99-0001548

Department of Energy
Washington, DC 20585

May 26, 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 second 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 IP milestones were completed during the quarter:

- IP Commitment 6.2.2, Milestone 1: Collocate logbooks (copies or originals) from all U.S. critical mass laboratories;

- IP Commitment 6.2.2, Milestone 3: Publish a Criticality Safety Information Research Center Program Plan;

- IP Commitment 6.3, Milestone 2: Document initiation of priority tasks from the Oak Ridge National Laboratory Sensitivity/Uncertainty Methods Development Program Plan in the Quarterly Report to the Board;

- IP Commitment 6.6.4, Milestone 1: Develop a qualification program for Departmental criticality safety personnel; and

- IP Commitment 6.7, Milestone 1: Individual sites will conduct surveys to assess line ownership of criticality safety and issue report.

The Department has completed the actions identified under Commitments 6.2.2, 6.3, and 6.7, above, and proposes closure of these commitments.

The enclosed quarterly report discusses in detail the status of all Nuclear Criticality Safety Program element areas. There is significant progress being made in each program element area, thereby maintaining essential infrastructure and providing information and tools needed by line criticality safety programs. One noteworthy accomplishment was attainment of the first critical configuration for the Zeus experiment at the Los Alamos Critical Experiment Facility on April 26, 1999. This experiment is very important because it will provide integral data on intermediate energy neutron spectra necessary to validate calculations for a number of Departmental programs.

The quarterly report also discusses IP milestones and indicates that four of them are overdue. These include:

- expanding criticality safety training at the Los Alamos National Laboratory;
- publishing guidance on contractor training and qualification;
- providing guidance to procurement officials regarding contractor criticality safety qualification requirements; and
- determining a date by which contractors will implement qualification guidance.

The IP contains thirty milestones of which twenty-four have been completed. Of the six remaining milestones, four are overdue, and the two milestones which are not yet due will be delayed because of their connection to the overdue milestones. The reasons for the overdue milestones are detailed in the enclosed Report. Recovery Plans, which the Management Team will use to track and complete these milestones, are being established. Four of these Plans are included in this Quarterly Report as Attachment C. Recovery Plans for the two remaining overdue milestone will be forwarded to you when completed. The Management Team is working very hard to complete all remaining milestones and to continue implementing the Nuclear Criticality Safety Program Plan.

Stability of funding to implement the IP has been an ongoing concern, and the Department was able to use the process defined in the August 1998 Memorandum of Understanding to address this issue. Following a meeting with the Assistant Secretary for Environmental Management on March 3, 1999, $750,000 was restored. With the restoration of this funding, I am pleased to report that all planned Fiscal Year 1999 funding for this program has been secured.

I will keep you informed as we continue to make progress on this important cross-cutting program.

Sincerely,

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

Enclosure

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

99.1548

QUARTERLY STATUS OF THE IMPLEMENTATION PLAN FOR DEFENSE NUCLEAR FACILITIES SAFETY BOARD RECOMMENDATION 97-2 SECOND 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 NCSPMT and CSSG conducted a program review at Los Alamos, coordinated completion of IP milestones, and continued to provide justification necessary for maintaining funding support. In addition, work has begun on updating the NCSP Five-Year Plan for Fiscal Years 2000-2004. This activity is scheduled to be completed by the end of June 1999.

Regarding the $750,000 funding shortfall for Fiscal Year 1999, NCSPMT representatives met with the Assistant Secretary for Environmental Management (EM-1), on March 3, 1999, and provided additional information on the NCSP. Following a productive discussion of NCSP support for EM Programs, EM-1 restored the funding. The $750,000 shortfall, which impacted the Applicable Range of Bounding Curves and Data, Nuclear Data, and Analytical Methods Program Elements, was provided to the performers in the EM April 1999 Financial Plan.

This quarterly report provides a status of activities for each of the seven NCSP elements, as well as Recommendation 97-2 IP Milestones. There are four attachments to this report: Attachment A is a table depicting the status of all IP Deliverables and Milestones; Attachment B is a table depicting milestones due next quarter; Attachment C contains Recovery Plans for two of the four overdue milestones and the two remaining IP milestones which will be delayed; and Attachment D contains the Criticality Safety Information Resource Center (CSIRC) Program Plan. The Department has made significant progress in implementing Recommendation 97-2 through execution of the NCSP. There is a significant amount of good work being done in each of the program element areas which not only maintains essential infrastructure, but provides information and tools that line criticality safety programs need. 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) was placed in a self-imposed stand-down on August 12, 1998, for identified deficiencies in conduct of operations. The facility conducted a rigorous resumption of the operations program. Resumption of most activities was completed, and limited facility operations were resumed on February 26, 1999. Activities that were not resumed in February included the critical assembly machines that employ computerized control systems (SHEBA, Comet and Planet). The issue with these activities centered around the adequacy of the Quality Assurance (QA) program that was used to develop and control the software for the computerized systems. An action plan was developed to address the QA issues. The short-term actions for Comet were completed, and Comet was approved for operation on March 26. The short-term actions for SHEBA and Planet have also been completed, and the documentation for the SHEBA and Planet software is in review. Approval for normal operations for SHEBA and Planet is expected in May 1999. The Planet Assembly was approved to allow limited operation for the Nuclear Criticality Safety Training Course which only requires sub-critical operation for a demonstration.

