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May 8, 1998

**HAND DELIVERED**

Dr. Rob Mullins, Jr.  
U.S. Army Corps of Engineers  
Public Information Center  
9170 Latty Avenue  
St. Louis, MO 63134

Re: Comments on the Feasibility Study and Proposed Plan for the St. Louis Downtown Site, April, 1988

Dear Dr. Mullins:

Mallinckrodt appreciates the opportunity to review the Feasibility Study and Proposed Plan for the St. Louis Downtown Site. Mallinckrodt commends the US Army Corps of Engineers for its efforts in moving this project forward. Mallinckrodt, like the Corps, is looking forward to the timely completion of a practical remedial program which protects the public, current and future employees and property owners, and the environment while providing for continued operation, maintenance, and development of Mallinckrodt's manufacturing activities. As discussed in the attached, Mallinckrodt encourages the Corps to select and implement Alternative 6.

Alternative No. 6 will remediate contamination to levels which are protective of human health and the environment. It will remove contaminated soils likely to be encountered during routine maintenance and construction activity and therefore will allow cost-effective operation, maintenance, and development of the facility by current or future property owners. It is therefore consistent with the St. Louis Site Remediation Task Force recommendations. As this alternative will provide clean borrow in future development areas, excavation for site maintenance and development may proceed with significantly lower risk of encountering contaminated soils. It has increased long term effectiveness and permanence than Alternatives 1-4. In addition, Mallinckrodt and Federal Government costs for the management and disposal of contaminated soil generated during facility maintenance and development will be greatly reduced when compared to all other alternatives except No. 5. Implementation of Alternative 6 is also endorsed by Federal, State, and local government representatives and officials as well community leaders and residents.

Mallinckrodt will be pleased to review our comments with you and your staff and answer any questions you may have. Please contact Robert Boland at 314-654-6170 if you have any questions or comments.

Sincerely,



Rita Bleser  
Vice President and General Manager

cc:	R. F. Boland	M. J. Collins	J. K. Grant
	M. L. Puett	P. H. Duft	J. M. Frauenhoffer
	R. A. Hoyt	M. K. Milosovich	

The Honorable John Ashcroft  
The Honorable Christopher Bond  
The Honorable James Talent  
General Joe Ballard (without enclosures)

The Honorable Richard Gephardt  
The Honorable William Clay  
Colonel Thomas Hodgini

## COMMENTS OF MALLINCKRODT INC. ON THE APRIL 1998 FEASIBILITY STUDY (FS) FOR THE ST. LOUIS DOWNTOWN SITE

### I. Introduction

Mallinckrodt Inc. ("Mallinckrodt") recommends that Alternative No. 6 be selected as the preferred remedial action at the St. Louis Downtown Site (SLDS). It will impose less restrictive use-limitations on Mallinckrodt and future property owners. Alternative No. 6 will remediate contamination to levels which are protective of human health and the environment. It will remove contaminated soils likely to be encountered during routine maintenance and construction activity and therefore will allow cost-effective operation, maintenance, and development of the facility by current or future property owners. It is therefore consistent with the St. Louis Site Remediation Task Force recommendations. As this Alternative will provide clean borrow in future development areas, excavation for site maintenance and development may proceed with significantly lower risk of encountering contaminated soils. It has greater long term effectiveness and permanence than do Alternatives 1-4. In addition, Mallinckrodt and Federal Government costs for the management and disposal of contaminated soil generated during facility maintenance and development will be greatly reduced when compared to all other alternatives except No. 5.

The following paragraphs provide general and specific comments on the Feasibility Study and Proposed Plan and support the selection and implementation of Alternative 6 by the Corps.

#### A. Mallinckrodt's Significant Investment in and Contribution to St. Louis

Mallinckrodt is a St. Louis-headquartered company with global operations. Mallinckrodt's economic presence in Missouri is significant and growing. Mallinckrodt's St. Louis area facilities have approximately 2200 employees with a total payroll of approximately \$150 million. In 1997, Mallinckrodt paid a total of \$6 million in state and local property, business, and income fees and taxes. Over the past 10 years, Mallinckrodt has installed \$370 million in new manufacturing and support facilities in the St. Louis area. \$200 million of this investment was at the St. Louis Plant. Employment at the St. Louis Plant has increased by 300 over this period. As a result of these St. Louis Plant investments, an estimated 450 jobs and an economic "output" benefit of \$165 million were created in the local economy.

