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July 12, 2003

Ms. Sharon Cotner
FUSRAP Program Manager
St. Louis District Corps of Engineers
8945 Latty Ave.
Berkeley MO 63134

Re: St. Louis **North County** Site Feasibility Study and Proposed Plan (5/1/03) --- as part of the St. Louis **Formerly Utilized [Manhattan Engineer District / Atomic Energy Commission] Sites Remedial Action Program (FUSRAP) Site**

Dear Ms. Cotner:

St. Louis has the unique distinction of being the home of the oldest radioactive waste of the Atomic Age. All the uranium used in the world's first self-sustaining nuclear chain reaction --- the birth of the Atomic Age, on December 2, 1942, at the Fermi reactor in Chicago --- was purified at Mallinckrodt Chemical Works (MCW) near Downtown St. Louis. Some of the uranium waste from that historic experiment may still be scattered at the Downtown Site, the St. Louis Airport Site, Latty Avenue, West Lake Landfill, the Weldon Spring quarry and bunker, and at Oak Ridge, Tennessee, Canon City, Colorado, and along haul routes and vicinity properties in between.

In only fifty days, starting in April 1942, MCW personnel figured out how to purify tons of uranium, the amount needed to embark on the challenge to harness the energy of the atom, and to create the atom bomb. Neither MCW nor anyone else at that time was asked to figure out what to do with the virtually permanent radioactive wastes that would be generated as a part of our entry into the Atomic Age. And now, more than sixty years later, a safe permanent disposal solution still eludes us.

MCW processed uranium for about 25 years in Metropolitan St. Louis, initially under the control and regulation of the Manhattan Engineer District of the U.S. Army, and later of the U.S. Atomic Energy Commission, for the purpose of producing nuclear weapons. At various times, following the closure of the MCW facilities Downtown and at Weldon Spring, both the U.S. Atomic Energy Commission and then the Department of Energy were assigned to search for, assess, and try to clean up the radioactive wastes at the MCW plant sites and at numerous other sites where the wastes were dispersed. And now, coming full circle, the Corps of Engineers once again is in charge.

I had first learned, back in 1978, about Mallinckrodt's participation in the Manhattan Project. I had known for several years about the hazards of uranium mill tailings and radon gas, etc., but was amazed when I learned that we had these materials here in our midst, in the middle of the nation, far from uranium mines and mills. The secret had been well kept!

I served as a founding member of the 39-person St. Louis Site Remediation Task Force from September 1994 until it dissolved in September 1996. When a successor group was formed, on September 9, 1997, I became a member of that, too --- the eleven-person St. Louis FUSRAP Oversight Committee. I resigned from the Oversight Committee about a week later because of concerns I had about the DOE's plans to start the exhumation of the wastes at the Airport Site along the highly contaminated western boundary of the site, contiguous to Coldwater Creek.

I am submitting these comments about the St. Louis North County Site in order to urge the St. Louis District of the Corps of Engineers to commit itself to complete the assessment, cleanup and removal of the MCW federal wastes located on the St. Louis side of the Missouri River. To quote the Task Force mission statement, from its September 1996 report:

The St. Louis Site Remediation Task Force is a broadly based representative body formed in September 1994 to identify and evaluate remedial action alternatives for the cleanup and disposal of radioactive waste materials at the St. Louis FUSRAP Site and at West Lake Landfill, and to petition the U.S. Department of Energy to pursue a cleanup strategy that is environmentally acceptable and responsive to public health and safety concerns. (emphasis added)

I would estimate that the Task Force or its committees met almost weekly for two years to try to understand the scope of St. Louis's radioactive contamination, and to recommend possible remedial actions. I believe that once the St. Louis District of the Corps, as the federal agency responsible nationwide for the cleanup of the FUSRAP sites, decrees that the remediation of the North County sites is complete, any wastes not yet remediated will be ignored and will therefore continue to leach, blow and otherwise migrate into the St. Louis environment, and beyond, for the indefinite future.

The Corps has the opportunity and responsibility at this time to try to recapture the St. Louis Site nuclear weapons wastes, including those at West Lake Landfill, and those in the stream channel and floodplain of Coldwater Creek --- and to isolate them from the human environment.

West Lake Landfill: It is my understanding that the U.S. Department of Energy (DOE), as a successor to the U.S. Atomic Energy Commission, is the agency responsible for the operation and cleanup of the nation's nuclear weapons facilities. The DOE has already been officially recognized as a "potentially responsible party" for the MCW radioactive wastes that were illegally dumped in 1973 at the West Lake Landfill, in the Missouri River floodplain next to Earth City. According to a 1982 radiological survey of West Lake, prepared for the Nuclear Regulatory Commission by the Radiation Management Corp., the MCW wastes cover an estimated 16 acres. (NUREG/CR-2722, p. 16)

While the Environmental Protection Agency has already designated West Lake as a Superfund site, it is extremely important at this time for the DOE to designate those areas at West Lake where MCW wastes were dumped as a FUSRAP site. And therefore as a site qualified for FUSRAP remediation. Funding to exhume the MCW wastes from the West Lake site should be

secured through the Congress as a part of the DOE's FUSRAP budget, which is currently being administered nationwide by the Corps of Engineers.

