Comments on the Environmental Assessment for the Biosafety Level 3 Laboratory at Lawrence Livermore National Laboratory

Western States Legal Foundation
1504 Franklin St., Oakland, CA 94612
phone: (510) 839-5877
fax: (510) 839-5397
web site: http://www.wslfweb.org

Western States Legal Foundation Comments on the Environmental Assessment for the Biosafety Level 3 Laboratory at Lawrence Livermore National Laboratory.

Submitted by Andrew Lichterman, Program Director

Summary

Western States Legal Foundation (WSLF) is a nonprofit organization that provides information, analysis, and legal support for peace and environmental activists. WSLF has monitored the activities of the Lawrence Livermore National Laboratory (LLNL) for twenty years, and has worked on broader Department of Energy weapons complex issues for approximately fifteen years.

WSLF believes that the construction of a Biosafety Level 3 (BSL- 3) laboratory at LLNL requires an Environmental Impact Statement. The proposed action, which will include research using significant quantities of dangerous organisms and the aerosolization of pathogens and biotoxins for various purposes including animal exposure tests, has significant foreseeable environmental impacts. The potential health risks, although perhaps difficult to quantify, are substantial. Because of the particular nature of biological warfare research, a known or suspected release may have disproportionately large direct economic and social impacts. The Environmental Assessment here provides only boilerplate assertions that the risks are negligible, and relies on adherence to procedures, some of which DOE laboratories have not followed in the past and others of which are not yet in place, for risk reduction. Because of the significance of the potential impacts, WSLF believes that an Environmental Impact Statement (EIS) is required here.

Because of the intrinsic risks of placing a laboratory that will handle dangerous biological materials in a densely populated urban area, a careful analysis of alternatives is both essential and required. The Environmental Assessment addresses in detail only various ways to construct a BSL- 3 facility at the Livermore Laboratory, without comparing in detail any of the other possibilities for accomplishing the same mission, ranging from using other existing government or contract facilities, using government facilities slated to be constructed in the near future, or constructing a new BSL 3 facility at another Department of Energy (DOE) site. These issues would be addressed in detail the more extensive analysis required in an EIS.

Adequate environmental review for this action, furthermore, would best be assured by preparing a Programmatic Environmental Impact Statement (PEIS) for the DOE Chemical and Biological National Security Program (CBNP) prior to site-specific environmental review. This would best allow comparison of both alternative means for fulfilling the purposes of the action, i.e. conducting various kinds of non-medical biological warfare defense research, (including, for example, use of contract laboratories), and alternative sites for a new BSL- 3 laboratory if it is determined that one is needed. In addition, this would allow more systematic consideration of reasonable alternatives not under the direct jurisdiction of the

agency, such as conducting research requiring BSL- 3 facilities at Department of Defense or other government facilities doing similar work. A PEIS also would help to inform a broader assessment and discussion of responses to the risk of biological attack, including whether resources are best used on biowarfare defense technologies as opposed to such other responses as improvements in overstretched emergency medical resources and existing public health systems for reporting, tracking, and responding to disease outbreaks.

Finally, the Programmatic NEPA review of DOE's biological warfare defense research should be accompanied by a Nonproliferation Impact Review. The potential for the development of offensive technologies intrinsic to "defensive" biowarfare research raises dangers of diffusion of technology, disruption of global nonproliferation efforts due to perceptions of a potential offensive threat from growing U.S. technical capabilities, and theft or diversion of dangerous materials.

The Environmental Assessment does not provide an alternatives analysis sufficient to allow meaningful comparison of the proposed action with other reasonable alternatives.

The discussion of alternatives here is deficient even for an Environmental Assessment. DOE has dismissed alternatives other than "No Action" and construction of a BSL- 3 laboratory at LLNL from the outset by defining the "purpose and need" for the action as "the purpose and need for NNSA to conduct future BSL-3 level work at LLNL in support of its assigned national NNSA security –and science mission responsibilities." EA at 26.

