



Department of Energy

Washington, DC 20585

February 23, 1999

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DNF SAFETY BOARD

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W.
Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

The Implementation Plan (IP) for Defense Nuclear Facilities Safety Board Recommendation 97-2 requires a quarterly status report. Enclosed is the Department of Energy's quarterly status report for the first quarter, Fiscal Year 1999.

Overall, the Department has made significant progress in implementing Recommendation 97-2, thereby maintaining important criticality safety infrastructure. The following Recommendation 97-2 Implementation Plan (IP) milestones were completed during the quarter:

- IP Commitment 6.2.2, Milestone 2: Screen existing logbooks with original author/experimenter;
- IP Commitment 6.4, Milestone 3: Calculations compiled by the Parameter Study Working Group on DOE web site; and,
- IP Commitment 6.6.2, Milestone 2: Initiate a program which addresses identified [training] needs.

The Department has completed the actions identified under Commitment 6.6.2 above and proposes closure of this commitment.

The enclosed quarterly report discusses in detail the status of all IP milestones and deliverables and indicates that seven milestones are overdue. These include archiving data at Los Alamos, conducting criticality safety training, improving training courses, developing guidance on training and qualification criteria, and assessing line ownership of criticality safety. The Management Team is working very hard to complete actions on these milestones and to continue to implement the Nuclear Criticality Safety Program Plan.

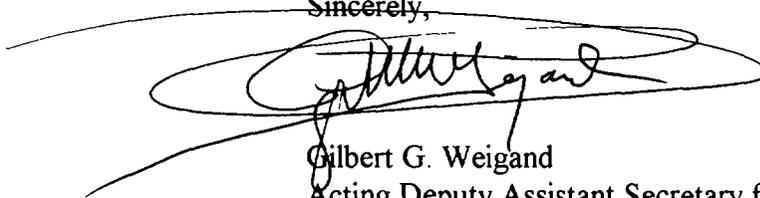


With respect to the self-imposed stand-down at the Los Alamos Critical Experiments Facility, the Los Alamos National Laboratory is committed to resolving safety issues which precipitated this stand-down and is executing a rigorous resumption program supported by mentors.

Finally, stability of funding to implement the IP remains an ongoing concern, and the Department is using the process defined in the Memorandum of Understanding, which was completed in August 1998, to address this issue. I am working with the Office of Environmental Management and the Office of the Deputy Secretary to secure adequate funding, and I hope to report successful resolution of the matter shortly.

I will keep you informed as we work to resolve this important issue.

Sincerely,

A handwritten signature in black ink, appearing to read "Gilbert G. Weigand", is written over a large, loopy scribble that also encompasses the word "Sincerely," above it.

Gilbert G. Weigand
Acting Deputy Assistant Secretary for
Research and Development
Defense Programs

Enclosure

cc (w/encl):
M. Whitaker, S-3.1

QUARTERLY STATUS OF THE IMPLEMENTATION PLAN
FOR
DEFENSE NUCLEAR FACILITIES SAFETY BOARD RECOMMENDATION 97-2
FIRST QUARTER FISCAL YEAR 1999

The Department of Energy (DOE) began implementing Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 97-2 in January 1998 by formally establishing the Nuclear Criticality Safety Program (NCSP). Each of the seven NCSP Elements (Critical Experiments, Benchmarking, Analytical Methods, Nuclear Data, Training and Qualification, Information Preservation and Dissemination, and Applicable Ranges of Bounding Curves and Data) is dependent upon the others for a successful program. Implementation of the NCSP is being accomplished according to the Five-Year NCSP Plan which was provided to the DNFSB on August 4, 1998. No changes in either the Five-Year Plan or membership of the Nuclear Criticality Safety Program Management Team (NCSPMT) or the Criticality Safety Support Group (CSSG) occurred during this quarter.

The NCSPMT and the CSSG are performing their respective chartered functions in supporting the Responsible Manager's execution of the Implementation Plan (IP). During the quarter, the CSSG conducted numerous teleconferences and several meetings in Washington, D.C., in support of NCSPMT efforts to coordinate completion of IP deliverables and provide justification necessary for maintaining funding support. Important CSSG contributions included: (1) development of a proposed Federal Criticality Safety Qualification Standard (which was submitted to the Department's Qualification Standards Review Board in December for review and approval); (2) a thorough assessment of the programmatic impacts from a proposed \$750,000 funding reduction; (3) a proposal to begin development of training modules for publication on the web page to meet identified training needs; and, (4) a recommendation on how to utilize CSSG expertise to identify criticality safety problems and improve criticality safety programs at the sites.