The St. Louis Site Task Force included West Lake as follows in a resolution passed on July 23, 1996: "And finally, with respect to those radioactive wastes at West Lake Landfill which were also generated at the St. Louis Downtown Site for nuclear weapons production, from 1942-1957, the Task Force requests that the DOE, in consultation with the U.S. Environmental Protection Agency (lead agency at West Lake) and the Missouri Department of Natural Resources, develop a plan for the excavation and removal of these wastes to a minimum of the Option 3 [hot spot removal and implementation of ongoing institutional controls] Cleanup Level." (Task Force Report, Sept. 1996, p. II-16.)

The Corps' description of the MCW wastes at West Lake also recognizes the fact that they are an integral part of the federal wastes that were generated at MCW during the processing of uranium. For example, quoting from the May 2003 Final Feasibility Study for the St. Louis North County Site, Vol. I:

The leached barium sulfate cake (as described above) was leached with sodium carbonate solution to recover the last traces of uranium (Note: AJ-4 was only generated when [Belgian Congo] pitchblende was processed). This cake would have been predominately barium sulfate with traces of lead and radium as sulfates. The leached barium sulfate cake, also described as resulting from the initial digestion with nitric acid and purification, contained an estimated 7 tons of uranium with a gross weight of 8,700 tons. This is the residue that is believed to be buried at Westlake Landfill after being mixed with 39,000 cubic yards of soil at HISS/Futura. (from Table 2-1. "Summary of FUSRAP-Authorized Materials used at North County Sites," p. 2-3)

It is important that our elected federal and state officials -- and government agencies -- recognize that the West Lake radioactive wastes are extremely dangerous. I hope the following chart will be helpful:

radioactive isotope	in nature	at West Lake -- in pCi/g	half-life
thorium-230	less than one pCi/gram	178,000	75,400 years
uranium-238	one pCi/g	2,900	4.47 billion yrs.
radium-226	one pCi/g	21,000	1,599 years

[A picocurie -- pCi -- is one trillionth of a curie, or that amount of a radioactive material that gives off 2.22 radiation particles per minute.]

(The above data come from the West Lake Survey, NUREG/CR-2722, pp.13, 58, 62.)

The U.S. Atomic Energy Commission was willing to purchase ore with at least 1/10th of one percent uranium. American ore contained, on the average, one to two percent uranium. **The Belgian Congo pitchblende, processed at the Downtown MCW, contained as much as 60 to 65% uranium.** Because almost all (99.2745%*) uranium found in nature is uranium-238, whereas only 0.7% is U-235, U-235 and its daughter products are not normally detectable in uranium mill tailings and related wastes in the United States. In the St. Louis Site wastes, however --- including those at West Lake Landfill, and those that had been transported to Weldon Spring --- such notoriously radiotoxic U-235 daughter products as protactinium-231 and actinium-227 are present. (e.g., West Lake Survey, p.21; N.County Feasibility Study, p.2-55) [*The U-238 percentage is cited in the CRC Handbook of Chemistry and Physics, 2001-2002, p. 11-184.]

I believe the radioactive radon gas flux levels at West Lake are also significant --- as high as 865 pCi per square meter per second in areas with surface contamination. (West Lake Survey, pp. 17, 76) The average natural background radon flux near West Lake is approximately 0.5 pCi per sq. meter per second. (West Lake Survey, p.110)

Radon-219 (actinon), another rarely detected U-235 daughter, is also specifically mentioned in the 1982 West Lake Survey. In fact, three radon isotopes were measured at West Lake --- 219, 220, and 226 (e.g., at p.8). Not only can radon be inhaled into the lungs as a gas, but its solid daughters are collected on dust in the air and in sediment in creeks. Remedial action is recommended in homes if the air from radon exceeds 3 or 4 picocuries per liter.

I believe the federal government should provide funding for the remediation of the MCW wastes at the West Lake Landfill as a part of the St. Louis North County FUSRAP Site.

Coldwater Creek: I believe that a new and thorough characterization of Coldwater Creek is warranted, starting at the Airport Site and continuing to the mouth of the creek, at the Missouri River. Because of the contamination of the creek known prior to the initiation of the Corps' remediation project, and because of the impact on the creek of the exhumation of the wastes and related activities, the levels of radioactive waste in the areas of the creek accessible to the public are most likely vastly greater now than the levels detected during earlier pre-remediation radiological surveys.

Because Coldwater Creek is no doubt especially appealing to children and is readily accessible to them, its radioactive sediments and soils should be dredged, using the best available technologies. I hope the surface soil remediation goal for unrestricted land will be used for the sediment and bank soil below the mean water gradient in the creek as well as for the sediment and soil above the mean water gradient --- that is, 5 pCi/g for radium-226; 14 for thorium-230; and 50 for uranium-238. Since children and other living creatures can access the creek at all depths, I do not believe the less stringent, subsurface goal of 15 / 43 / 150 provides adequate protection.