The EA claims that a BSL-3 facility must be built at LLNL. According to the EA, DOE is constructing another BSL- 3 laboratory at the Los Alamos National Laboratory. It also appears that DOE is constructing a facility that could be used for BSL- 3 work at the Oak Ridge National Laboratory, although the EA fails to mention it.[1] These would seem to provide alternative sites for the BSL-3 activities contemplated for LLNL.. DOE acknowledges that "it is possible to construct such a facility at any of the national security laboratories at approximately the same cost and schedule,"(EA at 26) but rules out any other options because they fail to meet DOE's self-fulfilling requirement of "need for NNSA to conduct future BSL-3 Level work at LLNL." The primary rationale for limiting alternatives to LLNL on-site construction of the BSL-3 laboratory appears to be that LLNL has supporting infrastructure, past program

[1] According to a February 2001 DOE Inspector General Report, DOE constructed a laboratory at Oak Ridge National Laboratory intended for BSL-3 work, but failed to do an environmental assessment. According to the Inspector General report, "Oak Ridge Operations Office officials subsequently placed restrictions on the Chem-Bio Facility to exclude BSL-3 activities, and stated they will conduct an environmental assessment before any BSL-3 work is performed in the facility." "Investigation of Department of Energy Activities Involving Biological Select Agents," DOE/IG-0492, February 2001, p.23

experience, and expertise that make it an appropriate site for the required work. EA at pp. 4-7. It is worthy of note in this connection that when conducting its NEPA analysis for the National Ignition Facility, an advanced laser facility, DOE considered a wide variety of sites, despite the fact that LLNL arguably has a far greater claim to the unique character of its laser programs and supporting infrastructure than can be made here for its biological research programs.[2]

Further, DOE's work in this area is by no means unique. The General Accounting Office in 2000 found a lack of coordination and potential duplication of effort in federal non-medical chemical and biological research, including DOE's Chemical and Biological Nonproliferation Program (apparently the forerunner of the current Chemical and Biological National Security Program). GAO

> found many similarities among these programs in terms of the research and development activities they engage in, the threats they intend to address, the types of capabilities they seek to develop, the technologies they pursue in developing those capabilities, and the organizations they use to conduct the work. "Chemical and Biological Defense, Observations on Nonmedical Chemical and Biological R&D Programs," Statement of Kwai-Cheung Chan, Director, Special Studies and Evaluations, National Security and International Affairs Division, U.S. General Accounting Office, Before the Subcommittee on National Security, Veterans' Affairs, and International Relations, Committee on Government Reform, House of Representatives, March 22, 2000, GAO/NSIAD-00-130, p.2. (Hereafter GAO 2000)

This also would suggest that there are reasonable alternatives to conducting CBNP program research requiring a BSL-III at DOE facilities, and at LLNL in particular. Given the risks of conducting the types of research characteristic of a BSL-3 facility, and particularly such activities as the aerosolization of pathogens and biotoxins, possibly in forms that could be used as biological weapons, an alternatives analysis must be conducted that is sufficiently broad to inform choices on whether a new BSL-3 facility is needed at all, and if so whether a particular location is most appropriate.

DOE should prepare a Programmatic EIS for its Chemical and Biological National Security Program and for similar and related work performed at its facilities.

As the above GAO report makes clear, the work performed by the DOE CBNP program is closely related to that being done by several other agencies, particularly within the Department of Defense (DoD). That report also noted that funding for chemical and biological warfare defense research is

---

[2] The National Ignition Facility environmental review considered sites at three DOE laboratories, and the Nevada Test Site. See U.S. Department of Energy, Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management, 1996, V.III, pp. I-S2-IS3.

increasing rapidly, and that there is a danger that resources will be wasted due to inadequate coordination of programs proceeding simultaneously in different agencies.[3] This was before September 11, and budgets for research of this kind continue to increase rapidly. A useful alternatives analysis for the type of work proposed in the action reviewed here– to "'develop, demonstrate and deliver technologies and systems to improve domestic defense capabilities and, ultimately, to save lives in the event of a chemical or biological attack'" (EA at 7)-- could best be performed as part of a Programmatic Environmental Impact Statement. (PEIS). A PEIS would allow comparison of both alternative means for fulfilling the purposes of the action, i.e. conducting various kinds of non-medical biological warfare defense research, (including, for example, use of contract laboratories), and alternative sites for a new BSL- 3 laboratory if it is determined that one is needed. In addition, this would allow more systematic consideration of reasonable alternatives not under the direct jurisdiction of the agency, such as conducting research requiring BSL-3 facilities at Department of Defense or other government facilities doing similar work. In this regard, it is noteworthy that the Department of the Army is preparing a PEIS for the Department of Defense Chemical and Biological Research Program.[4]