With the exception of a \$750,000 funding shortfall, funding for Fiscal Year (FY) 1999, as delineated in the Five-Year Plan, was allocated to performing organizations during this quarter. The funding shortfall was distributed as follows: the Applicable Range of Bounding Curves and Data Program funding was reduced from \$600,000 to \$150,000; and Nuclear Data and Analytical Methods Program activities at the Oak Ridge National Laboratory (ORNL), Argonne National Laboratory (ANL), and Los Alamos National Laboratory (LANL) were reduced by roughly eight percent at each Laboratory. With support from the CSSG, the NCSPMT is working within the provisions of the August 1998 Memorandum of Understanding to restore needed funding.

This quarterly report will provide a status of activities for each of the seven NCSP elements, as well as Recommendation 97-2 IP Deliverables. Accomplishments and key issues which arose during the period are as follows:

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Critical Experiments

The Los Alamos Critical Experiments Facility (LACEF) has been under a self-imposed stand-down since August 12, 1998, for identified deficiencies in conduct of operations. The facility is conducting a rigorous resumption of operations program which is scheduled for completion in February 1999. The Department recognizes the importance of LACEF to the NCSP and is providing additional support necessary to resolve safety issues and resume operations. The NCSPMT is monitoring the situation and will provide assistance wherever possible. The most important NCSP impacts of the LACEF stand-down include the need to postpone scheduled nuclear criticality safety training until Spring 1999 and further delay of the ZEUS critical experiment.

Benchmarking

The "International Handbook of Evaluated Criticality Safety Benchmark Experiments" contains 229 evaluations with benchmark specifications for nearly 1,700 critical or near critical configurations. Of the 229 evaluations in the Handbook, 108 came from the Russian Federation, 95 from the United States, 5 from France, 5 From the United Kingdom, 4 from Japan, 2 from the Republic of Korea, and 1 from Hungary. There are also 5 joint United States/French evaluations and 4 joint United States/Russian evaluations in the Handbook. The Handbook is currently being used in 34 different countries. The International Criticality Safety Benchmarking Evaluation Program (ICSBEP) has been funded to the level delineated in the NCSP Five-Year Plan and is continuing to evaluate benchmark data for inclusion in the Handbook. Currently, there are over 45 new evaluations in progress. Many of these are from outside the United States and Russia. Both France and Japan have accelerated their efforts to evaluate and contribute experiments from their experimental facilities. At least 30 of the new evaluations in progress are expected to be ready for publication in the 1999 version of the Handbook. Several of the new evaluations point to possible deficiencies in both cross section data and cross section processing codes, including a uranium/iron benchmark contributed by ANL and K-infinity measurements from France, the United Kingdom, and Russia. This information has been communicated to both members of the Cross Section Evaluation Working Group and code developers. The ICSBEP Internet address is: icsbep.inel.gov/icsbep/.

Mr. J. Blair Briggs, who manages the ICSBEP, made an invited Plenary presentation at the Second Japan Atomic Energy Research Institute Nuclear Fuel Cycle Safety Engineering Research Facility (NUCEF) International Symposium, NUCEF'98 in Hitachinaka, Ibaraki, Japan. The presentation focused on elements of the Nuclear Criticality Safety Program.

Analytical Methods

Staff at ORNL and LANL continued to maintain KENO and MCNP software and assist the nuclear criticality safety community in the use of this software. At ORNL, this included modifications and upgrades to KENO-VI and preparation of visuals for a one-week SCALE/KENO workshop held in October. The NCSP funding was received at all three Laboratories early in the quarter, and work resumed at ANL on VIM maintenance and the investigation of stratified sampling techniques. Resonance shielding methods for treating the intermediate energy range were tested on an ICSBEP iron benchmark critical experiment. MCNP energy pointwise analyses were compared against results obtained with the prototypic SCALE/CENTRM sequence and the SCALE production methods by applying the Nordheim method and the multigroup approximation. Both cross-section-structure energy definition and overall transport effects were identified.