Mallinckrodt<sup>11</sup> has shown a commitment to the City of St. Louis and the St. Louis area through continued investment and expansion at the St. Louis Plant. Our plant's location in North St. Louis helps stabilize this area. In addition, Mallinckrodt is an active corporate citizen in this neighborhood through its ongoing work with Grace Hill Settlement House,

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<sup>11</sup> The St. Louis Plant and downtown vicinity properties contain approximately one third of the estimated total volume of St. Louis Site contaminated materials. Therefore, Mallinckrodt is a significant stakeholder in the St. Louis Site FUSRAP program.

Hyde Park Neighbors, Clay Community Education Center, and The North Broadway Business Association.

**B. Under FUSRAP and the Federal Facilities Agreement, the Corps Must Remediate All MED/AEC-Related Contamination.**

As DOE's successor with responsibility for implementing the FUSRAP program, the Corps is obligated under FUSRAP and the Federal Facilities Agreement (FFA) to remediate all MED-AEC related residues - including both accessible and access-restricted materials. The presence of these contaminants hinders use and continued development of manufacturing operations at the St. Louis Plant.

The Downtown site remediation plan must recognize that Mallinckrodt has an active manufacturing facility and that site operations will continue and expand after completion of the work. Remedial criteria and institutional controls which are appropriate for dormant land are not applicable and appropriate for this expanding industrial site. Alternative 4 does not adequately address the issues associated with an active plant site. To continue development, Mallinckrodt must be able to excavate for the construction of new facilities and for the maintenance of those that are now being operated without having each new construction or maintenance project, no matter how small, become a remediation project.

Consistent with the United States' obligation to address all MED/AEC contamination under the FUSRAP program, several activities have recently been completed including: remediation of soils at City Block 1201, demolition of the 50 Series buildings, decontamination of surfaces in K building, and demolition of former uranium processing buildings in Plants 6 and 7. See FS at p. 2-47. To facilitate these FUSRAP remedial activities, Mallinckrodt has relocated ongoing operations, utility systems (gas, water, power), and demolished structures at a cost of approximately \$7 million. Mallinckrodt anticipates working with the Corps to facilitate remedial activities in the future.

**II. The Corps Should Select Remedial Alternative 6<sup>2/</sup>**

Mallinckrodt recommends that the Corps select Alternative 6. Implementation of Alternative 6 would remove contaminated soil to a depth of 4 to 6 feet and backfill the excavated site with clean fill. Contaminated soils likely to be encountered during routine maintenance and construction activity would be removed thereby eliminating a primary exposure risk which Alternative 4 fails to address. Alternative 6 is more consistent with CERCLA guidance than Alternative 4, is more protective of human health and the environment than Alternative 4, and minimizes long term worker exposure which is underestimated in the Corps' analysis of Alternative 4. In addition, Alternative 6 better addresses actual site conditions including Mallinckrodt's plans for future development and is consistent with the recommendation of the St. Louis Site Remediation Task force.

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<sup>2/</sup> Since the FS and the Proposed Plan are based on the same analysis, Mallinckrodt's comments also apply to the Proposed Plan.

In comparing Alternative 4 to Alternative 6, CERCLA requires the Corps to apply the following criteria:

- Threshold Criteria
  - overall protection of human health and the environment; and
  - compliance with ARARs.
- Balancing Criteria
  - long-term effectiveness and permanence;
  - reduction of volume, toxicity, and mobility through treatment;
  - short-term effectiveness;
  - implementability; and
  - cost.
- Modifying Criteria
  - state acceptance; and
  - community acceptance.

FS at p.5-2.