A PEIS also would help to inform a broader assessment and discussion of responses to the risk of biological attack, including whether resources are best used on biowarfare defense technologies as opposed to such other responses as improvements in overstretched emergency medical resources and existing public health systems for reporting, tracking, and responding to disease outbreaks. The current martial atmosphere, with its emphasis on military and technological solutions, may prevent adequate attention to other approaches that may actually be more effective in protecting the public, and is likely to strengthen tendencies to provide funding with little question to military and other weapons research laboratories for research that may be less useful.[5]

---

[3] Although the four programs we examined currently use both formal and informal mechanisms for coordination, we found several problems that may hamper their coordination efforts. First, we found that participation in current coordination mechanisms, whether formal or informal, is inconsistent. Second, program officials cited a lack of comprehensive information on which chemical and biological threats to the civilian population are the most important and on what capabilities for addressing threats are most needed. More detailed information could help guide and coordinate R&D. Third, several programs do not formally incorporate existing information on chemical and biological threats or needed capabilities in deciding which R&D projects to fund. Because of these problems, these programs may not be developing the most important capabilities or addressing the highest priority threats. GAO 2000, p.9

[4] See Department of Defense, Department of the Army, Notice of Intent, Preparation of a Programmatic Environmental Impact Statement (PEIS) on the Chemical and Biological Defense Program, Federal Register: June 4, 2001, (Volume 66, Number 107) pp. 29935-29936

[5] On this point, see generally Victor W. Sidel, M.D.; Robert M. Gould, M.D.; Hillel W. Cohen, Dr.Ph., "Bioterrorism Preparedness:Cooptation of Public Health?" *Medicine and Global Survival*, v.7 no.2, February 2002, pp.82-89. (Herafter Sidel 2002) As Sidel and his co-authors note, "In a world of finite resources, it is impossible to adequately prepare for all "what-if" catastrophic scenarios. What is needed is a thorough, objective, and scientific analysis of probabilities and alternatives that would guide the setting of priorities for programs to defend populations at risk."

In addition, the DOE Inspector General has identified a variety of operational issues that are common to DOE facilities doing biological warfare defense work, and that are likely to pose greater hazards if the volume of work increases and if more dangerous agents are used:

> We concluded that there was insufficient organization, coordination, and direction in the Department's biological select agent activities. Specifically, the Department's activities lacked sufficient Federal oversight, consistent policy, and standardized implementing procedures, resulting in the potential for greater risk to workers and possibly others from exposure to biological select agents and select agent materials maintained by the Department. "Investigation of Department of Energy Activities Involving Biological Select Agents," DOE/IG-0492, February 2001, p.2

The Inspector General recommended that DOE

> 1. Identify the types and locations of activities being conducted by the Department involving biological select agents and select agent materials.
>
> 2. Initiate actions to ensure: (a) appropriate federal oversight; (b) consistency in policy; and (c) standardization of implementing procedures for biological select agent activities being conducted by the Department. Actions, for example, could include encouraging more interagency cooperation in this area and, similar to the approach taken by the United States Army, supplementing CDC [Centers for Disease Control and Prevention] guidance regarding activities involving biological select agents and select agent materials to address situations unique to DOE.
>
> 3. Ensure that required NEPA reviews are conducted prior to the start of biological select agents and select agent materials and revised, as needed, when significant changes occur in the activities
>
> .
>
> 4. Initiate appropriate action to ensure the Department's laboratories, including those managed by the NNSA, receive timely and consistent information regarding CDC guidelines." "Investigation of Department of Energy Activities Involving Biological Select Agents," DOE/IG-0492, February 2001, p.25

These issues are particularly noteworthy given the types of activities proposed in this EA, and for the DOE Chemical and Biological National Security Program in general. As the Inspector General report noted, "activities by DOE laboratories, including those managed by the NNSA, are beginning to involve infectious (potentially lethal) forms of biological select agents that pose a greater risk to employees." at 4. The list in the environmental assessment of organisms to be used is very open ended, with the EA stating

that organisms could include "other bacterial or viral infectious organisms not specifically or currently regulated by CDC or other Federal agencies such as those shown in the tables at the end of Appendix A," (EA at Appendix A, p.22)-- a list including hundreds of organisms. The EA also notes that "[i]t is possible that the facility would receive genetically altered microorganisms."Appendix A, p.17.