Experimental activities conducted during the period are as follows:

(1) Fuel loading of the Zeus Intermediate Energy Spectrum Experiment on the Comet assembly began on March 29, 1999. To date, there are nine uranium plate/graphite "cells" loaded on the machine. The experimental data is predicting a critical mass of 9.9 cells. This experiment is the first in a series of experiments involving uranium or plutonium interspersed with different materials to simulate intermediate energy spectrum systems similar to those which exist in nuclear waste disposal programs.

(2) During the weeks of March 29 and April 5, GODIVA and SHEBA were operated for the Portsmouth Gaseous Diffusion Plant (Lockheed Martin Utility Services) to verify that their Criticality Alarm Systems will function correctly with a new scintillating crystal. Because SHEBA operations had not yet been resumed, special authorization to operate SHEBA within a specific set of guidelines for this project was granted.

The LACEF also hosted the annual NCSP Program Review on March 10-11, 1999. Representatives from the NCSPMT, CSSG, each of the program elements, the DNFSB, and Nuclear Regulatory Commission staffs attended the review which covered programmatic and basic technical detail for each of the seven technical program elements. Tours of experimental facilities were also provided.

Benchmarking

An International Criticality Safety Benchmark Evaluation Program (ICSBEP) Working Group meeting was held during the second quarter of Fiscal Year 1999. Twenty-eight ICSBEP participants attended the meeting, eleven of whom where from outside the United States (United

Kingdom, Russian Federation, France, Japan, and Slovenia). A total of seventeen new evaluations and one major revision were considered at the meeting. Sixteen of the seventeen new evaluations considered were approved for publication. Approximately twenty-five new evaluations are being prepared for the next ICSBEP meeting. It is estimated that forty new evaluations will be included in the 1999 publication. The ICSBEP is also giving consideration to subcritical benchmarks and benchmarks that can be used to validate criticality alarm placement calculations.

Three of the newly approved evaluations provide experimental data in which the majority of the fissions occur in the intermediate energy range. These data indicate that large discrepancies between experimental and calculated data can be obtained for systems containing significant quantities of nickel, chromium, molybdenum, stainless steel, zirconium, and, to a lesser extent, graphite. The magnitude of these discrepancies sometimes exceeds ten percent, and there is little or no consistency among results from different codes or cross section data. These results point out the importance of continuing several NCSP activities which are focused on intermediate energy spectrum systems: (1) critical experiments like the ZEUS experiment currently being conducted at LACEF; (2) acquisition and evaluation of nuclear data; (3) the continued development and maintenance of nuclear criticality safety codes; and, (4) the careful benchmarking of these codes and cross section data for each application.

One of the goals of the ICSBEP is to expand the database in areas where benchmark data, important to U.S. programs, are either nonexistent or scarce. Very little data exists for TRIGA research reactor fuel. These data are applicable to transportation and storage of TRIGA reactor fuels at the Idaho National Engineering and Environmental Laboratory (INEEL) and Savannah River. Participants from Slovenia recently contributed data for arrays of twenty percent enriched uranium TRIGA reactor fuel elements. These data, which will be published in the 1999 version of the "International Handbook of Evaluated Criticality Safety Benchmark Experiments," help to fill a gap in the database and will directly benefit the INEEL and Savannah River programs which must store and disposition spent TRIGA Reactor fuels.

Significant progress was also made on the addition of detailed spectral characteristics for the experiments published in the "International Handbook of Evaluated Criticality Safety Benchmark Experiments" and on the documentation of previously undocumented experiments.