Nuclear Data

A review of the Nuclear Data, Analytical Codes, and Range of Applicability Elements of the NCSP was held on October 19, 1998, at the Brookhaven National Laboratory. The Cross Section Evaluation Working Group meeting was conducted during the following three days. Transmission measurements at the Oak Ridge Electron Linear Accelerator on U-233, for the purpose of determining the total cross section in the intermediate energy region, were completed during November, and analysis of the data are under way. Plans for additional capture measurement on Al-27 and chlorine are currently on hold pending the resolution of budget uncertainties. Resonance analysis of O-16 and Al-27 with SAMMY continued, as did the development of unresolved region treatments in SAMMY that will be used for U-235 and U-233. From LANL, the new MCNP4X software that handles the unresolved resonance treatment has been sent to the Radiation Safety International Computational Center (RSICC), tested, and packaged for dissemination. RSICC is assembling final documentation and a limited dissemination list of criticality safety users who will be using the new MCNP4X. ORNL and LANL are finalizing a report on the status of fission product evaluations currently available in ENDF/B-VI. Benchmark testing exercises at ORNL have revealed problems with the current evaluation for Al, and indications are the new evaluation being prepared will improve the situation.

Training and Qualification

This program element includes three sub-elements: (1) hands-on criticality safety training at LACEF; (2) training development; and, (3) criticality safety qualification program development.

All hands-on criticality safety training was postponed due to the self-imposed stand-down at LACEF which began in August. One of these courses was the new pilot five-day course (IP Commitment 6.6.1, Deliverable 1). This pilot course, along with the other FY 1999 courses, will be rescheduled during the remainder of FY 1999 following resumption of operations at LACEF. Full resumption of LACEF activities should be accomplished by March 1999. The Department

recognizes the importance of this training and has directed LACEF to make it a high priority activity within the LACEF operations resumption process.

Training development activities have made significant progress during this quarter. Following identification of areas where additional training programs were needed, the CSSG proposed piloting the development of four training modules for production and publication on the Department's web page. Work is currently under way on two of the modules (on Neutron Physics) which should be placed on the web in late March or early April. In the area of qualification, the CSSG developed Contractor Qualification Guidance (IP Commitment 6.6.3, Deliverables 2 and 3) a Federal Qualification Standard (IP Commitment 6.6.4, Deliverable 1), and the guide for reviewing criticality safety evaluations (IP Commitment 6.5.2, Deliverable 1). The Federal Technical Qualification Standard for Criticality Safety was presented at the January meeting of the Technical Personnel Coordinating Committee. The Standard will be forwarded to the Federal Technical Capability Panel for approval. The guides for training and qualification of criticality safety engineers and for reviewing criticality safety evaluations were issued to the CSSG for review. The CSSG and the NCSPMT will work within the Department's directives system to issue these guides by May 1999. The CSSG is working with various Department elements to define a path forward to issue guidance to procurement officials to ensure that the requirement to utilize qualified criticality safety engineers flows down through contract agreements (Commitment 6.6.3, Milestone 3).

Information Preservation and Dissemination

This program element currently contains three sub-elements: (1) the Criticality Safety Information Resource Center (CSIRC); (2) web book development; and, (3) standards and guides development.

Continued execution of the CSIRC program involves developing a program plan, archiving remaining critical experiment logbooks (from the Lawrence Livermore National Laboratory (LLNL) and ORNL), and screening logbooks with the original experimenter where it makes sense to do so. A Draft CSIRC program plan has been developed and is currently being reviewed by the CSSG. This Plan should be completed by the end of February 1999. All logbooks have been archived at Los Alamos except those from Savannah River, Oak Ridge, and Lawrence Livermore. Following an extensive search, it has been determined that the Savannah River logbooks have been lost. As for the Oak Ridge and Livermore logbooks, since both sites want to retain their logbooks, it appears that the most economical process for archiving them at Los Alamos is to have them scanned into electronic format by their owners and archived electronically. This activity will be completed by March 1999. (The Hanford and Rocky Flats logbooks have already been scanned, and electronic copies are archived at Los Alamos). The logbooks have undergone a gross screening with original experimenters, and it is unlikely that the gross screening process will yield additional information. Therefore, the Department is proposing closure of the milestone associated with the screening of logbooks (Commitment 6.2.2, Milestone 2). Although this milestone has been met, the Department will continue to solicit information from original experimenters if specific questions regarding archived logbooks arise. In addition, Los Alamos is

also planning to continue to videotape some of the original experimenters, if possible, in an attempt to enrich the archived material.