Both the operational and management issues and the increase in lethality of the agents being studied are issues that apply across DOE's Chemical and Biological National Security Program. The use of genetically modified organisms poses particular problems that are not specific to any one facility. The problems identified by the Inspector General may be exacerbated by the management changes that may come with the establishment of a Department of Homeland Security, which may change lines of authority yet again in institutions where unclear responsibility and lax oversight has been a chronic problem. The DOE CBNP is clearly a "program" responsible for a discrete set of interconnected activities with similar environmental risks and impacts at a number of different locations, and common operational and management issues. For all of these reasons, DOE should prepare a PEIS for this program. Scoping for this PEIS could examine what other DOE biological research activities (e.g. similar or related "work for others" programs) should be included.

DOE should conduct a Nonproliferation Impact Review for its Chemical and Biological National Security Program

The Programmatic NEPA review of DOE's biological warfare defense research should be accompanied by a Nonproliferation Impact Review. Such a review is not unprecedented, having been conducted in the past by DOE for the National Ignition Facility to assess the effects of a new advanced nuclear weapons research facility on the nuclear nonproliferation regime. The potential for the development of offensive technologies intrinsic to "defensive" biowarfare research raises dangers of diffusion of technology, disruption of global nonproliferation efforts due to perceptions of a potential offensive threat from growing U.S. technical capabilities, and theft or diversion of dangerous materials. The risk that techniques or agents will be developed that have offensive applications is significant where "defensive" research weaponizes organisms or biological toxins to test defensive technologies or to develop medical responses such as vaccines.

The Nonproliferation Impact Review should be similar in form to a NEPA proceeding, with an opportunity for the public to participate in scoping, and a draft circulated for public comment. If biowarfare defense research must be conducted, keeping secrecy to a minimum is critical to reduce both perceptions and the real possibility that "defensive" programs will be used to develop technologies with offensive capabilities. A review of this kind would allow the civilian medical, scientific, public health, and arms control communities, as well as the general public, to make suggestions for how such research could be conducted in the most open possible manner and how unnecessarily dangerous or provocative activities

could be avoided.

DEFICIENCIES IN THE IMPACTS ANALYSIS IN THE ENVIRONMENTAL ASSESSMENT

In general, the EA assumes that a significant release of pathogens or biological toxins from the proposed facility is an event too unlikely to require detailed analysis. The EA presumes that a the most hazardous conceivable release would require a structural breach in the facility, and even then that the potential hazard is insignificant. The pathway of worker exposure, and of subsequent transmission to other LLNL workers or to people off-site, also is dismissed as insignificant. These conclusions are based, however, on a number of assumptions that are questionable. In particular, we believe that the risks of worker exposure are understated, as are risks of subsequent transmission of illness to other workers or people off-site.

The CEQ NEPA regulations list elements to be taken into account in determining whether an environmental impact is "significant" for the purposes of determining whether an EIS should be prepared. Factors of particular relevance here include:

> "The degree to which the proposed action affects public health or safety....
>
> The degree to which the effects on the quality of the human environment are likely to be highly controversial.
>
> The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.... 40 C.F.R. § 1508.27

Here, the nature of the proposed action is inextricably related to "public health and safety." The EA states that the proposed facility may handle a wide range of dangerous organisms and biotoxins, including genetically engineered organisms. Some of these materials will be aerosolized in the course of doing the research. The research is on defense against biological weapons, so it appears possible that some of these materials will be in weaponized form. The EA states that work at the facility will include aerosolization of materials for animal inhalation tests, which means that the material will be reduced to small, easily respirable particles in quantities sufficient to cause disease in the test animals. This work is inherently dangerous, and unless done with a high level of physical and procedural safeguards appears likely to pose a high level of hazard to both workers and the public.

Both the likelihood of exposure of workers or the public are " highly uncertain"and "involve unique or unknown risks." The uncertainty comes form the difficulty of assessing the risk that facility workers, other LLNL personnel, or people off-site will be harmed as a consequence of a release or a worker

exposure. The EA's conclusions that this risk is insignificant are based on a number of questionable assumptions about the reliability of both physical and procedural safeguards, the specifics of which we will return to below. The "unique or unknown risks" element results from the purposes of the proposed facility and the work that may be performed there. Biological warfare agents are seldom encountered by the general public, or by emergency personnel and regional medical workers who would have to respond if there were a substantial disease outbreak as a result of the proposed activities. Since they in most cases have not been tested on human subjects, the consequences of exposure of a human population may be only theoretically grounded, and not proven. Genetically modified organisms pose a particular problem in this regard. It is worth noting here that an EIS also would provide an opportunity for more extensive participation in the impact analysis by state and local agencies concerned with emergency services and medical response, which both will improve the quality of the analysis and help to provide responders with an understanding of the risks posed by the proposed activities.