As Alternative 6 includes excavation of contaminated soils which will be encountered during plant maintenance and development, it will be more protective of human health and the environment and will provide for more cost-effective operation, maintenance, and development of the site. It therefore better satisfies the Threshold Criteria objectives of protection of human health and the environment and of establishment of remedial criteria which are applicable, relevant, and appropriate for the continued use and development of an industrial facility.

Alternative 6 also better satisfies the objectives of Balancing and Modifying Criteria than does Alternative 4. The removal of soils which will otherwise be disturbed by continued industrial activity at the facility will increase the long term effectiveness and permanence of the remedy when compared to that provided by Alternative 4. As Alternative 6 requires the establishment of fewer institutional controls and restrictions on site activities, it has increased implementability than Alternative 4. As described below, the long term costs of Alternative 6 are no greater, if not less, than those of Alternative 4. Lastly, implementation of Alternative 6 is supported by Federal, state, and local officials as well as local community residents.

The following paragraphs further demonstrate that the required comparative analysis favors selection of Alternative 6.

#### **A. Alternative 4 Poses More Risk than Alternative 6**

The Corps' risk analysis shows that potential exposures to employees and construction workers may exceed Nuclear Regulatory Commission rules for site cleanup unless unrealistic restrictions on excavation (and hence future plant development) are imposed. These restrictions would include prohibitions on excavation at the St. Louis Plant. This is unreasonable at an active plant. Such restrictions on future excavation are not required by Alternative 6.

The FS is in error when it fails to identify the exposure pathway of a construction/industrial worker digging in soil as important. Excavation for plant maintenance and development is a routine activity at the St. Louis Plant and represents the primary route of worker exposure, particularly for those alternatives, such as Alternative 4, which leave contaminated soils at depths of six feet or less. The baseline risk assessment (BRA) identified that potential health impacts at the St. Louis Plant are highest for the construction worker. In addition, the potential for adverse impacts on human health and the environment is increased since these future excavation projects will not be implemented as part of a single remedial effort as would occur under Alternative 6.

To properly address this recognized risk to maintenance and construction workers, removal of MED/AEC contamination which restricts or impedes the current and future operation, maintenance, and development of the site must be included as a remedial objective and the effectiveness and implementability of a remedial alternative must be evaluated on the basis of how well the alternative accommodates current and future plant operations and development.

#### **B. Site Appropriate ARARs favor Alternative 6**

The FS study (see, e.g., p. 3-20, Table 3-3) does not appropriately consider soil removal requirements associated with the future use of the property in establishing ARARs and remedial objectives, specifically the need to:

- Provide for and allow future industrial use and development of the facility.
- Minimize the administrative and financial burden of managing contaminated soils excavated during site maintenance and development.
- Minimize the administrative and financial burden of managing radon exposure from access-restricted soils beneath existing and new site structures.

In selecting ARARs and evaluating risks, the FS fails to recognize that site operations will continue and expand after completion of the work. The Corps mistakenly applied remedial criteria and institutional controls which are appropriate for unused land but which are not applicable and appropriate for this industrial site. Because the site is actively being developed, the ARARs must take into account excavation for the construction of new facilities and for the maintenance of those that are now being operated.

Mallinckrodt believes that UMTRCA (40 CFR 192) is not appropriate for soils in an active facility. See FS at p. 3-20, Table 3-3. The Corps is simply wrong when it states that the St. Louis Plant is similar to "inactive" uranium processing sites where these standards apply. See FS at p.3-9. the St. Louis Plant is anything but inactive particularly when it comes to ongoing excavation activities for maintenance and construction. Hence, these standards are not appropriate for this site.

Failure of the Corps to effectively address the management of soils containing above-background radioactivity which will be routinely excavated during ongoing plant maintenance and anticipated future development is a significant shortcoming of the FS. The Corps has not considered how effectively remediation alternatives allow continued operation, maintenance, and development of Mallinckrodt's manufacturing activities and facility, nor did the Corps consider the effectiveness of the Alternative for addressing the management and disposal of excavated soils during these activities. Since these points were not considered, the evaluation of Alternative 4 is incomplete. Alternative 4 would be very difficult to implement at an active site and impossible to implement cost-effectively at an expanding site.