Analytical Methods

Staff at the Oak Ridge National Laboratory (ORNL) and the Los Alamos National Laboratory (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 a substantial upgrade of the KENO-VI visuals in anticipation of a one-week SCALE/KENO workshop. ENDF/B-VI data libraries for eighteen nuclides were prepared for the extended testing of the SCALE/CENTRM resolved resonance sequence. At LANL, code documentation for MCNP4XS and an ENDF/B-VI based data library for twenty-seven nuclides (UNRES) were provided to the Radiation Safety Information Computational Center for limited

distribution to the DOE criticality safety community. At Argonne National Laboratory, work continued on VIM maintenance and user assistance. A comparison of stratified sampling with the Superhistory Powering Technique used in the MONK code was performed.

Nuclear Data

The following nuclear data acquisition activity was conducted during the quarter. Capture cross section measurements for Al-27 at the Oak Ridge Electron Linear Accelerator 40-m flight-path at room temperature (300 degrees Kelvin) were planned and scheduled. It is expected the measurements will be made in April 1999.

Nuclear data evaluation activities conducted during the quarter are as follows: (1) A preliminary resonance parameter evaluation for Al-27 up to 850 keV was completed. Capture measurements will be made in April to finalize the evaluation. The resonance parameter fit is being tested to verify its adequacy in benchmark calculations. (2) A preliminary resonance parameter fit for O-16 up to 6 MeV has been obtained. Data analysis in the low energy region is under way to fix the thermal values of the cross sections. Also, resonance capture integral tests are being done. In addition, the adequacy of the resonance parameter was also checked for benchmark calculations. (3) Unresolved resonance analysis of the U-235 cross section continues. Several upgrades have been inserted into the computer code SAMMY to address this issue. (4) To address nuclear data uncertainty pertinent to criticality safety application, a workshop on nuclear data covariance and sensitivity has been set up at Brookhaven National Laboratory. The intent is to resolve the issue related to formats and application of covariance data in defining range of applicability for nuclear criticality safety. (5) A procedure has been introduced in the SAMMY code to allow the generation of covariance matrix and sensitivity parameters for existing evaluated data. The procedure is being tested for the silicon isotopes 28, 29, and 30. (6) Work continues on a report on the status of fission product cross sections.

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 when LACEF began a self-imposed stand-down on August 12, 1998. One of these courses was the new pilot five-day course (IP Commitment 6.6.1, Milestone 1). This course has been scheduled for August 1999 (see Recovery Plan in Attachment C). The standard three-day and five-day courses will be rescheduled during the remainder of Fiscal Year 1999, following resumption of the SHEBA at LACEF. A two-day demonstration course was conducted on March 30-31, 1999, to demonstrate improvements made in formality of operations for hands-on training activities. The demonstration was deemed successful and, as stated above in the "Critical Experiments" section, a schedule for additional classes will be released in early May 1999. The Department recognizes the importance of this training and has directed LACEF to place a high priority on resuming this activity.

Training development activities have made significant progress during this quarter. Two of the training modules identified in the pilot training development program have been completed and are currently being reviewed by the CSSG. These modules cover basic neutron physics, chain reactions, criticality limits and an introduction to diffusion, transport and Monte Carlo methods. Once these modules have been reviewed and sample problems added, they will be made available on the NCSP website. Negotiations are in progress to develop the other two modules in the pilot program covering the topics of hand calculations and validation techniques. It is expected that the first two modules will be posted on the website by the end of May 1999, and the next two modules posted by the end of July 1999. These courses will meet a need expressed by a majority of criticality safety program managers who responded to a training needs survey conducted by the CSSG last summer.

Progress has been made in the development of qualification guidance for Federal and contractor criticality safety professionals. However, three milestones are overdue, and one related milestone will be delayed. A status of each of the remaining milestones for contractor and Federal qualification guidance is presented below, in the order in which they appear in the IP.

Regarding IP Commitment 6.6.3, Milestone 2, concerning issuance of contractor qualification guidance, the CSSG developed and approved qualification guidance for contractor employees. This document, SAFT-0070, "Guidance for Nuclear Criticality Safety Engineer Training and Qualification," was entered into the Department's formal technical system for Department-wide coordination on April 20, 1999. The coordination period ends on June 19, 1999. After comments have been addressed, the Guide will be formally issued by the Department. This should occur by the end of September 1999 and complete this Milestone (see Recovery Plan in Attachment C).

Regarding IP Commitment 6.6.3, Milestone 3, concerning promulgation of guidance to procurement officials on contractor qualification, the Management Team is working with the Office of Procurement and Assistance Policy (MA-51) to issue the guidance. This milestone is tied closely with the issuance of the revised DOE O 420.1, Facility Safety. The revised Order will contain a new requirement for site contractors to develop and implement a criticality safety training and qualification program. SAFT-0070 will describe acceptable methods to implement this requirement. MA-51 will issue guidance to field procurement officials once both SAFT-0070 and DOE O 420.1 are final. A date for issuance of the revised DOE O 420.1 is uncertain as the Department resolves comments on the Order. The Management Team is working closely with the Office of Nuclear Safety Policy and Standards (EH-31) and the Directives Management Team to determine when the revised DOE O 420.1 is expected to be issued. A Recovery Plan for this milestone will be provided to the Board when the date of issuance of the revised Order is known.

