

**Department of Energy**  
Washington, DC 20585

August 19, 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:

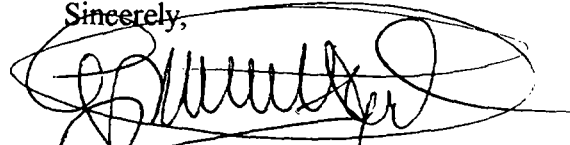
The Implementation Plan (IP) for Defense Nuclear Facilities Safety Board Recommendation 97-2 requires a quarterly status report. Enclosed is the Department of Energy's quarterly status report for the third quarter, Fiscal Year 1999.

The Department has made significant progress in implementing Recommendation 97-2, thereby maintaining important criticality safety infrastructure. The enclosed report outlines steady progress in each of the Nuclear Criticality Safety Program (NCSP) task areas. In addition, the Criticality Safety Support Group (CSSG) worked on a number of projects during the quarter including development of the NCSP Five-Year Plan and the organization and presentation of technical sessions related to the NCSP at the American Nuclear Society and Nuclear Criticality Technology and Safety Program meetings. The CSSG also provided assistance to the Office of Environmental Management in the review of the Multi-Canister Overpack criticality safety evaluations.

The IP contains thirty milestones of which twenty-four have been completed. Of the six remaining milestones, five are overdue, and the remaining milestone which is not yet due will be delayed because of its connection to the overdue milestones. Recovery Plans which were established to complete four of these milestones were forwarded to the Board in the January-March 1999 Quarterly Report. They are included in Attachment B to this report to chronicle progress; all Recovery Plan milestones are being met on schedule. 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 NCSP Plan.

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

Sincerely,

A handwritten signature in black ink, appearing to read "G. Weigand", enclosed within a large, hand-drawn oval. A long, thin line extends from the bottom of the signature down towards the typed name below.

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  
THIRD 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 Tasks (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. A revised Five-Year Plan is being finalized and will be published in August 1999.

The Nuclear Criticality Safety Program Management Team (NCSPMT) and the Criticality Safety Support Group (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 coordinated activities aimed at completing IP milestones and continued to provide justification necessary for maintaining funding support. The CSSG worked on a number of projects, including development of the NCSP Five-Year Plan and the organization and presentation of technical sessions related to the NCSP at the American Nuclear Society (ANS) and Nuclear Criticality Technology and Safety Program meetings. In addition, considerable effort has gone into assisting the Office of Environmental Management (EM) in the review of the Multi-Canister Overpack criticality safety evaluations. Work was also done on the review and resolution of comments for the Federal Criticality Safety Qualification Standard.

This quarterly report provides a status of activities for each of the seven NCSP elements, as well as Recommendation 97-2 IP Milestones and Recovery Plans. There are two attachments to this report: Attachment A is a table depicting the status of all IP Deliverables and Milestones, and Attachment B contains Recovery Plans for four of the remaining milestones. The Department has made steady 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:

**Critical Experiments**

Resumption of operations at the Los Alamos Critical Experiments Facility (LACEF) continued this quarter. SHEBA was approved for operation on June 16. Comments were received on the documentation for the Planet machine. This documentation was prepared under the short-term action plan for upgrading the Quality Assurance program that was used to develop and control the software for the computerized systems. The comments have been answered, and approval to

operate Planet for delayed critical operation is expected during the next quarter. The Planet Assembly is already approved to allow limited operation for the Nuclear Criticality Safety Training Course which only requires sub-critical operation for a demonstration.

On March 29, the LACEF placed the Flattop Critical Assembly machine in standby mode pending resolution of issues raised from seeping hydraulic fittings. A safety evaluation of the seeping fittings was prepared and submitted to the Los Alamos Area Office (LAAO) which subsequently determined the issue to be an Unresolved Safety Question. Electrical and fire inspections have been conducted, and repairs are underway to refurbish the wiring and place barriers between the electrical systems and the hydraulic systems. Following completion of these upgrades and a subsequent inspection, it is expected that Flattop will be released for normal operation. These actions are expected to be completed by August 31, 1999. The LACEF has also committed to performing a safety analysis for the Flattop fire accident and implementing monthly cleanup of any hydraulic oil, monthly inspections of fire loading, and preparation of an action plan to correct the seeping fittings.

Experimental activities conducted during the period are as follows:

(1) The Zeus Intermediate Energy Spectrum Experiment on the Comet assembly achieved first critical on April 26, 1999. 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. Experimental measurements during the rest of this quarter included a measurement of the temperature coefficient and initial measurements to determine the neutron spectra of the experiment.

The accident analysis for this machine is now being redone using the measured temperature coefficient. The results of this analysis will be sent to LAAO to request that more excess reactivity be allowed to be loaded on the machine. Relaxation of the current limit on excess reactivity will allow a much more efficient experimental program.

(2) The Godiva assembly was used to make several sub-critical measurements in a collaboration with the Los Alamos National Laboratory (LANL) group that is developing the neutron transport codes.

(3) During the week of June 23, Godiva was operated for a Russian delegation from Arzamas-16 as part of the Material Protection, Control and Accountability part of the Lab-to-Lab program. Measurements of the sensitivity of Godiva to a 4 gm sample of high enriched uranium (HEU) and to a 28 gm sample of HEU were made during this visit.