Rather than addressing contaminated soils on a continuing and ongoing basis as the plant is maintained and developed, it is more reasonable and practical that the Corps remove all soils containing elevated radioactivity which will likely be encountered during plant maintenance and development at this time and in so doing minimize the burden and cost of management in the future. Mallinckrodt believes the use of clean cover as well as clean fill within the construction/excavation zone (depth of 4-6 feet, depending on location) will best minimize potential doses and risks to construction workers and workers or the public exposed to excavated soils, both on-site and off-site. Removal at this time will minimize the potential for mismanagement at some point in the future. Alternative 6 accomplishes this. In addition, both DOE and the St. Louis Site Remediation Task Force embraced this concept. Isolation from radioactive materials by providing clean fill in the excavation zone is the most practical and workable approach for remediation at the St. Louis Plant. If such isolation is not provided, the institutional controls envisioned by Alternative 4 will be violated and the Corps will be continually and repeatedly managing soils containing above-background radioactivity, or development at the plant could be severely curtailed. See page 4-9, paragraph 1.

The plan does not identify elimination of the potential for direct contact when contaminated soil is brought to the surface by subsurface excavation and subsequently managed for disposal as a remedial objective. See Page 3-29, paragraph 4. This situation will occur whenever excavation is performed for facility maintenance or development. This pathway has the potential to expose excavation workers, Mallinckrodt employees and contractors working around the excavation area, and employees of waste transportation and disposal firms who handle the excavated materials. Failure of a remedial alternative to eliminate such exposures will increase the potential for worker exposure during facility maintenance and construction and reduce Mallinckrodt or future property owner's ability to cost-effectively operate, maintain, and expand the facility.

Alternative 6 would excavate soil containing more than 5 pCi/g to 6 inches deep and subsoil containing more than 15 pCi/g to 6 feet deep in some areas and to 4 feet deep in other areas of the St. Louis Plant. Only approved (non-contaminated) earthen fill would be used to backfill. This remediation strategy would allow industrial use of the St. Louis Plant without prohibition against disturbing land shallower than 4 or 6 foot below grade. Restrictions when excavating deeper than 4 or 6 feet, restriction against ground water withdrawal, and provisions to manage excavation into currently inaccessible areas are expected and are acceptable to Mallinckrodt.

To a depth of 4 or 6 feet, Alternative 6 would resolve the incompatibility between Alternative 4's proposed restriction against disturbing land at the St. Louis Plant and Mallinckrodt's need to maintain and change its operations. Alternative 6 also reduces the need for future radiation protection and contaminated soil disposal accompanying subsurface utility work, foundation construction, and grading on-site.

Moreover, under Alternative 4, there appears to be no safeguard during remediation against excavating radioactivity concentration in soil greater than remediation criteria, then mixing it to less than *composite* criterion, and depositing it back onto the site. Although that might be effective in reducing residual radioactivity concentration over larger area, it might be much less effective in reducing site-wide inventory of residual MED-AEC material. And the lower concentration, higher volume soil might still have to be dealt with in the future.

Whereas Alternative 4 depends on restriction against disturbing the remediated site to meet ARAR, Alternative 6 is better able to meet ARAR for industrial use. Thus, Alternative 6 is the preferred alternative.

### C. The Corps has Underestimated Alternative 4 Costs

The Corps has not considered all the costs associated with implementation of Alternative 4. As the Mallinckrodt facility and vicinity properties are developed, soils in the near-surface building zone will be excavated by property owners and provided to the Corps for management and disposal. In analyzing Alternative 4 in the FS, the Corps addressed neither Mallinckrodt's nor the Corps' administrative or remedial costs of managing these soils in the future. This soil removal will occur during utility maintenance and facility development (foundations, sewers, elevators, etc.). The actual costs for excavation and disposal of contaminated soil above free release criteria will be incrementally increased over those estimates for the planned remediation because of the smaller volumes handled and the cost and availability of support staff resources to plan, implement, and coordinate disposal activities. As a result, the purported savings recognized by leaving these contaminated soils in-place are exaggerated and, at best, temporary. The Corps implicitly recognized the future costs associated with Alternative 4 when, in analyzing Alternative 6, it said: "Alternative [6] focuses on reducing the need for future studies, designs, and remedial actions, in addition to protection of human health and the environment relative to Alternative 4." FS at p. 4-25.