The effects on human health and the environment of the kinds of research here are without doubt controversial. There is extensive debate over the degree of risk presented by research of this kind, and particularly by research in which genetically modified organisms are used and may be accidentally released.

Finally, a particular characteristic of biological warfare research that the EA fails to address is the peculiarly terrifying nature of biological warfare agents themselves. If there were a release or exposure at such a facility, it might be difficult for some time to determine the nature or extent of the hazard. As was demonstrated by the anthrax attacks of Fall 2001, even the possibility of small quantities of dangerous organisms can close down entire facilities, or change the way that a region– or even an entire country– functions, despite the fact that only a relatively small number of people actually become ill or die.

Particular deficiencies in the Impact Analysis

The analysis of the risk that workers may be exposed to dangerous organisms or toxins, and of the possibility that this may lead to transmission of disease to other workers or off-site, rests on a number of assumptions. These include:

--Procedures for handling of biohazard materials will be consistently followed.

Much of the analysis is devoted to listing the procedures that will be followed by laboratory personnel to assure that materials are properly tracked, handled, and disposed of. The EA also relies heavily on the 1989 Final Programmatic Environmental Impact Statement for its Biological Defense Research Program. There is no explanation for why we should believe that the safety culture at the Army laboratories is the same as that at the Department of Energy, whose past record of adherence to health and safety procedures has not been good. Again, as the DOE Inspector General noted in regard to the type

of activity at issue here,

> the Department's activities lacked sufficient Federal oversight, consistent policy, and standardized implementing procedures, resulting in the potential for greater risk to workers and possibly others from exposure to biological select agents and select agent materials maintained by the Department. "Investigation of Department of Energy Activities Involving Biological Select Agents," DOE/IG-0492, February 2001, p.2

--Physical safeguards, and particularly HEPA filter systems, will function well.

The Department of Energy has a long history of difficulty with HEPA filters at its facilities. Two recent reports by the Defense Nuclear Facilities Safety Board document DOE nuclear weapons complex-wide problems with confinement ventilation systems, and particularly with HEPA filters. These problems are not limited to existing or older facilities, since they concern a wide range of issues including problems with safety analyses, filter design, behavior of filter and ventilation systems under fire and other accident conditions, and filter production quality control. See Defense Nuclear Facilities Safety Board Technical Report, "HEPA Filters Used in the Department of Energy's Hazardous Facilities," DNFSB Tech-23, May 1999, and Defense Nuclear Facilities Safety Board Technical Report, "Improving Operation and Performance of Confinement Ventilation Systems at Hazardous Facilities of the Department of Energy," DNFSB/Tech-26, February 2000.

These reports addressed DOE nuclear facilities; the EA, however, fails to address why, given the systemic nature of the problems, things would be any better at a BSL-3 facility.

-- Even if workers are exposed, they are unlikely to become ill because they will be immunized, and even if they get sick, the risk of a widespread outbreak is small because of the nature of the organisms and toxins handled at a BSL-3 facility:

> "Even though these accidents are more frequently reported, they rarely result in workers actually contracting diseases due to the use of vaccines and drug therapies." EA at 48.

> "The worker(s) would have the appropriate prophylaxis available or immunization prior to working in the laboratory and would not become symptomatic." EA at 51

> "Last, but not least, Risk Group 3 agents (those handled in BSL-3 laboratories) are associated with serious or lethal human diseases for which preventative or therapeutic intervention may be available (high individual risk but low community risk). EA at 51.

These assumptions are problematic. The first assumes that there would be "prophylaxis or immunization available" for all pathogens handled. This seems questionable in a laboratory that may handle an open-ended array of biological warfare agents, particularly for example that "immunizations" will be available for genetically altered agents. It also implies that all workers would be immunized. This seemed dubious enough to the DOE Inspector General to recommend that the DOE General Counsel

> 5. Determine the potential liability to the Department if contractor employees working with biological select agents refuse immunizations or if they do not sign a statement acknowledging the risks associated with the project, the availability of immunizations, and the individual's decision not to be immunized.
>
> 6. Determine the feasibility of requiring Department laboratory employees to be immunized in order to work with infectious agents.
>
> 7. Determine whether the Department has liability to third parties (e.g., spouses, families, members of the community) who may be infected as a result of coming in contact with a laboratory employee who works with biological select agents, but has refused to be immunized. "Investigation of Department of Energy Activities Involving Biological Select Agents," DOE/IG-0492, February 2001, p. 25.

