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August 28, 1997

To: Steve McCracken, St. Louis Site Manager
U.S. Department of Energy -- Public Information Center
9170 Latty Ave.
Berkeley, MO 63134

from: Kay Drey --Redacted - Privacy Act) Redacted - Privacy Act

re: St. Louis Airport Site (SLAPS) Interim Action
Engineering Evaluation/Cost Analysis (EE/CA) -- Draft.
U.S. Department of Energy -- July 1997.

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First, I would like, for the record, to express my appreciation to the Department of Energy for at last beginning the cleanup of the St. Louis Airport Site -- the location of radioactive wastes generated during the earliest hours and years of the Atomic Age. These nuclear weapons wastes began accumulating here in St. Louis on April 24, 1942, were dumped at SLAPS from 1946 through 1957, and have been dispersed intentionally and not intentionally ever since. Located in the floodplain of an urban creek that discharges into St. Louis' drinking water, the St. Louis Airport Site needs and warrants your studied and most enlightened attention.

With all the major funds that have been expended by the DOE's Office of Science and Technology (OST) to design, develop, test and implement new environmental restoration and waste management technologies, it seems unconscionable to send a dozer or back-hoe in to attack a highly contaminated creek bank and its associated floodplain landfill without putting in place at least one of those technologies. If this site -- its groundwater, surface water, air, and workers -- is not entitled to such protections and the wisdom engendered by the OST's research, what site <u>is</u>?

The most basic concern I have about the Draft EE/CA is my belief that no interim action should be taken until a comprehensive plan has been designed -- and has undergone interagency and public review -- for the <u>entire</u> 22-acre site. The interim actions proposed in the Draft EE/CA might accelerate the erosion offsite of radioactive solids, liquids and gases into the air, into surface and ground waters, and onto adjacent lands (including McDonnell Douglas, the Airport, Banshee Rd., the Norfolk Southern Railway tracks, and McDonnell Blvd.) and could further contaminate the Coldwater Creek sediments, banks, floodway, and neighboring properties. Within days or weeks of the first digging, groundwater could be encountered -- in fact, I believe is <u>likely</u> to be encountered. If that happens, DOE staff and contractors have told the Missouri Department of Natural Resources and St. Louis County that they will stop digging. And <u>then</u> what?

After participating in about two years of meetings and research, the members of the St. Louis Site Remediation Task Force voted to request the DOE to clean up the Airport Site first. Quoting from a resolution approved unanimously on July 23, 1996:

The St. Louis Site Remediation Task Force hereby

notifies the U.S. Department of Energy that the St. Louis Airport Site (SLAPS) ranks as our highest priority for remediation. We request that the DOE start the cleanup of the site in Fiscal Year 1997 for its eventual release for "unrestricted use" . . . . (emphasis added)

Everyone recognizes today, with hindsight, that the Department of the Army's decision in 1946 to use a 22-acre tract of floodplain land for the storage and disposal of highly radioactive residues was a mistake. It had announced to the public at the time that the residues "are not radio-active or otherwise dangerous" and are the "type of refuse that any ordinary commercial firm of this type would store there." (from two St. Louis newspapers, September 1946) The Army's choice of a creek whose watershed is filled with people makes cleanup extremely complex and technologically challenging if the cleanup is indeed to be safe and final.

1. As proposed in the Draft EE/CA, the radioactively contaminated eastern bank of Coldwater Creek (the western boundary of SLAPS) would be exhumed starting to the east of the gabion wall -- and extending eastward for 70 feet, with clay to be used, then, as fill. The excavation would extend as deep as necessary throughout that area until soil is reached that meets the DOE's guidelines -- less than 5 picocuries per gram of thorium, less than 5 pCi/g of radium, and less than 50 pCi/g of uranium.

