APPENDIX F

Comments Received for the Public Comment Draft Health Consultation, Review of Health Studies Relevant to LLNL and the Surrounding Community, Livermore, California

Ms. Sumi Hoshiko, M.P.H.
Research Scientist
Environmental Health Investigations Branch
California Department of Health Services
1515 Clay Street
Oakland, CA 94612

Re: Review of Health Studies Relevant to Lawrence Livermore National Laboratory and the Surrounding Community CERCLIS No. CA28900125584

Dear Ms. Hoshiko:

We are writing on behalf of our three community based organizations, San Francisco Bay Area Physicians for Social Responsibility (PSR), Tri-Valley Communities Against a Radioactive Environment (Tri-Valley CAREs), and Western States Legal Foundation (WSLF). As you know, our three organizations are also members of the Site Team convened by the Agency for Toxic Substances and Disease Registry (ATSDR) to provide input to ATSDR on their assessment of the potential human health impacts of environmental releases of radioactive and chemical substances from Lawrence Livermore National Laboratory (LLNL).

Thank you for the opportunity to provide comments on the document "Review of Health Studies Relevant to Lawrence Livermore National Laboratory and the Surrounding Community CERCLIS No. CA28900125584". Our primary observation about this document is that it is an extremely objective, thorough, and comprehensible compilation of the health studies relevant to LLNL workers and Livermore community members. Your document addresses precisely the type of information that community members frequently want to know, i.e.; have there been studies of the health impacts of working or living near LLNL and if so, what were the results? Therefore, your work provides a valuable resource for workers and community members. We applaud the efforts of CDHS to provide such useful and objective information to community members that may be impacted by LLNL activities.

Your presentation of the studies that have been conducted to date is helpful in that it presents the strengths and limitations of each type of study. Moreover, it is clear from your review that no one study by itself can provide a definitive answer. However, when the available data are looked at together, they provide evidence for the existence of a relationship between exposure to ionizing radiation and melanoma. This finding was first identified in the 1984 Resource for Cancer Epidemiology

(RCE) of the California Department of Health Services study, and was later confirmed in two independent evaluations of the study. First, the data were reviewed in 1987 at the request of LLNL by independent scientists at the University of North Carolina and found to be valid. The data withstood further scrutiny in a 1994 independent review by the University of North Carolina. The results of one study in 1994 by LLNL using different data did not support the relationship between ionizing radiation and melanoma. However, the 1994 LLNL study has not undergone the same intense scientific scrutiny as the1984 RCE study.

Therefore we fully support CDHS recommendation "that given the past consistent elevations of melanoma among the LLNL workforce and the strong associations found between melanoma and risk conditions such as exposure to radiation, it would be beneficial for future epidemiologic studies of radiation exposure (not specifically at LLNL) to address melanoma directly."

We recommend CDHS address these additional points:

1. The negative findings regarding the relationship between melanoma and radiation exposure in the 1994 LLNL study have not undergone intensive independent scientific scrutiny as have the positive findings in the 1984 RCE study.

   CDHS should recommend that there be an independent review of the data, methodology and interpretation of the 1994 LLNL study to validate its findings.

2. As you know, melanoma is not traditionally considered a radiation-linked cancer, although it is linked to exposure to ultra-violet radiation (i.e., sunlight). At least two major releases of tritium from LLNL have been documented: In 1965 approximately 350,000 Curies were released and in 1970 approximately 300,000 Curies were released. It is also known that tritium was routinely released from LLNL in much lesser quantities. In total, the available evidence document that over one million Curies of radiation have been released by LLNL. We note that these documented quantities could underestimate actual tritium releases because specific accident reports are either not available or have not been declassified by the US Department of Energy. The consistent finding of increased levels of melanoma among workers and in the community, and known releases of ionizing radiation from LLNL, suggest two questions:

CDHS should comment in the report on the questions:

Is the relationship between exposure to ionizing radiation and melanoma biologically plausible?