The Corps proposes to allow soils with concentrations 30 times higher than the appropriate limit to remain after excavation. See FS at p. 3-10, fn. c. This will result in increased exposures to maintenance and construction workers and increase the cost and complexity of management and disposal of excavated soil. As such, exposures and costs associated with those alternatives which leave contaminated soil in the construction zone are underestimated.

To appreciate the substantial future costs of soil removal which the Corps ignored in evaluating Alternative 4, during the past three and one half years, Mallinckrodt has spent approximately \$660,000 (roughly \$190,000/yr) managing soil which contains MED/AEC residues. These soils were generated during routine operation and maintenance and by minor construction projects. DOE took possession of most of the soil and the Corps is obligated to take the remainder. Mallinckrodt estimates that it will generate approximately 340 cubic yards per year of soils containing MED-AEC contamination through future routine operation and maintenance activities, and spend approximately \$195,000 per year for health-physics support and soil management and storage. The presence of radioactivity in soils also increases the cost and complexity of site construction. During a typical construction project, Mallinckrodt will incur approximately \$150,000 in increased design, coordination, and contractor costs. Fifteen hundred to two thousand cubic yards of soil will be excavated during a typical major construction project such as installation of a new manufacturing or support structure. Based on recent experience, Mallinckrodt will spend approximately \$400,000 per project to analyze, store, and deliver these soils to the Corps if construction is performed in an area containing FUSRAP contamination. Therefore, the presence of soil contamination increases the cost of major construction projects in areas containing FUSRAP contamination by approximately \$554,000 each. Based on past history, Mallinckrodt assumed implementing eight development projects in areas containing MED-AEC contamination over the 30 year cost evaluation period.

Over the 30 year period evaluated in the FS, Mallinckrodt will experience increased costs of approximately \$10 million (1998 dollars) to manage the contaminated soils which will remain on site if Alternatives 1, 2, 3, or 4 are implemented by Corps. Over the same period, the Corps will spend approximately \$11 million (1998 dollars) for the management, transportation, and disposal of these soils. These expenditures were not taken into account in evaluating Alternative 4. When these additional costs of future soil handling are taken into account, there is no cost justification for selecting Alternative 4 instead of Alternative 6.

#### **D. Alternative 4 Would Limit Future Development of the Site to the Detriment of the Surrounding Community**

The adverse impacts on the community, as well as Mallinckrodt, are not justified by the purported short term savings achieved by Alternative 4. Since 1980, City of St. Louis employment has declined in the services, manufacturing, and military industries. In contrast, during this period, Mallinckrodt employment increased by approximately 100. Further growth and the associated increased employment and community benefits are at risk if Mallinckrodt is unable to continue expansion in a cost-effective manner due to the presence of FUSRAP residues left behind by Alternative 4.



Over the past ten years, Mallinckrodt has made capital investments of approximately \$200 million for installation of new manufacturing facilities and upgrading of existing processes at the St. Louis Plant. Mallinckrodt has constructed state-of-the-art laboratory, maintenance, and warehouse facilities to support pharmaceutical manufacturing operations on previously remediated property. Mallinckrodt anticipates constructing new manufacturing facilities when other areas are fully remediated. Thus, continued remedial activities at the St. Louis Plant will provide immediate economic benefit to the St. Louis area. Over the next five years, Mallinckrodt anticipates a further capital investment of \$120-150 million at the St. Louis Plant. Mallinckrodt hopes to install approximately \$30 million of this new capital in areas remediated under FUSRAP. However, if Alternative 4 is selected, Mallinckrodt will be unable to construct new manufacturing facilities in these areas without encountering FUSRAP contamination. This creates a financial burden on development at the St. Louis Plant.