The SLAPS groundwater flows into Coldwater Creek; the creek flows and overflows through residential, industrial, institutional, and agricultural land, and empties into the Missouri River just a few miles upstream from where the City of St. Louis gets its drinking water. (Although on the Mississippi River, the City's Chain of Rocks water plant is located just below the Mississippi's confluence with the Missouri River. Because the Missouri River's waters hug the west bank of the Mississippi for many miles downstream of the confluence, St. Louisans predominantly drink Missouri River water.)

The Coldwater Creek banks at the Airport Site contain extremely high levels of radioactivity. For example, shortly before the gabion wall was installed along the eastern bank, in 1985, one soil sample collected from that bank contained 14,000 picocuries of thorium-230 per gram; another contained 8300. Please remember that Missouri soils naturally contain only 0.2 pCi/g of Th-230. (The creek-bank data were included in an August 14, 1985, letter [Enclosure 2], from John Baublitz, Deputy Director of the DOE's Office of Remedial Action and Waste Technology, to Dr. Frederick Brunner, Director of the Missouri Department of Natural Resources.)

According to the latest proposal I have heard about, the DOE would leave a "wall" of the contaminated creek bank standing between the gabion wall and the excavation area (with five feet at the top and sloping toward a wider width at the bottom, as the excavation extends deeper). My questions about the timing of the excavation include the following:

a. Do you agree that the disturbance of the soils during excavation could cause the release and migration of unpredictable,

uncontrollable amounts of contaminants, both vertically and horizontally? If so, are you planning before excavation begins to install frozen soil barriers around the sides and underneath the excavation area, or a coffer dam, steel pilings, or other protection for the creek and groundwater?

b. The gabion wall (chicken-wire baskets filled with rocks) was installed in 1985 as an interim action, to try to reduce the rate of erosion of the contaminated bank into the creek and quite possibly to make things look better. (The creek flows next to a McDonnell Douglas property line.) As a few of us tried to point out at the time, it was obvious that the gabion wall would itself become contaminated, thus adding to the volume of wastes that would one day need to be removed from the site.

It has been explained to me that gabion baskets serve as a porous retaining wall, enabling the ground water on the embankment side of the wall to flow through, thereby keeping the water from building up pressure on the embankment side of the baskets, preventing the overturning of the wall. I doubt that the Swedish engineers who designed the gabion wall concept some decades ago envisioned its use as a barrier along the shore of a radioactive-waste landfill located in a floodplain. It has also been explained that a clay barrier would never have been installed on the embankment side of a gabion wall, because such a barrier would have negated the purpose of the wall -- namely, to provide a porous route for excess groundwater.

(1) Why is the gabion wall not to be removed from the site, along with the rest of the contaminated materials on site?

(2) When do you intend to remove the contaminated gabion wall?

(3) After the entire site has been cleaned up (after you have exhumed the wastes and backfilled with clean dirt), are you planning to install a new, clean gabion wall?

c. The gabion wall provides no protection against the discharge of contaminated ground- and surface-waters from the landfill. (1) Is it your intention to install the 70-foot clay barrier to try to stop the groundwater flow temporarily until the entire Airport Site cleanup is complete? (2) Do you intend to dig deep enough during the initial, interim-action excavation project to reach soil that meets the DOE's permissible unrestricted-use guidelines even if, in fact, contaminated soil lies below the level of the groundwater? (3) Would you please comment on the application of frozen soil barriers -- possibly using pipes installed by directional boring equipment -- to resolve this potential threat to the groundwater?

d. Would you please explain why it would not be more prudent to defer the initiation of excavation at SLAPS until the current Geology Panel has completed its analysis of (1) the volume, velocity and directions of the upper aquifer water flow; (2) the potential impact of that water's movement on the deeper aquifer and on the creek; and (3) the projected transport of the radioactive contaminants in the water?

e. After you install the 70-foot area of clay, at which location

at SLAPS are you planning to undertake the next excavation -- that is, how far up-gradient? How soon after the completion of the proposed 70-foot buffer do you expect to begin excavating the remainder of the site?

f. If it is correct that you are not intending to extend the buffer area all the way to the southwest border of SLAPS during this first phase, would you please explain how you decided to leave that highly contaminated soil in place?