Is a relationship between tritium exposure and elevated levels of melanoma in LLNL workers and community members biologically plausible?

3. We believe that the study by CDHS "Cancer incidence among children and young adults in Livermore, California: 1960-1991, provisional report. September 6, 1995 also identified elevated levels of brain cancer in children in some, but not all decades studied.

   CDHS should include these findings in the report.

4. Page 22: fourth paragraph from top – you state "In 1984 ... Fortunately, as exposure conditions at LLNL have improved over time, it would be anticipated that any risk at that facility has been commensurately reduced". We wondered what is the evidence to support that exposure conditions at LLNL have improved over time?

   CDHS should clearly state that "exposure conditions at LLNL have improved over time" is an unsupported assumption, or the report should reference the basis of this assumption. We note that even if individual worker' exposures have been reduced over time, if the number of workers at LLNL has increased during this same period, the population dose may be higher than in the past.

Once again, thank you for providing such a useful presentation of information on health studies related to LLNL. We appreciate the opportunity to provide input. CDHS' extremely objective, thorough, and comprehensible compilation of the health studies relevant to LLNL workers and Livermore community members is a valuable and timely resource.

Sincerely,

Robert M. Gould
President
San Francisco Bay Area Physicians for Social Responsibility

Marylia Kelley
Executive Director
Tri-Valley CAREs

Patrice Sutton
Western States Legal Foundation

Lawrence Livermore National Laboratory

Environmental Protection Department

March 12, 2003

Sumi Hoshiko
1515 Clay Street, Suite 1700
Environmental Health Investigations Branch
California Department of Health Services
Oakland, CA 94612

Dear: Ms. Hoshiko

Enclosed with this letter are the LLNL comments on the draft health consultation entitled, "Review of Health Studies Relevant to Lawrence Livermore National Laboratory and the Surrounding Community," September 2002.

The draft was reviewed by scientists and statisticians familiar with the studies cited in the draft document. We have suggested significant changes that would improve the accuracy, completeness, and balance of this document. We request that our comments be incorporated into any final document. If that is not possible, please include our comments in that document as an addendum or appendix.

It is our understanding that this health consultation was funded by the Agency for Toxic Substances and Disease Registry, we therefore are sharing a copy of our comments with ATSDR.

Please contact me if you have any questions. You may call (925) 424-4026 or contact me via e-mail at heffner1@llnl.gov.

Sincerely,

H.F. Heffner, Manager
Environmental Community Relations

Att: Draft Review Comment Form: "Review of Health Studies Relevant to LLNL and the Surrounding Community," March 2003.

cc: Jim Seward , LLNL
Mark Evans, ATSDR

HFH:klp

#03-22

DRAFT DOCUMENT REVIEW COMMENT FORM		Page 1 of 1
DOCUMENT TITLE	Review of Health Studies Relevant to LLNL and the Surrounding Community	Comments by LLNL
DOCUMENT NO.	CERCLIS CA 28900125584	March 2003

*NOTE: Comment categories are Major (show stoppers), Minor (flow of document is faulty or text is unclear), and Insignificant (primarily typographical errors identified for the author's convenience.)

Page	Section	¶	Comments	Urgent?	Who
3	Ex. Sum	3 and 7	The executive summary overstates the findings of the Austin/Reynolds study related to risk factors and puts inordinate weight on the results of that study in contrast to the subsequent LLNL study. This statement ignores both biological likelihood and the body of epidemiology that demonstrates little support for a causal link between ionizing radiation and melanoma. A more accurate summary would be "The search for workplace factors at LLNL yielded no consistent workplace associations."	Major	
6	Malignant Melanoma	3	The Sentence beginning " Because melanoma…' does not make sense. There have been many studies of occupational factors associated with melanoma, including ionizing radiation. There is little support for this association.	Minor	
13	LLNL Announce …	1	It seems rather unusual for a review such as this one to quote news releases. One of this LLNL-commissioned report's co-authors was on the ATDSR site team and was not contacted for input.	Minor	
13	LLNL Announce …	1	In reference to higher rates of "early stage" cancers other than breast and cervical, it is technically correct that the category of " all other" *in situ* cancers in women is statistically elevated. The numbers are small. It is rather unusual that this review singles out a category that represents miscellaneous *in situ* cancers. It is not a particularly meaningful finding or category. There are other much more important and interpretable findings in the cancer incidence report, such as the statistically lower rates of overall invasive cancer in LLNL women and, specifically, lower rates of invasive genital organ cancer in women. The elimination of this reference and possibly the substitution of a more meaningful one is suggested	Major	