IP Commitment 6.6.3, Milestone 4, concerning the requirement for contractors to provide DOE Line Management with dates by which they will have implemented qualification guidance, is also tied closely to the issuance of the revised DOE O 420.1, Facility Safety. After the revised Order is issued, contractors will be tasked to provide DOE Field Managers with dates by which they expect to implement the new criticality safety training and qualification requirement.

The Federal Technical Qualification Standard for Criticality Safety (IP Commitment 6.6.4, Milestone 1), developed last quarter, was presented at the January 1999 meeting of the Technical Personnel Coordinating Committee and subsequently forwarded to the Federal Technical Capability Panel for issuance in late May 1999. This completes IP Commitment 6.6.4, Milestone 1, by establishing a qualification program for Departmental criticality safety personnel. Although approval of this Standard was only delayed by about four months, it is highly unlikely that all Federal employees will be qualified by December 1999, which was the original date cited for completion of Commitment 6.6.4, Milestone 2 in the IP. In addition to the four-month delay in getting the Standard approved, the stand-down at LACEF caused a one-year delay in conducting the new five-day training pilot course. Following the pilot five-day course, which is scheduled for August 1999, and allowing sixty days to address comments and make suggested changes, the new five-day courses will be available for general attendees by late Fall 1999. The date by which all Federal employees should be qualified is now projected for December 2000 (see Recovery Plan in Attachment C).

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.

In the CSIRC program, progress has been made during this quarter in gaining positive control of logbooks which are not currently located at LANL. IP Commitment 6.2.2, Milestone 1, is to collocate at Los Alamos all original logbooks (or copies) from United States critical mass laboratories. Under this effort, logbooks from Rocky Flats, Brookhaven, and Richland have been sent to LANL. Once at LANL, under the CSIRC program, the logbooks will be indexed and converted to an electronic format for eventual posting on the LANL website. Similar logbooks from ORNL and the Lawrence Livermore National Laboratory (LLNL) have been identified and collected at their respective site. Instead of sending them directly to LANL, however, the CSIRC activities of indexing and converting them to an electronic format will be performed at ORNL and LLNL. Once these activities are complete, the logbook copies and the electronic files will be shipped to LANL. Now that the ORNL and LLNL logbooks have been identified, are under positive control, and are being archived under the CSIRC program, the Department's Milestone 1 under Commitment 6.2.2 is complete.

Other CSIRC activities conducted during the quarter include: (1) finalized the CSIRC Five-Year Plan (IP Commitment 6.2.2, Milestone 3, at Attachment D); (2) held discussions with ORNL and LLNL criticality safety staff and management and agreed upon process for these sites to index and convert their logbooks to electronic format; (3) made a second, supplementary videotape of Hugh Paxton; (4) began assembling the references to NCT-04, A Review of Criticality Accidents, in preparation for eventual scanning and loading on the CSIRC website; (5) continued discussions with E. Duane Clayton with the goal of a contract to review documentation concerning past experiments at Hanford and have himself videotaped; (6) continued work on loading the entire text of all 195 references to LA-10860 on the CSIRC website; (7) published, for inclusion in the next release of the ICSBEP handbook, a report on nested plutonium shells gleaned from logbooks archived at LANL.

Regarding web book development, the U.S. DOE Nuclear Criticality Safety Program Website at http://ncsc.llnl.gov:8080/ is being maintained and improved by LLNL. This web page provides technical information and serves as a pointer to other websites which are important to the NCSP. Improvements in the second quarter of Fiscal Year 1999 included: (1) installation of the Nuclear Criticality Information System Database (LLNL Database) on the web page (IP Commitment 6.4, Milestone 4); (2) installation of a user-friendly search engine for data search for the Hanford and LLNL databases: (3) addition of a data link to display text of the DOE Orders related to criticality safety; (4) addition of key technical reference sets to help new criticality safety practitioners; and (5) initiation of the development of a community message board to enhance communication. Response to the web book task has been very positive from the criticality safety community. The LLNL website has received more than a thousand users during the second quarter.