2. Both Alternatives 2 and 3 of the EE/CA call for the excavation of the ditch that lies between the Airport Site's northern fence and McDonnell Blvd. and that extends east-west for approximately 3000 feet. The two (or is it three?) culverts that direct contaminated water northerly from the ditch, under McDonnell Blvd., would be closed up, and a new ditch would be built that is capable of carrying a greater volume of water at a greater velocity. As happens now, the contaminated ditch water would flow into Coldwater Creek.

a. To what depths and widths would the proposed ditch excavation have to extend in order to bring the ditch(es) into compliance with the DOE's cleanup guidelines? Some observations:

(1) To place the ditch data in perspective, according to the "Radiological and Limited Chemical Characterization Report for the St. Louis Airport Site," Bechtel National, Inc. (BNI), August 1987: "11,000 cpm corresponds to the DOE guidelines for surface contamination of 5 pCi/g for radium-226 and thorium-232" (p.11); and "a count rate of approximately 40,000 cpm corresponds to the 15-pCi/g subsurface contamination guideline." (p.13) [The background radiation data mentioned herein are from the same 1987 BNI publication, at pp.19 and 25.]

(2) Citing sample data from BNI's "Radiological Survey of the Ditches at the St. Louis Airport Storage Site (SLAPSS)," August 1983: Along the fence to the north, radium-226 that was found in a borehole sample collected 4.7 feet below the surface measured 35 picocuries per gram, compared with natural background readings of 0.5. (page 70: taken at grid location 1670X/R and 490 Y/S). At the same location, 4.0 feet below, a scan registered 106,402 gamma ray counts per minute. (Background radiation is 2200 cpm.)

(3) A few of many other incredible ditch measurements: 1,140,978 counts per minute were measured above ground (page 33: 660R/440S); and 9.01 millirads per hour [that is, thousandths-of-a-rad], compared with background radiation of 8 microrads [millionths] per hour (page 38: 920R/520S). Interestingly enough, the 1983 Bechtel ditch radiological survey failed to include thorium-230, now known to be, by far, the Airport Site's predominant contaminant of concern. (Perhaps Bechtel had decided not to test for thorium-230 because of the lengthy turnaround time laboratories require for its analysis.)

A later Bechtel report indicated that one surface soil sample, collected from the ditch to the south of McDonnell Blvd., contained 15,000 picocuries per gram of thorium-230. [from BNI's "Radiological Characterization Report for FUSRAP Properties in the St. Louis, MO Area,"

August 1990, Vol.III, Revision 1, p.471; and Vol.I, Rev.1, pp.7-2 and 7-14].)

b. Which should come first: exhumation of the ditch which lies at a lower elevation than the Site -- or exhumation of the Site itself? Would the new ditch area not become recontaminated? To quote from two Airport Site studies:

> The most likely source of contamination of the ditches along McDonnell Boulevard appears to be rainfall runoff from residues. Another contributor could have been spills from trucks hauling residues on and off the site, particularly at the east end of the site. (from the 1983 BNI Airport ditches survey cited above; p.8; emphasis added.)
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> Stormwater runoff from the site drains to Coldwater Creek either by direct overland flow or through drainage ditches along Brown Road [McDonnell Blvd.] and the Norfolk and Western Railroad [Norfolk Southern] right-of-way. (Roy F. Weston, Inc.: "Environmental Impact Assessment of the Former Airport Storage Site of the Atomic Energy Commission - St. Louis County." July 1979; p. 3-11.
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c. Would you please explain the following sentence, from page C-3 of the EE/CA: "The data for the ditches on the north side of SLAPS (south of McDonnell Boulevard) were not screened because the purpose of the excavation is to control surface water flow at SLAPS, so the exposure concentrations to the worker would not be affected by any cleanup criteria."?