Page	Section	¶	Comments	Urgent?	Resolved
13-17	Case Control		This section contains an unbalanced review of two case control studies relating to the search for occupational associations for melanoma at LLNL. The section offers an overly strong endorsement of the findings from 1984 CDHS case control (published in *1997*). The section also makes incorrect assumptions and criticisms about the methodology of the LLNL case-control study. This section is remarkable for focused criticism and re-analysis that is not directed towards any other paper reviewed in the current report. This review could also benefit from a reference to the discussion of the comparison between the two case control studies that appears in the LLNL report (UCRL-LR-106723, pages 46-49). It is suggested that this section should undergo a balanced revision and rewrite. There are two additional issues that should be mentioned in relation to the 1984 CDHS report. First, an inherent weakness of the design is the likelihood of recall bias relating to risk factors, including ionizing radiation, in the cases. Subsequent analysis of the radiation badge data from the 1984 cases did demonstrate recall bias. Second, the study, through no fault of the authors, did not use actual radiation measurements. This problem was corrected in the subsequent LLNL case study. The criticisms of the 1994 LLNL case control study in this review should be reconsidered. First, the conclusion that "this algorithm was chosen after experimentation with different algorithms" is erroneous. The implication that the authors used multiple matching methods to find the most favorable one is incorrect. This assessment appears to have been inferred from the statement (UCRL-LR-106723, page 16): "We considered the first 11 cases to be a pilot study group and used the experience from them to improve, modify and expand our procedure." According to the author responsible for this aspect of the study, one algorithm was used in the pilot. The algorithm was presented to and discussed by the Advisory Committee. The Committee suggested an improvement that was adopted for the final matching procedure. This is a reasonable research methodology and is not the iterative experimentation process that is suggested by the CDHS reviewer. Second, the argument that race should have been used as a matching factor is an insignificant issue. Only one control selected under the algorithm was Afro-American, and there were no Asian or Latino controls. Finally, the criticism of the matching criteria does not reflect the complexity of the situation. The argument in the Case Control section of the CDHS review document is essentially *that matching by start date introduces the possibility of* biasing the results of occupational factor associations towards the null. The concern is that there are significant associations between start date and many of the occupational factors noted in the Austin/Reynolds study.	Major	

Page	Section	¶	Comments	Urgent?	Resolved
			However, there are stronger arguments in favor of the use of start date is as a matching criterion in this situation. Failure to match by start date would result in an inherent bias in the result. Since laboratory activities changed over time, a comparison of "earlier" employees with "later" employees introduces the strong likelihood that associations between melanoma and specific occupational factors would result simply because of change in LLNL activities over the years. Every one of the 5 significant questions in the earlier case control study (Austin, Reynolds) is subject to the temporal effect of LLNL activities. For example, work in the Pacific Test Series is clearly something from the distant past. If a case control study ignores dates of employment when sampling controls, it will systematically underestimate controls having had this experience. The result will be a false and significant correlation of Pacific involvement and melanoma, which is exactly what was found. It is absolutely crucial to correct for such effects, and the simplest and safest correction is to balance dates of employment.		
			The 1994 study used actual radiation badge data, and this corrected a source of bias that existed in the earlier case control study. The additional cases in the 1994 case control study compensate for the use of a single control to maintain the power of the study. The strengths of the 1994 report, including its careful and appropriate methodology, make it a valuable addition to the understanding of the LLNL melanoma situation. The search for workplace factors at LLNL has yielded no consistent workplace associations.		