Progress has been made in two other areas related to information preservation and dissemination. The CSSG developed and approved SAFT-0071, "Review Guide for Criticality Safety Evaluations" (IP Commitment 6.5.2, Milestone 1). This Guide was entered into the Department's formal technical standards system for Department-wide coordination on April 20, 1999. It is anticipated that this Guide will follow the same path as the qualification guide for contractors, described above, and will be published by the end of September 1999 (see Recovery Plan in Attachment C). Finally, the CSSG reviewed the latest version of DOE O 420.1, *Facility Safety*, and issued a recommendation regarding necessary changes to the NCSPMT. The NCSPMT forwarded the CSSG recommendation to EH-31 and has received assurances that the requisite changes have been made.

Applicable Ranges of Bounding Curves and Data

As defined in the October 1998 Technical Program Plan for the Development of Guidance for Defining Applicable Ranges of Bounding Curves and Data (AROBCAD) relative to Nuclear Criticality Safety, 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. This task is very important because the methodology being developed will help criticality safety practitioners validate calculations in areas where benchmark data is unavailable. It will also help them select appropriate benchmarks, thereby providing greater confidence in the their calculational validation. Funding uncertainties and shortfalls for the scheduled Fiscal Year 1999

work have been resolved with full funding to be restored by the beginning of the third quarter of Fiscal Year 1999. Progress, resulting from the continuation of this project that began in December 1998, is itemized below. Initiation of priority tasks in the AROBCAD Program Plan meets IP Commitment 6.3.2, Milestone 2.

Much progress was made during the quarter relative to the AROBCAD Technical Program Plan (TPP), in the following areas: (1) the University of California at Berkeley subcontract work on code optimization for development of methods to establish bounding curves and data (Task 1 from the TPP) continued; (2) statistical reviews and analyses were continued for the development of methods to establish bounding margins of subcriticality for safety applications (Task 5 from the TPP); (3) ORNL discussed arrangements for LANL to provide explanations about and MCNP models of the NIST water sphere neutron slowing down/leakage measurements next quarter (Task 2 from the TPP); (4) the USNRC-supported and ORNL-developed SEN1, one-dimensional sensitivity analyses code, was modified to accommodate fixed source calculations for sensitivity and uncertainty analyses (Task 2 from the TPP); (5) sensitivity and uncertainty analyses were initiated for the 3", 4" and 5" diameter NIST fixed source water sphere experiments for testing the slowing down and leakage of fission energy neutrons as inferred from unshielded and cadmium shielded ^{239}Pu, ^{237}Np, ^{235}U, and ^{238}U fission detectors. The previously observed (by ORNL-MORSE/XSDRN and LANL-MCNP/ONEDANT in the late 1980s) calculated-to-experimental values for the various fission chamber results were confirmed and, in particular, the ~19 percent variation in calculated-to-experimental value for the cadmium covered plutonium fission detector values were confirmed (Task 2 from the TPP) by the preliminary studies; and (6) site visits and model developments for performing trial sensitivity and uncertainty analyses related to the K-Basin-to-Tank waste transfer (Hanford), National Spent Fuel safety analysis issues (Idaho Falls), and plutonium salts issues (Rocky Flats) were arranged (Task 3 from the TPP).

IP Commitment 6.7, Milestone 1

This milestone has been met with the completion of surveys and subsequent publication of reports of reviews of line management ownership of criticality safety at the DOE Albuquerque and Oakland Operations Offices.

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	Completed
	2. Screen existing logbooks with original author/experimenter	December 1998	Completed
	3. CSIRC program plan	December 1998	Completed
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	Completed
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	Completed
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	Expected completion date is September 1999 - See Recovery Plan in Attachment C

Commitment	Deliverable/Milestone	Due Date	Status
6.6.1 Expand training course at LACEF	1. Expanded LACEF training course	July 1998	Overdue: Should be completed by August 1999 - See Recovery Plan in Attachment C
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 by September 1999 - See Recovery Plan in Attachment C
	3. Guidance to procurement officials specifying qualification criteria for contractor criticality safety practitioners	September 1998	Recovery Plan to be submitted when completed.
	4. DOE Field will provide line management dates upon which contractors will have implemented guidance in Deliverable #2, above	March 1999	Overdue: Recovery Plan to be submitted when completed
6.6.4 Federal staff directly performing criticality safety oversight will be qualified	1. Qualification program for Departmental criticality safety personnel	December 1998	Completed
	2. DOE criticality safety personnel qualified	December 1999	Expected completion date is December 2000 - See Recovery Plan in Attachment C
6.7 Each site will conduct surveys to assess line ownership of criticality safety	1. Individual sites issue report of findings	June 1998	Completed
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
6.5.2 Issue a guide for the review of criticality safety evaluations	1. Departmental guide for reviewing criticality safety evaluations	May 1999	Expected completion date is September 1999 - See Recovery Plan in Attachment C

ATTACHMENT C: RECOVERY PLANS FOR OVERDUE AND DELAYED MILESTONES

OVERDUE MILESTONES

Recovery Plan for IP Milestone 6.6.1.1: Expand the LACEF training course (was due in July 1998).