Elimination of future Mallinckrodt costs and restrictions which would impede operation, maintenance, and future development of the site are best addressed by adopting Alternative 6 which provides for clean fill to depths ranging from four to six feet.

#### E. Alternative 6 is Preferred by Government and Community Leaders.

Alternative 4 is not consistent with the recommendations of the St. Louis Site Remediation Task Force. In its September 1996 report, this task force of community representatives recommended that soil contaminants be removed to a depth permitting general excavation for maintenance without concern. Because it includes removal of contaminated soils likely to be encountered during routine maintenance and construction activity, Alternative 6 is consistent with the Task Force recommendation. In addition to support by Mallinckrodt, implementation of Alternative 6 is supported by Missouri DNR, City of St. Louis Mayor Harmon, St. Louis County Executive Westfall, and the St. Louis Congressional delegation. Implementation of Alternative 6 is also supported by numerous community leaders and area residents, several of whom voiced their support at the public meeting held by the Corps at Clay School on April 21, 1998.

#### F. Requirement for Long Term Commitment

The FS provides: "inaccessible soil will be addressed at a later date when an appropriate remedy that minimizes disruption of active facilities has been identified." FS at pp. 1-5; 4-1. However, the Feasibility Study and Proposed Plan fail to address how the Corps will take responsibility for the long term management of contaminated soils which are not removed by the cleanup. The Corps, DOE, or another Federal Government entity must establish a long term commitment to Mallinckrodt for management and disposal of residual materials if MED-AEC materials are left on site following remediation. In contrast to the Corps' inaccurate suggestion that there is uncertainty concerning the source of radionuclides at the St. Louis Plant (FS at ES-3), the MED/AEC operations caused by far the bulk of the

radioactive materials processed at Mallinckrodt.<sup>37</sup> It would be inappropriate and inequitable to shift the burden of dealing with MED/AEC contamination to Mallinckrodt. The congressional intent of FUSRAP was to relieve property owners of this burden. Moreover, the United States is contractually obligated to Mallinckrodt to address all contamination related to MED/AEC uranium processing. Future responsibility must be acknowledged at this time to ensure that contaminated soils do not become a burden to future property owners or present a risk to human health and the environment when they are disturbed during future operation, maintenance, and development of the facility.

Mallinckrodt believes that the FS must either address remediation of inaccessible soils which will occur at some point in the future, provide a long term commitment that these soils will be addressed when they become accessible, or provide for remediation of these soils now with appropriate compensation to property owners for the disruptions caused by this remediation. Failure of the Corps to include these soils in the FS leaves their status and future remediation uncertain.

In addition, the FS does not anticipate and address response actions for contaminated soils that are not now known but are discovered in the future. Mallinckrodt and future property owners must not be burdened with the administrative and financial costs of managing such contaminated materials in the future.

#### **G. Corps Responsible for Chemical Contamination Resulting from Uranium Processing and For all Contamination Commingled with MED/AEC Residues**

The FFA requires the Corps to remediate all waste, including but not limited to, radiologically contaminated waste, resulting from or associated with uranium manufacturing or processing activities conducted at the St. Louis Plant as well as other chemical or non-radiological waste which have become mixed or commingled with radiological contaminated waste resulting from or associated with uranium manufacturing or processing activities conducted at the St. Louis Plant. The FS expressly acknowledges the scope of the Corps' obligations when it cites the FFA as covering:

- All wastes, including but not limited to radiologically contaminated wastes, resulting from or associated with uranium manufacturing or processing activities conducted at the St. Louis Plant.
- Other chemical or radiological wastes that have been mixed or commingled with wastes resulting from or associated with uranium manufacturing or processing activities conducted at the St. Louis Plant.

Areas of chemical contamination from MED/AEC activities are therefore also within the scope of the FFA and this remedial project.

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<sup>37</sup> The Corps essentially concedes this fact in the FS stating: "the MED/AEC operation comprised most of the radioactive materials processed at Mallinckrodt." FS at p. .

In evaluating the extent of chemical contamination for which the Corps is responsible, characterization activities did not attempt to identify all organic compounds used in uranium processing. See FS at p. 2-27, paragraph 4. Consequently, characterization studies completed to date may not have identified all of the compounds used in uranium processing which remain in the environment.