Department of Energy
Washington, DC 20585

February 27, 2003

Mr. Burt J. Cooper
Chief, Energy Section
Federal Facilities Assessment Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry
1600 Clifton Road, NE, MS: E-28
Atlanta, Georgia 30333

Dear Mr. Cooper:

Enclosed are the Department of Energy's (DOE) comments on the California Department of Health Services' (CDHS) draft health consultation entitled "Review of Health Studies Relevant to Lawrence Livermore National Laboratory and the Surrounding Community."

Bonnie S. Richter, Senior Epidemiologist, DOE Office of Health Studies, reviewed the draft document and determined that the literature does not support the conclusions reported by CDHS. DOE requests that Dr. Richter's comments be incorporated in CDHS' final health consultation.

It is our understanding that this health consultation was funded under a cooperative agreement between the Agency for Toxic Substances and Disease Registry (ATSDR) and CDHS. On February 10, 2003, DOE requested that ATSDR conduct a similar review of CDHS' health consultation.

If you have any questions, please contact Dr. Richter via email: **bonnie.richter@eh.doe.gov**. DOE appreciates the opportunity to comment on this draft document.

Sincerely,

Marsha Lawn

Marsha Lawn
Program Manager
for HHS Activities

Enclosure

cc: Jim Seward, M.D., LLNL
Bert Heffner, LLNL

Department of Energy
Washington, DC 20585

February 24, 2003

MEMORANDUM FOR THE RECORD

FROM: Bonnie Richter, Ph.D., Senior Epidemiologist
Office of Health Studies

SUBJECT: Department of Energy (DOE) Comments on "Review of Health Studies Relevant to Lawrence Livermore National Laboratory and the Surrounding Communities"

I had the opportunity to review a health consultation prepared by the California Department of Health Services (CDHS) entitled "Review of Health Studies Relevant to Lawrence Livermore National Laboratory and the Surrounding Communities" (Hoshiko, 2002). The review is dated September 2002 and was funded by the Agency for Toxic Substances and Disease Registry (ATSDR) to CDHS under a Memorandum of Understanding between DOE and the Department of Health and Human Services. The report was presented by CDHS at a community meeting held at the Livermore Council Chamber on February 19, 2003. The document that I have is not marked "draft," but has been indicated as so by ATSDR.

I have personally reviewed most of the literature cited in the health consultation, in addition to other references that were not included by the authors that I thought were relevant. It is not my intent to review those studies, but to determine if the CDHS health consultation fairly represented the research cited. The health consultation "summarizes the health studies and reviews" regarding the Lawrence Livermore National Laboratory (LLNL). It is my opinion that, overall, the review lacks credibility, as the conclusions drawn by CDHS are not supported by the scientific literature.

One aim of the CDHS consultation was to determine if the excess melanoma rates were, in fact, elevated. Again, a review of the cited papers indicates more evidence supporting surveillance bias than a true excess of risk during a relatively short window of time (1972-1977, or through 1985, depending on the study). Five of the referenced papers cited by CDHS indicate that melanoma among lab workers were probably due to early detection as evidenced by more visits to physicians and thinner tumors. The CDHS reviewers chose to ignore the most recently available cancer incidence report (updated through 1997), which could have been obtained from LLNL, and instead, cited two newspaper articles written by a reporter regarding the study findings. CDHS states "LLNL officials have not released the report itself"; however, CDHS failed to report that information about the study was made available to all LLNL workers by the site occupational medicine department. The report was also made available to DOE Headquarters. Nor did CDHS contact the medical department at LLNL to obtain the report (personal communiqué with J. Seward, Director). Had CDHS reviewed the report, they would have noted that the apparent excess appears to vanish by 1986 (Whorton 2003).