The latter assumption, that "preventative or therapeutic intervention may be available," also seems weak for a biowarfare defense lab that may employ genetically altered organisms. There also is an implication that this will be sufficient to contain an outbreak at 'acceptable' levels, whatever that may be.

These assumptions, drawn from a long list of assumptions cited as support for the "conservatism" of the EA's limit case accident analysis, are important because they are key underpinnings of the EA's broader assumption that workers will not get sick in the ordinary scheme of things, and if they do it they are unlikely to infect many others on or off-site. Here too the EA relies heavily on the 1989 Army PEIS (see generally EA Appendix B). Again, it is worth noting the relevance of DOE's past difficulties with health and safety regulation compliance (not addressed in the EA). And worker exposures do happen:

> [A] researcher at the US Army Medical Research Institute of Infectious Diseases (USAMRID) developed a case of glanders, a disease considered to have biowarfare potential. The researcher spent considerable time in his community before the diagnosis was made. Sidel 2002, citing Srinivasan A, Kraus CN, DeShazer D, et al., "Glanders in a military research microbiologist, " N Engl J Med 2001;345:256-8.

Another unanswered question relevant to DOE's reliance on past data from military labs is the

relative risk of different types of research activities. Aerosolization studies that may include biowarfare agents would seem to be a fairly high-risk activity, and there is no indication of what proportion of the labs whose experience provided the data for the studies relied on by the EA did work posing similar or greater hazards.

The EA does note that "[o]nly by prior approval of the LLNL Institutional Biosafety Committee (IBC), and after a risk analysis is conducted, would any infectious agent be considered for use in the proposed laboratories." Appendix A p.22. But this promise of a future procedure, with no guarantee of public participation, is no substitute for adequate environmental review before the facility is built.

There are other flaws in the EA's analysis both of a bounding accident and of possible worker exposures from far smaller mishaps in routine operations. Both the bounding accident discussion and Appendix B, which addresses the issue of worker exposure during operations, appear to assume that agents only could be aerosolized at the proposed facility by accident– a centrifuge accident in the case of the accident analysis, and various other laboratory errors or incidental releases in the Appendix (see Appendix B-4). One of the activities proposed for the facility, however, is aerosolization of agents, including aerosolization for animal experiments.

> "The proposed facility would have the unique capability within DOE/NNSA to perform aerosol studies to include challenges of rodents using infectious agents or biologically derived toxins (biotoxins)." EA at ii.

It would seem possible that this process would produce more efficiently aerosolized particles, possibly even in larger quantities, that the scenarios posited by the EA. The possibilities of other accidents– earthquakes, facility fires, etc.-- seems more likely during the routine, intended process of aerosolizing agents than the unlikely string of events the EA claims as the bounding accident. In addition, the possibility of failure of filter systems, both within the facility and leading outside, during aerosolization of agents is not addressed. This failure could be partial or complete, and could, depending on circumstances, go unnoticed at the time. Filters that are not functioning properly on a routine basis, and possible consequences, also are not addressed. These possibilities would seem to pose a risk of worker exposure, particularly given if DOE's past systemic problems with HEPA filters have not been fully remedied, and also of further disease spread, and should be analyzed.

Other questions and areas where past practices suggest caution

–Disposal of liquid waste.

The EA states that "Soluble or liquid waste materials generated from laboratory operations can be

disposed in the laboratory sinks after first being treated with disinfectants." p.23 It is unclear from the EA whether this waste will be discharged directly to the sanitary sewer or first to retention tanks. The EA states at page 34 that these wastes will first go to retention tanks, but at p.45 it states in connection with hazardous wastes that "There would be no retention tanks or need for waste accumulation areas since no hazardous waste would be produced (hazardous chemicals would be used up in process or leave the building as a stabilizing product for microorganisms and biological material)." Presumably this applies only to hazardous wastes, and there will be retention tanks for other liquid waste.

Discharge of improperly characterized retention tanks to the sewer system has been a problem in the past at LLNL with hazardous and radioactive wastes. This too is an area that requires further analysis, since a discharge of toxins or pathogens to the sewer system is a possibility. Sewage sludge should be analyzed as a possible transmission route for organisms discharged to the sewer.