Regarding the web book development, the NCSPMT has approved a criticality safety web architecture which will involve multiple web pages at DOE sites hyper linked together in a coordinated fashion. The NCSPMT has assigned the responsibility for coordinating this activity to LLNL with support from the CSSG. Web related deliverable status is as follows. The calculations compiled by the Parameter Study Work Group (IP Commitment 6.4, Milestone 3) were published on the LLNL web site in December 1998. The DOE web page address is: <http://ncsc.llnl.gov:8080/>.

In the area of standards and guides development, the CSSG is currently reviewing the Draft *Review Guide for Criticality Safety Evaluations*. This is on schedule for completion in May 1999 (Commitment 6.5.2, Deliverable 1). In addition, the CSSG is reviewing the latest version of the DOE Criticality Safety Good Practices Guidance and will render a recommendation regarding the Guide by the end of February 1999.

Applicable Ranges of Bounding Curves and Data

The Technical Program Plan for *Development of Guidance for Defining Applicable Ranges of Bounding Curves and Data Relative to Nuclear Criticality Safety* (IP Commitment 6.3., Deliverable 1), was submitted to the DNFSB in October 1998. The objective of this project is to provide the criticality safety practitioner with information, tools, and guidance that will assist in establishing and using applicable bounding values. Work on this project began in December 1998; however, due to a funding shortfall, scheduled FY 1999 work will cease by the end of February 1999 unless funding is restored. The NCSPMT is working hard to resolve the funding issue.

Activities initiated in December 1998 relative to the AROBCAD Technical Program Plan Rev. 4 include: (1) the University of California at Berkeley has begun subcontract work on code optimization for development of methods to establish bounding curves and data (Task 1 from the Program Plan); (2) Various bases, justifications, and needs (e.g., arguments, presentations, documentation, and discussions) were developed to support the NCSPMT in its efforts to resolve the funding issue. Examples included the value of the AROBCAD program to address the Hanford TWRS Project and the Rocky Flats drum and container storage concerns (Task 6 from the Program Plan); and, (3) Preliminary planning and statistical reviews and analyses were conducted to develop methods to establish bounding margins of subcriticality for safety applications. (Task 5 from the Program Plan).

IP Commitment 6.7, Milestone 1, which is related to line management responsibility for criticality safety, is monitored by the NCSPMT separate from the seven NCSP technical program elements. Individual site surveys to assess line ownership of criticality safety were completed by DOE at Savannah River, Rocky Flats, Idaho, Chicago, Oak Ridge, and Richland. DOE Oakland is conducting the survey in conjunction with implementing Integrated Safety Management at Building 332, which will be completed in February 1999. DOE Albuquerque staff has completed

surveys of line ownership of criticality safety at Los Alamos, Sandia, and Pantex and has briefed its management but has not documented the results. This documentation should be completed in February 1999. This commitment will remain open until all surveys have been completed.

There are two attachments to the quarterly report. Attachment A contains a complete IP Commitment and Deliverable/Milestone Status. Attachment B provides a summary of Deliverables/Milestones Due during the Next Quarter.

The Department has made significant progress in implementing Recommendation 97-2, thereby maintaining important criticality safety infrastructure. However, funding stability is still an issue requiring significant NCSPMT attention. In accordance with the process delineated in the Nuclear Criticality Safety Funding Memorandum of Understanding, the Assistant Secretary for Defense Programs informed the Deputy Secretary. Currently, the NCSPMT is working with Departmental management to restore the funding.

ATTACHMENT A: IP COMMITMENT AND DELIVERABLE/MILESTONE STATUS

| Commitment | Deliverable/Milestone | Due Date | Status |
|--|---|---------------|---|
| 6.1 Reexamine the experimental program in criticality research | 1. Assessment report of criticality research program | March 1998 | Completed |
| 6.2.1 Perform CSIRC pilot program | 1. Identify an experiment to archive | November 1997 | Completed |
| | 2. Archive logbook(s) and calculation(s) for that experiment | December 1997 | Completed |
| | 3. Videotape the original experimenter | January 1998 | Completed |
| | 4. Digitize data and calculations | February 1998 | Completed |
| | 5. Publish data and calculations | April 1998 | Completed |
| 6.2.2 Continue to implement the CSIRC program | 1. Collocate logbooks (copies or originals) from all U.S. critical mass laboratories | December 1998 | Partially overdue: All logbooks have consolidated at LANL except SRS, ORNL, and LLNL. SRS logbooks are unrecoverable. Electronic copies of the ORNL and LLNL logbooks should be consolidated at LANL by March 1999. |
| | 2. Screen existing logbooks with original author/experimenter | December 1998 | Completed |
| | 3. CSIRC program plan | December 1998 | Overdue: Should be completed by February 1999. |
| 6.3 Continue and expand work on ORNL sensitivity methods development | 1. Technical program plan | July 1998 | Completed |
| | 2. Document initiation of priority tasks from the program plan in the quarterly report to the Board | January 1999 | Although priority tasks have been initiated, resolution of the funding shortfall is necessary to continue this work. |