As mentioned above, the pitchblende processed at the Downtown Site is extremely radioactively hot, as are the raffinates (industrial sludges) and other residues that were trucked to the Airport Site. Colloidal, particulate and liquid wastes have been impacting upon the ground and surface

water ever since 1946 when the 21.7-acre site became a radioactive waste dump, and the contaminated water began flowing and eroding into Coldwater Creek.

The following data from the North County Feasibility Study help describe how significantly contaminated the Airport Site soils are, and therefore help predict their potential impact on the creek sediments and soils. Three of the isotopes considered to be extremely radiotoxic have been and are present at the site --- thorium-230, actinium-227, and protactinium-231. (1) Thorium-230 was found in surface soil at 37,780 picocuries per gram at the east end of the site, outside of the former site fence (North County Feasibility Study Figure 2-9; and Attachment 5, pages 76 and 80) It had been detected at even higher levels in the Radium Pits area. In natural uncontaminated soil, thorium-230 is found at 0.2 pCi/g. (2) Actinium-227 was detected in surface soil at the same location, at 695.7 pCi/g (loc. cit.). (3) And protactinium-231 was found there, too, at 685.8 pCi/g. (loc. cit.) Ac-227 and Pa-231, which are daughters of uranium-235, are not detectable in natural background.

While I have read the descriptions of the Airport Site excavations in the Feasibility Study (in Section 2.2.1 at pp. 2-4, -5, -6), and have compared these with Figure 2-10, I am not clear about which "removal actions" and "remedial actions" have been completed and which have not. That is, aside from the statement that "Radiologically contaminated soils remain below the groundwater table in Area 1," (p. 2-6; Area 1 is at the southern end of the gabion wall), the Feasibility Study text does not seem to estimate the volumes or depths of the Airport Site areas that remain contaminated and in need of excavation and removal.

And speaking of the gabion wall --- that is, the stacks of chicken wire baskets filled with rocks, that line the eastern bank of Coldwater Creek, across from the Boeing Company --- I hope the Corps will decide to remove the entire wall, with the inaccessible radioactive sludges and particulates that have been accumulating in the interstices between the rocks, ever since the wall was installed in 1985. If an effort were made to wash the contaminants out of the wire baskets, instead of removing the wall, it would seem that an elaborate water treatment plant would have to be installed (including such technologies as ion exchange resins, and activated carbon and alumina) to try to purify the wash water before it could be discharged to the creek.

As evidence that the groundwater is continuing to be contaminated by wastes buried at the Airport Site, data in the Feasibility Study indicate that total uranium in shallow ground water collected next to the gabion wall in 1998, measured at 5,273 micrograms per liter --- or 3,586 picocuries per liter. (Vol. I, Figure 2-42)

Conclusion: I understand the expressed reluctance of the Corps of Engineers, in its preferred Alternative 5, to recommend exhuming contaminated soil from underneath roads, highways and railroads because of the inconvenience to commuters and transporters, and because of the cost. I do not believe it would be reasonable or safe, however, to leave contaminants under bridges. The continuing impact on the water quality and nearby wetlands caused by such contaminants should make the excavation mandatory of radioactive soils that have collected at the bridges. The waters impacted upon will continue serving as transport mechanisms for these long-lived radioactive wastes.

It seems most reasonable for the Corps of Engineers to clean up the bridges, sediments and banks of Coldwater Creek and to exhume the West Lake wastes while the Corps has active ongoing radioactive waste cleanup projects under way nearby. The expertise, the experience and the equipment are already in place, and contracts have been negotiated to transport and bury similar MCW wastes at licensed or permitted waste facilities that would no doubt accept these additional St. Louis Site wastes.

The Metropolitan St. Louis area has been burdened with nuclear weapons wastes for more than sixty years. Though much remediation of the St. Louis North County Site has been completed, for which we can be grateful to the Corps of Engineers, it's time to finish the job.

And with the greatest possible protection provided to the workers and the environment.

Sincerely,

Kay Dray

FUSRAP Document Management System

Year ID

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Operating Unit

North County

Site

Area

MARKS Number

FN:1110-1-8100g

Primary Document Type

Public Affairs/Community Relation

Secondary Document Type

Correspondence

Subject or Title

Typed comments on North County FS/PP

Author/Originator

Kay Drey

Company

Redacted - Privacy Act

Date

7/12/2003

Recipient (s)

Sharon Cotner

Company (-ies)

FUSRAP

Version

Final

Original's Location

Central Files

Document Format

paper

Confidential File?

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Comments

Include in which AR(s)?

☒ North County

☐ Madison

☐ Downtown

☐ Iowa

ETL

8.1

SAIC number

Filed in Volume

8

Bechtel ID

