, we believe the surface water and sediment locations for the ongoing environmental monitoring program to be inadequate.

p. 2-37 The limited investigations completed thus far on Coldwater Creek have not yet defined the extent of contamination. Samples have been widely spaced (up to 500 feet apart) and at only surficial depths. The lack of metals analysis is significant. The lack of detailed information on contamination in Coldwater Creek is a significant data gap.

p. 2-40 What is meant by "composite surface sampling location" as indicated on Figure 2-15? What was the compositing procedure? What parameters were analyzed? What was the purpose of the composited samples?

p. 2-40 It doesn't appear that the disposal pit identified in other reports and located near the western edge of the ball field was specifically assessed during the ball field investigation. Please clarify.

p. 2-44 The text here (and in the earlier ball field report) states that no samples were taken from the 16 monitoring wells installed in 1988. Despite the fact that the wells were installed "to support the geological investigation", we believe that the wells should have been sampled and analyzed for all contaminants of concern. The lack of groundwater quality information in the ball field area is an important data gap.

p. 2-45 Which three railroad properties had surface samples analyzed for Th-230 only?

p. 2-46 Much discussion is given to the sampling scheme for the haul road vicinity properties, as described in Figure 2-19. Yet, a review of the sample locations in the 1990 FUSRAP report indicates that the sampling scheme was actually adhered to in very few instances. Please explain this discrepancy and discuss any implications this might have on the effectiveness of the characterization activities at these properties.

p. 2-49 The appropriateness of using wells along Byassee Road as background wells should be discussed. Page 3-4 states that the background wells had TOC values to 44.8 mg/l and TOX values to 45 mg/l. The text here states that mobile ions, VOCs, and BNAEs were not determined. Based on the limited information presented, these wells do not represent background conditions.

p. 3-11 TCLP testing only for those areas that failed the EP toxicity test for lead will be unacceptable to EPA.

p. 3-11 We take exception to the statements in paragraph 4. Insufficient data has been presented to support the assumption

that chemicals found at the SLDS facility are not MED/AEC related. Risk from all identified contaminants of concern needs to be assessed. Cleanup levels will be based on the results of the risk assessment. Responsibility for that chemical contamination clearly shown by DOE not to be related to MED/AEC activities can be discussed at a later date. Regardless, DOE has not yet clearly identified those areas where mixed waste may be a concern.

p. 3-30 The scale of Figure 3-11 makes the figure illegible.

p. 3-33 It is not possible to tell from the information provided in the RI report whether sampling activities at the SLDS vicinity properties have been adequate.

p. 3-46 If mobile ions do not bind to clay particles, why is their absence in a soil sample said to be an indication that contaminant migration has not occurred? Regardless, the use of mobile ion analysis in this manner is inappropriate (please see comment 23).

p. 3-47 The first paragraph states that "None of the VOCs found (at SLAPS) are believed to have been used during uranium processing". This is unsupported by the evidence. Such chemicals are found both at Mallinkrodt and in the downgradient wells at SLAPS. If DOE purports that groundwater contamination beneath comes from a facility other than SLAPS, or that the wastes were deposited at SLAPS after DOE's relationship to Mallinkrodt ceased, then evidence of such needs to be presented.

p. 3-47 Again, efforts conducted to date cannot support the statement that "the material at SLAPS is not a RCRA-hazardous waste".

p. 3-48 Again, the argument that elevated TOX values in the groundwater beneath SLAPS are not associated with AEC/MED activities, but instead are from an "unknown" source is weak.

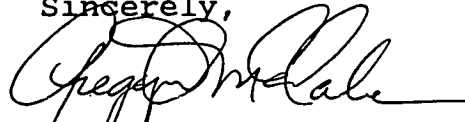
p. 3-108 The text states that "The cause of the radial flow pattern at HISS/Futura is still under investigation". Has any new information come to light recently? What efforts are planned to resolve this question?

p. 4-5 of the RI summary report where the first paragraph states "Installation of a gabion wall stabilized the western bank . . . " apparently should say, " . . . stabilized the eastern bank . . . " The gabion wall is on the eastern bank of Coldwater Creek.

p. 5-6 We disagree that the objective of the RI, to delineate the boundaries of contamination at the St. Louis site, was fulfilled by the RI efforts to date.

Should you have any questions regarding our review, please  
contact me a FTS 276-7709

Sincerely,

A handwritten signature in black ink, appearing to read 'Gregory D. McCabe', written over a horizontal line.

Gregory D. McCabe  
Site Assessment and Federal  
Facility Section  
Superfund Branch

cc: David Bedan, MDNR