| Commitment | Deliverable/Milestone | Due Date | Status |
|---|--|----------------|--|
| 6.4 Make available evaluations, calculational studies, and data by establishing searchable databases accessible through a DOE Internet web site | 1. DOE criticality safety web site | March 1998 | Completed |
| | 2. Y-12 evaluations on DOE web site | June 1998 | Completed |
| | 3. Calculations compiled by the Parameter Study Work Group on DOE web site | September 1998 | Completed |
| | 4. Nuclear Criticality Information System Database on DOE web site | March 1999 | On Schedule |
| 6.5.1 Revise and reissue DOE-STD-3007-93 | 1. Revise DOE-STD-3007-93 | September 1998 | Completed |
| 6.5.2 Issue a guide for the review of criticality safety evaluations | 1. Departmental guide for reviewing criticality safety evaluations | May 1999 | On Schedule: Currently being reviewed by the CSSG |
| 6.6.1 Expand training course at LACEF | 1. Expanded LACEF training course | July 1998 | Overdue: Should be completed within 6 months of full resumption of operations at LACEF |
| 6.6.2 Investigate existing additional curricula in criticality safety | 1. Assessment of additional training needs and review of available supplementary curricula | June 1998 | Completed |
| | 2. Initiate a program which addresses identified needs | December 1998 | Completed |
| 6.6.3 Survey existing contractor site-specific qualification programs | 1. Report on the review of site qualification programs | June 1998 | Completed |
| | 2. Guidance for site-specific criticality safety training and qualification programs | September 1998 | Overdue: Should be completed in May 1999 |
| | 3. Guidance to procurement officials specifying qualification criteria for contractor criticality safety practitioners | September 1998 | Overdue: Working with GC to determine most effective method. Expected completion is Summer 1999. |
| | 4. DOE Field will provide line management dates upon which contractors will have implemented guidance in Deliverable #2, above | March 1999 | Expected completion date is 2 months following issuance of guidance to procurement officials. |

| Commitment | Deliverable/Milestone | Due Date | Status |
|--|--|---------------|--|
| 6.6.4 Federal staff directly performing criticality safety oversight will be qualified | 1. Qualification program for Departmental criticality safety personnel | December 1998 | Overdue: Expected completion date is February 1999 |
| | 2. DOE criticality safety personnel qualified | December 1999 | Expected completion date is March 2000 |
| 6.7 Each site will conduct surveys to assess line ownership of criticality safety | 1. Individual sites issue report of findings | June 1998 | Partially overdue: All surveys have been completed except for DOE-AL and DOE-OAK; these surveys should be completed in February 1999 |
| 6.8 The Department will form a group of criticality safety experts | 1. Charter for Criticality Safety Support Group approved by the NCSPMT | January 1998 | Completed |
| 6.9 Create NCSPMT charter and program plan | 1. NCSPMT charter | January 1998 | Completed |
| | 2. NCSPMT program plan | June 1998 | Completed |

**ATTACHMENT B: DELIVERABLES/MILESTONES DUE DURING
THE NEXT QUARTER**

| Commitment | Deliverable/Milestone | Due Date | Status |
|---|---|--------------|--|
| 6.3 Continue and expand work on ORNL sensitivity methods development | 2. Document initiation of priority tasks from the program plan in the Quarterly report to the Board | January 1999 | Although priority tasks have been initiated, resolution of funding shortfall is necessary to continue this work. |
| 6.4 Make available evaluations, calculational studies, and data by establishing searchable databases accessible through a DOE Internet web site | 4. Nuclear Criticality Information System Database on DOE web site | March 1999 | On Schedule |
| 6.6.3 Survey existing contractor site-specific qualification programs | 4. DOE Field will provide line management dates upon which contractors will have implemented guidance in Deliverable #2 for this Commitment | March 1999 | Expected completion date is 2 months following issuance of guidance to procurement officials. |