3. The following questions concern water management:

a. May I please have a copy of the Excavation Design mentioned in the EE/CA for the area "immediately adjacent to the creek," that is, the bank contiguous to the gabion wall and the creek (p.4-1)?

b. I would also be interested in seeing a copy of the management plan for the water that may be encountered during the excavation of the proposed 70-foot "buffer area" east of the gabion wall -- and conceivably water that collects during the excavation of the ditch(es) to the north of SLAPS -- including the groundwater, potential floodwaters, and precipitation (rain and snow) that could pick up particulate, colloidal, dissolved and entrained contaminants.

c. If the DOE has already determined that a water treatment plant will be required for the Airport Site, can you please explain why it should not be built before excavation begins, so that it will be available as soon as

contaminated water is reached? That moment could occur early in the project! To quote from a 1982 DOE report on SLAPS prepared for BNI by a subcontractor:

> Figure 3-2 shows that the groundwater table rose approximately 6 feet during the interval from 17 December 1980 to 5 June 1981. A change of this magnitude appears inconsistent with the laboratory-measured permeability of soil samples, and would tend to indicate an increased bulk permeability in the upper soil layers possibly due to flaws and/or anomalies. Since the buried waste is in the zone of fluctuating water table, it must be assumed that the radioisotopes may be considerably more mobile than is indicated by the permeability data, and in fact may by 'pumped' to the stream by relatively rapid rises and falls in the water level. (Roy F. Weston, Inc.: "Formerly Utilized Sites Remedial Action Program - St. Louis Airport Storage Site (SLAPSS) - Technical Series." Vol. 2 - No. 1; p. 3-8; emphases added.)

4. Although the proposed exhumation of highly radioactive soils could cause the release of radioactive dust and gases into the air, and thus significantly affect the human environment -- the workers, the public, and our regional airshed -- the discussion of the air pathway in the EE/CA is minimal, at best.

For example, I believe the only mentions of radon gas in the entire EE/CA appear in Appendix A, "Applicable or Relevant and Appropriate Requirements," with only one mandated radon standard included (an EPA Clean Air Act emission rate). The omission of radon from the EE/CA is surprising.

> The nature of the waste formerly and currently in place at the St. Louis Airport site dictates concern for emission of radon from the site. Consequently, permanent protection of humans from elevated radon and radon daughter levels must depend on site barriers that can provide protection at present, and remain effective for long periods of time. (Weston, Inc.: "Formerly Utilized Sites Remedial Action Program - St. Louis Airport Storage Site - Technical Series," Vol. 2, No. 1, p.3-9. January 1982; emphasis added.)
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> Based on our review [of 22 FUSRAP radiological survey reports], eight representative sites were selected for further study including the St. Louis Storage site which appears to have the greatest emissions of radionuclides to air. (U.S. Environmental Protection Agency: Background Information Document, Final Rules for Radionuclides, Vol. II; 1984. EPA 520/1-84-022-2;

page B-14; emphasis added.)

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a. Was exposure to radon gas and its solid daughter products included in the calculation of the inhalation dose pathway (p.C-8)?

b. Did the inhalation dose pathway include resuspended dust particles -- and if so, with what ratio of alpha- to beta-emitters?

The "enriched" levels of uranium-235 present in our St. Louis/Belgian Congo pitchblende residues are high enough to generate detectable levels of radon-219 (known as "actinon," a rare isotope not normally seen at uranium mill tailings sites in this country).

A paper published in Health Physics specifically explains that radon-219 and its progenitors (actinium-227 and protactinium-231) are detected at sites in the United States where pitchblende ore from the Belgian Congo had been processed using diethyl ether for the removal of uranium. [That includes St. Louis!] "Deposition of this product onto the ground surface, either through spills or intentional dumping, provides a long-lived source of actinon." The paper discusses the need to consider radon-219 and its daughters, along with the much more common radon-222, in estimating a worker's critical lung dose. Radon-219 has a half-life of only 3.96 seconds. Because workers at the Airport Site will be in the immediate vicinity when layers of uranium- and thorium-contaminated soils will be penetrated, the potential will exist for the inhalation of the short-lived radon-219, -220 and -222 aerosols and their solid daughters. (D.J. Crawford: "Radiological Characteristics of Radon-219." Health Physics Vol. 39 [Sept.] pp. 449-461.)