In addition, the Corps is incorrect in stating that "No RCRA listed compounds were used..." The remedy that is implemented must account for all of the chemical contamination associated with MED/AEC operations. See FS at p. 2-33, paragraph 3. Acids (e.g., nitric) and organics (e.g., TCE) were used in uranium processing and are listed hazardous wastes. In fact, the FS lists numerous chemicals associated with uranium processing: chemicals associated with MED/AEC materials or processes include trichloroethylene (TCE), diethyl ether, inorganic compounds such as hydrofluoric, nitric, and sulfuric acids (Harrington and Ruehl, 1959), nitrates, calcium hydroxide, caustic soda, sodium bicarbonate and carbonate, anhydrous ammonia, graphite, and petroleum products. FS at p. 2-25.

### III. Conclusion

As stated above, Mallinckrodt recommends that Alternative No. 6 be selected as the preferred remedial action at the St. Louis Downtown Site (SLDS). It will impose less restrictive use-limitations on Mallinckrodt and future property owners. Alternative No. 6 will remediate contamination to levels which are protective of human health and the environment. It will remove contaminated soils likely to be encountered during routine maintenance and construction activity and therefore will allow cost-effective operation, maintenance, and development of the facility by current or future property owners. It is therefore consistent with the St. Louis Site Remediation Task Force recommendations. As this alternative will provide clean borrow in future development areas, excavation for site maintenance and development may proceed with significantly lower risk of encountering contaminated soils. It has greater long term effectiveness and permanence than do Alternatives 1-4. In addition, Mallinckrodt and Federal Government costs for the management and disposal of contaminated soil generated during facility maintenance and development will be greatly reduced when compared to all other alternatives except No. 5.

### IV. Miscellaneous Specific Comments

#### A. Inadequacy of Radon Analysis

Page 3-18, paragraph 2. This statement is incorrect. Radon emissions from materials beneath buildings 101 and K required installation of radon control measures to maintain concentrations at acceptable values. These soils also represent exposure risks when subsurface maintenance is performed.

The Feasibility Study proposes, "... occupancy and use restrictions and engineered control measures would also be implemented for buildings where radon gas is a concern." [FS 5-32]. "... use of active and passive radon control systems and adherence to worker safety

regulations will be used to maintain safe work levels for all SLDS employees." [FS 5-29] This, as well as routine monitoring for radon gas, are additional costs to Mallinckrodt which has not been identified.

Industrial worker scenarios assumed a 2-foot thick zone of contamination. Yet a substantial fraction, perhaps the majority, of radon entering a building through its floor may originate deeper than 2 feet wherever cinder fill is relatively porous and dry.

RESRAD models radon entry into a building by assuming diffusion from ground below and inflow of ventilation air from outside as the motives for entry. Although argumentative perhaps, the primary motive is apparently pressure differential between interior and exterior of the house near the ground floor caused by the chimney effect, wind, and atmospheric pressure drop that draws in soil gas.<sup>4,5</sup> In view of this likely deficiency in RESRAD and RESRAD-BUILD models, the CORPS should request ANL to re-examine the radon model in RESRAD and RESRAD-BUILD. The CORPS should reconsider its estimation of potential radon exposure within a habitable building on land containing elevated  $Ra^{226}$ . If the CORPS proposes to rely on the RESRAD model to predict indoor radon progeny concentration, it should address these concerns.

The CORPS should reconsider its estimation of potential radon exposure within a habitable building on land containing elevated  $Ra^{226}$  made using RESRAD or RESRAD-BUILD. The State of Missouri's prohibition on the placement of radioactive materials in landfills will increase the cost of disposal of soils containing any radioactivity above background levels. It was not considered a relevant and appropriate factor in evaluating the acceptability of remedial alternatives

#### B. The Corps Is Correct in finding Groundwater Treatment Unnecessary

Mallinckrodt concurs with the Corps' assessment of the overall poor conditions of groundwater in the vicinity of the St. Louis Plant. See FS at pp. 2-36, ES-3, 2-11, 2-36, 2-39, 3-16, 4-3.