Milestone	To Be Completed By	Responsibility
1. Finalize critical assembly demonstrations	June 30, 1999	LANL
2. Finalize curriculum	July 31, 1999	LANL
3. Conduct the pilot course	August 31, 1999	LANL

Recovery Plan for IP Milestone 6.6.3.2: Issue guidance for site-specific contractor criticality safety training and qualification programs (was due in September 1998).

Milestone	To Be Completed By	Responsibility
1. Issue Guide for Department Wide Coordination	April 19, 1999	Completed
2. Receive All Comments	June 20, 1999	EH-34
3. Disposition Comments and Revise Guide	July 30, 1999	EH-34
4. Deliver Final Guide and Comment Resolution to Technical Standards for Issuance	August 15, 1999	EH-34
5. Publish Guide on Directives Web-Page	September 30, 1999	EH-31

Recovery Plan for IP Milestone 6.6.3.3: Guidance to procurement officials specifying qualification criteria for contractor criticality safety practitioners (was due in September 1998).

Will be provided upon issuance of DOE O 420.1.

Recovery Plan for IP Milestone 6.6.3.4: DOE Field will provide line management dates upon which contractors will have implemented guidance in Milestone 6.6.3.2 (was due in March 1999).

Will be provided upon issuance of DOE O 420.1.

DELAYED MILESTONES

Recovery Plan for IP Milestone 6.5.2.1: Issue a guide for the review of criticality safety evaluations (due by the end of May 1999).

Milestone	To Be Completed By	Responsibility
1. Issue Guide for Department Wide Coordination	April 19, 1999	Completed
2. Receive All Comments	June 20, 1999	EH-34
3. Disposition Comments and Revise Guide	July 30, 1999	EH-34
4. Deliver Final Guide and Comment Resolution to Technical Standards for Issuance	August 15, 1999	EH-34
5. Publish Guide on Directives Web-Page	Sept. 30, 1999	EH-34

Recovery Plan for IP Milestone 6.6.4.2: DOE criticality safety personnel qualified (due by the end of December 1999).

Milestone	To Be Completed By	Responsibility
1. DP will inform the Field Management Counsel (FMC) about Fed Qual Program	June 30, 1999	DP-10
2. Lead Program Secretarial Officers (LPSOs) Task Field Managers	September 30, 1999	FMC
3. Fed Qual Plans Submitted to LPSOs	December 31, 1999	FMC
4. All Federal employees qualified	December 31, 2000	Field

ATTACHMENT D: CSIRC PROGRAM PLAN

Criticality Safety Information Resource Center (CSIRC) Five Year Program Plan, FY00 - FY04

April 1999

Criticality Safety Information Resource Center (CSIRC) Five Year Program Plan, FY00 - FY04

CSIRC is a program to preserve primary documentation supporting criticality safety and to make this information available for the benefit of the technical community. This primary information includes not only experimentalists' logbooks, notes, drawings, photographs, and material descriptions from those sites at which critical experiments were conducted in the past, but also company reports and internal memoranda which might be of benefit to future criticality safety engineers. There is a threefold benefit of this preservation and dissemination effort: the uncovering of original experimental results which had not previously been reported; the sharing of information to minimize duplication (of experimental results and analytical evaluations) worldwide; and the training of new criticality safety engineers. Recently there has begun the videotaping of some of the pioneers in the field to capture their thoughts and philosophies as to proper approaches to the practice of criticality safety.

Background

CSIRC was formally funded for the first time in Fiscal Year 1998 by the DOE as part of the integrated response to the DNFSB's Recommendation 97-2. Previously, the program had been evolving and developing informally beginning in the mid-1980's with the sending of the logbooks from the former Brookhaven National Laboratory (BNL) Critical Mass Laboratory to the Los Alamos National Laboratory's Archives Center for preservation. There was a strong concern that these logbooks were vulnerable to misplacement or destruction at BNL and the realization that they may contain valuable, previously unreported, critical experiment descriptions and measurement results. In some instances, even previously reported journal articles do not contain experiment descriptions in the detail desired for today's benchmark purposes, and it has been proven to be practical to return to original logbooks and extract additional, valuable information.