If evidence about the cancer excess is unclear, the role between radiation exposure and melanoma is even less so. The review of papers cited in this health consultation is remarkably uneven. Studies that favor the outcome held by CDHS (the association between radiation and melanoma) are summarized, but those papers that do not support that association are critically reviewed or even reanalyzed. Even in cases where the results are marginally significant, CDHS overstates the outcome. For example, "occupational factors were found to be strongly associated with risk status." However, the association between working around ionizing radiation (reported by Austin and Reynolds) has an odds ratio of 2.3; yet the 95 percent confidence interval (CI) indicates that the results are not statistically significant (1.0 – 7.6). Furthermore, the cited paper received an extensive independent review (Shy, 1985) that raised many concerns about the validity of the interpretation of research results as determined by CDHS.

Despite these caveats, the CDHS executive summary states: "because of the strong association found between melanoma and risk conditions, such as exposure to radioactive materials, it is important for future radiation studies to investigate melanoma specifically." A review of the cited references, as well as DOE's more than 20 years of mortality studies does not support the above stated association. Most notably, studies to investigate melanoma risk were conducted at Los Alamos National Laboratory (LANL) due to the similarities in work and location. No excess risk of melanoma was detected (Acquavella, 1982) between 1969-1978. A case-control study found no association between plutonium body burden, cumulative external radiation exposure, or employment as a chemist or physicist (Acquavella, 1983).

Although, mortality is not the best indicator of melanoma, a review of disease prevalence data from DOE's Epidemiologic Surveillance Program does not suggest an excess of melanoma among workers specifically classified as "nuclear workers" across DOE sites. It is highly unusual that radiation would be implicated in a causal association at LLNL, and yet those findings do not appear at other sites. The National Academy of Sciences report "Health Effects of Exposure to Low Levels of Ionizing Radiation BEIR V" indicates that radiation-induced skin cancer had been documented among pioneer radiation workers, and among individuals who received therapeutic doses. However, these skin cancers were observed to be primarily basal cell carcinoma and squamous cell carcinoma, not malignant melanoma. The average therapeutic doses in those studies averaged 3.3 Gy (330 rem) to 4.5 Gy (450 rem). The occupational doses incurred by LLNL workers in the 1970's were orders of magnitude less than these therapeutic doses. The average measurable whole body dose incurred by LLNL workers during the years 1974-1976 was about 0.120 rems per year.

The CDHS health consultation concludes that there is a causal relationship between radiation and melanoma essentially on the findings of one study, a study that was conducted by its own agency. It is unfortunate that the concept of causality and those steps in establishing causal relationships, which serve the basis of public health intervention, are largely ignored. A careful review of the papers referenced by CDHS would indicate, if anything, that there is a large question as to the association between radiation and melanoma.

References

Acquavella JF, Wilkenson GS, Tietjen GL et al. 1983. A melanoma case-control study at the Los Alamos National Laboratory. Health Phys 45:587-592

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Austin DF, Reynolds P. 1997. Investigation of an excess of melanoma among employees of the Lawrence Livermore National Laboratory. Am. J. Epidemiol. 145:524-535.

Hoshiko S, Underwood MC. September 2002. Review of health studies relevant to Lawrence Livermore National Laboratory and the surrounding community. California Department of Health Services.

National Research Council, Committee on the Biological Effects of Ionizing Radiations 1990. Health effects of exposure to low levels of ionizing radiation (BEIR V). National Academy Press, Washington DC

Shy CM, Checkoway H, Marshall EG. November 15, 1985. Malignant melanoma at a scientific laboratory. A synthesis of reviewer's comments on the Austin and Reynolds' Study of employees at the Lawrence Livermore National Laboratory. Lawrence Livermore National Laboratory.

Whorton D, Moore D, Seward J et al. January 16, 2003. Cancer Incidence Rates among Lawrence Livermore National Laboratory Employees: 1974-1997. (Manuscript in preparation for publication)