Page 2-36, paragraph 2. Residents consuming groundwater from on-site wells and produce from home gardens is not a realistic future use scenario for SLDS. Residential use of the property is not a reasonable future use assumption and is therefore not a reasonable basis for evaluation of future exposures.

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<sup>4</sup> Nazaroff, W.M. "Entry by Pressure-driven Flow or Molecular Diffusion? A Reassessment of  $^{222}Rn$  Concentrations Measured in an Energy-Efficient House." *Health Physics*. 55, no. 6. Pp1005-1008. Dec. 1988.

<sup>5</sup> Holub, R.F. "Reply to "Entry by Pressure-driven Flow or Molecular Diffusion?" *Health Physics*. 55, no. 6. Pp1009-1011. Dec. 1988.

### C. Other issues

Page 2-3 and elsewhere throughout report: Uranium processing was not performed in plant 6E to our knowledge. Some portions of plant 6E may have been contaminated by migration of radionuclides into the area.

Page 2-25, paragraph 3. It is likely that the presence of coal slag and cinders in fill material has resulted in the presence of both inorganic and organic compounds in the environment (e.g., polycyclic aromatic hydrocarbons). PAH's are not believed to be from Mallinckrodt processing, but from the cinder fill material. Such fill material was used throughout the river front area to raise the grade elevation and allow development.

Page 3-8, paragraph 5. Although the State of Missouri has not implemented regulations which address radioactive contamination in soil, it has issued regulations which effectively prohibit the landfill disposal of soils containing above-background concentrations of radioactivity. This effectively precludes the use of Missouri landfills for disposal of soils containing FUSRAP residues in any concentrations and creates a significant burden on property owners whenever soils are excavated for facility maintenance or expansion.

Page 3-10, Table 3-1, Soil Guidelines. The guidelines list is incomplete. It appears to provide only the guidelines in 40 CFR 192 and DOE Order 5400.5, Soil criteria for the full list of MED/AEC radionuclides to be addressed by the project and the impact of depth on criteria are not identified.

Page 3-10, Table 3.1, External Gamma Radiation. Table 3-1 cites 20  $\mu\text{R/hr}$  as a criterion in a habitable building. However, 7.5  $\mu\text{R/hr}$  exposure rate times 2000 hr/yr occupancy would produce about 15 mrem/yr, absent any other exposure.

Page 3-10, Line 37. The DOE interpreted the equivalent of Table 3-1 to specify a surface release criterion of 5000  $\alpha/(\text{min } 100 \text{ cm}^2)$ , ignoring the thorium criterion. How will the Corps interpret Table 3-1 surface criteria with the prospect that thorium is present? The proposed criteria do not seem to account for potential presence of thorium series radionuclides.

Page 4-7, paragraph 6. The containment alternative is not acceptable to Mallinckrodt. Such an alternative would have significant impact on plant maintenance and development and would significantly reduce property values.

Page 5-51, Public Services. The statement that Alternative 4 has a low impact on utilities is not correct. Utilities exist in the soil horizons where residual contamination will remain.

Page 5-57, paragraph 4; 4-10, paragraph 5. The use of Plant 2 as a location for fill or treatment processing facility is unacceptable to Mallinckrodt as this area is in the middle of the manufacturing facility. Moreover, as the Corps notes: "Consolidation at Plant 2 would

have an impact on Mallinckrodt Inc.'s ability to expand its operations. This could result in reduced employment." FS at 5-23.

Page 5-9, paragraph 9. Alternative 2 - Institutional Controls And Site Maintenance is not acceptable to Mallinckrodt as it does not reduce employee exposures or impediments to facility maintenance and development.

Page 5-15, paragraph 3. Alternative 3 - Consolidation and Capping is not acceptable to Mallinckrodt as it does not reduce employee exposures or impediments to facility maintenance and development.

Page 5-15, paragraph 5. Mallinckrodt will not agree to consolidating and capping contaminated materials from property outside their boundaries.