Subsequently, the experimentalists' logbooks and related records from the Rocky Flats (RF) and Hanford critical mass laboratories were sent to Los Alamos for preservation. As word of this co-location of logbooks spread, those in need of benchmark critical data, which was not available in published sources, began to come to Los Alamos to search for such data. Clearly, if "mining of the stockpile" is successful in uncovering required data, this activity is likely to be much less expensive and faster than performing new critical experiments.

Recent Successes and Disappointments

Within the last few years, reviews of logbooks from RF and Oak Ridge National Laboratory (ORNL) by original experimenters have resulted in the discovering, further documenting, and publishing of benchmark quality information. The material gleaned from the Rocky Flats logbooks, in particular, was of such high quality that it has already been peer reviewed within the

International Critical Experiments Benchmark Evaluation Project (ICSBEP) and accepted. While difficult to quantify, the value of this information in an era of ever increasing costs for nuclear research, a lack of facilities in which to perform such, and tightening budgets, is enormous.

On the other hand, the bringing together of about a dozen past researchers from the Los Alamos Critical Experiments Facility recently did not lead to excitement about the research for unreported data. In contrast to the Rocky Flats success which was associated with a single researcher working his entire career at a facility with only one critical mass cell, the Los Alamos experimenters were generally older, had worked in numerous combinations with their various co-workers, did not always follow an experiment to completion, and had much less expectation that unreported, high quality data was available. However, when showed a short videotaped segment of a colleague, Hugh Paxton, they universally thought this and similar efforts had value in educating new criticality safety engineers.

Finally, in this latter category of disappointments, it appears that the logbooks associated with the numerous experiments performed over the years at the Savannah River Laboratory have been lost. Extensive searches and personal inquiries have been unsuccessful in locating them.

Current Capability

The logbooks and records from the past critical mass laboratories at BNL, RF, and Hanford, as well as those from the operating facility at Los Alamos, are currently located at the Archives Center at Los Alamos for perusal by researchers. Efforts are under way in Fiscal Year 1999 to scan all logbooks stored at Los Alamos and those from the Lawrence Livermore National Laboratory (LLNL) and ORNL, which were never sent to Los Alamos. These approximately 100,000 pages will be loaded onto the Los Alamos Nuclear Criticality Safety website and will be available for electronic review by researchers worldwide.

Concurrently, the loading of electronic versions of general interest documents, such as LA-12808, The Nuclear Criticality Safety Guide, and the in-progress update of the Review of Criticality Accidents, along with their approximately 200 references, are planned to be loaded onto the website during the next two Fiscal Years. Relatedly, the first attempt at putting reference material particular to a site, in this case the Y-12 Plant, on the website has occurred this Fiscal Year. While full documents from Y-12 are not yet available, the titles of a vast store of documents are already there. This previously published, but often difficult to find, information promises to be of value to current and future engineers as they often must otherwise duplicate efforts already undertaken.

Lastly, the videotaping of pioneers in the fields of criticality safety and critical experiments, often one and the same person, is proceeding. These videotapes will be made available first as "hard copy" and, as technology permits, on the website. Their recollections and reflections should be valuable teaching tools and serve as original sources for the practices and operational philosophies that were subsequently codified in the ANS-8 National Consensus Standards.

Current Requirements

As regulatory scrutiny and expectations become ever more stringent and the cost of large safety margins (in lieu of more relevant benchmark data) becomes less tolerable, the value of "mining the stockpile" of past experiments becomes more clearly cost-effective. Similarly, the awareness and use of past (reports of) analyses are much more important, not only as a time saver, but also as an instructional tool for the newer engineer. While in the past, most criticality safety engineers had the opportunity to spend time performing critical experiments, today's criticality safety practitioners must learn largely from the documentation of their predecessors. The videotapes of the pioneers should prove valuable in this training effort also.

Anticipated Future Direction

The logbook scanning and availability on the Los Alamos website is only the first step in mining this stockpile. A very labor-intensive effort, and one, which requires criticality staff time, will be the review and indexing of this scanned information. When the information is initially scanned, it is not keyword searchable, and therefore, not user friendly. A follow-on effort, having the original experimenters review documentation for unreported data, has been very successful to date, but only minimally attempted. Significant effort by those who have personal and past professional contact with these experimenters will be required in many cases to entice them to review these logbooks. This is a labor intensive effort which, like the indexing mentioned above, can best be performed by those already practicing criticality safety, a resource in short supply.

The scanning and making available of past published documents, company reports, and internal criticality safety evaluations on the website will prove exceedingly valuable if this wealth of documents is searchable by keyword. It is not yet clear how large or time-consuming an effort this might be, but it is definitely worthwhile to pursue.