c. Because of the high levels of radioactivity at SLAPS, it would seem that occasional spraying of water may not be sufficient to adequately reduce the risk to workers and the public of radioactive emissions to the air. (1) Has any consideration been given to the installation of a tent over the excavation area to reduce exposure to radon gases and resuspended radioactive dusts? (Such a tent is being proposed by one vendor-applicant, as a part of the microwave vitrification technology.) (2) Is protective gear to be provided for the workers?

5. Because of its proximity to people and water, the Airport Site's location should mandate the use of the most advanced remediation technologies -- for monitoring, exhumation, and treatment. To what extent has the DOE's St. Louis Site office explored the use of new technologies (such as those to be displayed by vendors at the technology fair to be held here in St. Louis County, on September 11)? Or is the potential use of innovative technologies to be deferred until after a year or more of contract negotiation, field experimentation, and assessment? In the meantime:

a. Could the risk of creek-bank collapse during a downpour or flood, or the likelihood of the release of a massive plume of contaminated soils be ameliorated by employing frozen soil barriers (to stabilize the

vertical and base boundaries around the area to be excavated)? (Brief descriptions appear in the DOE-OST's focus-area technology summaries, for example in "Subsurface Contaminants," August 1996, pp.269-275; and "Contaminant Plumes Containment and Remediation," June 1995, pp.105-107.)

b. Could you please explain why the DOE's request for proposals for new waste remediation technologies for the St. Louis Airport Site specifically excluded the consideration of water management (which I assume would include both existing and consequent waters)?

c. Could any of the new, more sensitive monitoring systems -- for soil, water, and air -- be employed immediately at SLAPS, particularly for the detection of alpha contamination, known to be particularly elusive?

d. If not here, where?

6. How can the best location be determined for the rail staging facility prior to the completion of the Geology Panel's collection and analysis of the groundwater well data? What area(s) of the Site will be most problematic and generate the most waste and contaminated water?

Some final comments: Please remember that many of the SLAPS radioactive wastes emit alpha radiation, recognized by even the U.S. Nuclear Regulatory Commission to be at least twenty times more dangerous than gamma and beta emitters, if swallowed or inhaled. (Code of Federal Regulations, Title 10, Sec. 20.1004)

It is also important to remember that the Mallinckrodt Chemical Works weapons wastes found at the St. Louis Airport Site and related locations have extremely long half-lives. They will continue releasing radiation particles and rays for a period lasting at least ten half-lives. Some sample half-lives of SLAPS isotopes include: uranium-238 = 4.5 billion years; uranium-235 = 704 million years; thorium-232 = 14 billion years; thorium-230 = 75,000 years; radium-226 = 1600 years; and protactinium-231 = 32,760 years.

Some of the other SLAPS materials with shorter half-lives also pose major health risks. For example: three isotopes of radon gas; actinium-227 (21.8 years); radium-228 (5.75 years); six isotopes of polonium; and radioactive lead, bismuth and thallium. Plus a bunch of known and unknown hazardous wastes that are also mixed in with our famous Belgian Congo pitchblende brew!

If, by chance, the DOE were to proceed with its proposal to place a 70-ft. clay buffer zone along the creek at this time, and an engineered drainage ditch along McDonnell Blvd., and then were to decide to defer the rest of the Airport Site's cleanup until after the nation's other weapons wastes are exhumed, collected and contained somewhere, somehow, St. Louisans and our Mississippi River neighbors downstream could continue to be exposed chronically to these eroding materials for virtually an infinite number of generations into the future. Now is the best time to design and complete a final, safe solution for the oldest radioactive wastes of the Atomic Age.

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Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for the St. Louis Site, Missouri

U.S. Department of Energy