Either linking to foreign websites that have information holdings similar to CSIRC or the importing of such information onto the CSIRC website is expected to be of major benefit to the worldwide community. The extent of this effort is largely unknown. Certainly, there are criticality pioneers from other countries, particularly Britian, France, and Russia, whose recollections and reflections would be valuable to preserve on videotape.

One more small, but very significant, information set is the classified holdings, particularly from the nuclear weapons related facilities. The various tasks involved with making this information usefully available are essentially the same as those already accomplished or described above for the current, unclassified CSIRC program.

Projected CSIRC Funding and Schedule of Milestones and Deliverables

The pace of some of this work has significant urgency, while other parts may not. As the pioneers and original experimenters dwindle in numbers and the memories of those remaining fade,

irrecoverable loss occurs. Thus, the allocation of funds to support the review of logbooks by original experimenters, where practical, and the videotaping of pioneers recanting the historical evolution of what have become accepted practices, and in many cases, regulatory norms will be given priority. The DOE and the Nuclear Regulatory Commission (NRC) are each providing funding to achieve CSIRC objectives. The planned funding levels shown below for both the DOE and NRC represent a sufficient level to continue to achieve meaningful progress. Should the planned funding level not materialize, this program plan and associated milestones will be revised accordingly.

PROJECTED CSIRC FUNDING

	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
DOE ($k)	50	50	51	52	53
NRC ($k)	50	50			
TOTAL ($k)	100	100	51	52	53

Schedule of CSIRC Specific Program Activities, Milestones and Deliverables

I. Locate, secure, scan, review, index and make available on the CSIRC Website logbooks, notes drawings, photographs and material descriptions from those sites at which critical experiments were conducted, including relevant company reports and internal memoranda.

A. Locate and secure logbooks and other relevant data (LANL) Complete

B. Scan material to create electronic version

Task I.B.1.	logbooks located at ORNL. (ORNL)	3/99
Task I.B.2.	logbooks located at LLNL. (LLNL)	3/99
Task I.B.3.	logbooks located at LANL. (LANL)	9/00
Task I.B.4.	other relevant documents located at LANL. (LANL)	Ongoing
Task I.B.5.	other relevant documents located at ORNL. (ORNL)	Ongoing
Task I.B.6.	other relevant documents located at LLNL. (LLNL)	Ongoing

C. Review, index, and make available scanned material. Criticality specialists will review scanned material to provide concurrent identification and indexing necessary to allow word search capability for the scanned information. Publication on the CSIRC website will occur as soon as possible following completion of tasks I.C.1-3. Publication on the CSIRC website will occur as soon as possible following review and indexing of each document for Tasks I.C.4-6.

Task I.C.1.	logbooks located at LLNL. (LLNL)	9/00
Task I.C.2.	logbooks located at ORNL. (ORNL)	9/00
Task I.C.3.	logbooks located at LANL. (LANL)	9/01
Task I.C.4.	other relevant documents located at LANL. (LANL)	Ongoing

Task I.C.5. other relevant documents located at ORNL. (ORNL) Ongoing
Task I.C.6. other relevant documents located at LLNL. (LLNL) Ongoing

II. Interview and videotape criticality safety pioneers and preserve this information for future use and benefit. Index videotapes to allow key word search capability.

Make this information available on the CSIRC Web site. (LANL) Ongoing

III. Scan and place key reference documents on the CSIRC website and make this information available on CD-ROMs. Place videotapes of pioneers on the CSIRC website, technology permitting (all LANL).

Task III.A. Load all 195 references to LA-10860, including the document itself, on the CSIRC website with user-friendly search features. 6/99

Task III.B. Make all 195 references to LA-10860, including the document itself, available on a CD-ROM (with user-friendly search features) for free distribution upon request. 9/99

Task III.C. Scan and load all 147 references to LA-12808, including the document itself, on the CSIRC website with user-friendly search features. 3/00

Task III.D. Make all 147 references to LA-12808, including the document itself, available on a CD-ROM (with user-friendly search features) for free distribution upon request. 6/00

Task III.E. Load the updated Criticality Accident Report on the CSIRC website. 12/00

Task III.F. Scan and load all references to the updates Criticality Accident Report on the CSIRC website. 3/01

Task III. Make videotapes of the pioneers in nuclear criticality safety and critical experiments available on the CSIRC website, technology permitting. 9/01

IV. Coordinate the progress and information from the above tasks with the Benchmark program for the purpose of updating Benchmarked data. (LANL & INEEL) Ongoing