### **Benchmarking**

An International Criticality Safety Benchmark Evaluation Project (ICSBEP) Meeting was held June 2, 3, and 4 in Portland, Maine. Representatives from the United States, United Kingdom,

France, Russian Federation, Japan, Hungary, Yugoslavia, and the Republic of Korea participated in this meeting. Twenty new evaluations were submitted to the working group for review of which 19 were approved for publication in the 1999 Version of the "International Handbook of Evaluated Criticality Safety Benchmark Experiments." Thirty-five new evaluations will be included in the 1999 publication bringing the total to 263 evaluations. This version of the handbook will contain 2,157 critical configurations that may be used by criticality safety engineers for validation purposes. Detailed neutron spectra data for all plutonium systems and most highly enriched uranium systems will also be included in the 1999 publication.

Included in the 1999 additions to the handbook are highly enriched uranium systems in the form of dry and damp oxides, including several configurations in which the majority of the fissions occur in the intermediate energy range; low enriched uranium system containing dry and damp oxides (formerly proprietary Maracas data from France); low enriched uranium solutions reflected with concrete, borated concrete, and polyethylene (STACEY data from Japan); U-233 solution data; Mixed plutonium - uranium system data, including lattices in fissile solution; low enriched lattices in borated stainless steel and boral canisters (from France); additional VVER data (from Hungary); natural and low enriched uranium data in heavy water (from Yugoslavia); concrete reflected plutonium solution data; 9 percent enriched uranium metal data (ZPPR data); low density uranium in graphite data (from Russia); beryllium and graphite reflected highly enriched uranium metal spheres; 20 percent enriched uranium fuel lattices (TRIGA data from Slovenia), and k-infinity measurements for stainless steel, zirconium, and graphite (from Russia and the United Kingdom).

An informal request to evaluate a series of experiments that was documented by Dr. Robert E. Rothe for the ICSBEP was received from the Rocky Flats Environmental Technology Site. This series of experiments is documented in a report entitled, "Critical Experiments on an Enriched Uranium Solution System Containing Periodically Distributed Strong Thermal Neutron Absorbers" (INEL/EXT-97-00293). In order to respond to this request, priorities were modified and sufficient funding was transferred from the LANL Criticality Safety Group to the Argonne National Laboratory (ANL). Evaluation of these data should be ready for ICSBEP independent review before the end of Fiscal Year 1999.

Finally, Dr. Robert E. Rothe completed the draft of his seventh and final paper documenting previously undocumented experimental criticality safety data. The title of this paper is, "Critical Parameters of Complex Geometries of Intersecting Cylinders Containing Uranyl Nitrate Solution." The draft was distributed for review prior to publication.

### **Analytical Methods**

Staff at the Oak Ridge National Laboratory (ORNL) and LANL continued to maintain KENO and MCNP software and assist the nuclear criticality safety community in the use of this software. At Oak Ridge, this included fixing a bug in KENO-VI associated with shared boundaries in nested arrays with multiple geometry coordinate systems. Substantial effort went into the development

and testing of the software utilized by the new SCALE/CENTRM/ KENO sequence. Partially motivated by difficulties with existing multigroup methods in treating an intermediate-energy spectrum benchmark, the sequence is being enhanced to consider inelastic scattering and to perform a more-effective transport weighting of multigroup constants. At Los Alamos, further testing of the effect of the new unresolved resonance processing treatment in MCNP4XS on uranium and plutonium fueled benchmarks was performed. Notable, but relatively modest reactivity effects (~1-2 percent delta-keff) were observed. An exception was for intermediate spectrum systems containing large amounts of Uranium-238, which indicate the need for the new treatment and a probable need for a review of the Evaluated Nuclear Data File (ENDF)/B data. The perturbation capabilities in MCNP4XS have been upgraded to include automatic results for delta-keff and automatic corrections for perturbed cross section calculations. At the ANL, the stratified sampling effort with the VIM code included the definition of four proposed benchmarks which represent realistic nuclear systems and test fission source convergence algorithms. The source convergence issue will be presented to the Organization for Economic Cooperation and Development/Nuclear Energy Agency Nuclear Science Committee Working Party on Criticality Safety.

Substantial administrative assistance was performed for the NCSP under this task during this quarter. Presentations on the status and enhancement of all three code systems were made at the Nuclear Criticality Technology Safety Project (NCTSP) meeting in May. These included the studies of the Uranium/Iron Intermediate Spectrum Benchmark which demonstrated the value of two, independent, rigorous analog physics analyses and the needs for capability enhancements in the energy multigroup approach. The CSSG Methods Advisory Group met at the NCTSP and set priorities on future methods work to be proposed under the current revision of the NCSP Five Year Plan. Several presentations were made at the Boston ANS meeting including a special session on geometry modeling graphics and graphical user interfaces and a panel session which reported progress under the NCSP to the nuclear criticality safety community.

## **Nuclear Data**

### **Nuclear cross section data measurement activities:**

Cross Section Measurements at the ORNL Oak Ridge Electron Linear Accelerator for aluminum were completed and data reduction was started. Preparations are being made for silicon capture and chlorine transmission measurements to be performed later this summer.

### **Nuclear cross section data evaluation activities:**

The Uranium-233 evaluation in the resolved resonance region and for <sup>235</sup>U in the unresolved range continues. SAMMY/URR allows the internormalization of partial cross section data. Preliminary fits, including the experimental fission data of Blons (Saclay), Migneco (Geel), Wagemans (Geel), Weston (ORNL), and Perez (ORNL), were performed generating fission and capture cross sections with alpha values higher than those in ENDF/B-VI, in agreement with experimental values from Beer (Karsruhe) or De Saussure (ORNL).

Work on the covariance and sensitivity matrix generation for the Applicable Ranges of Bounding Curves and Data Task of the NCSP continues. The covariance and sensitivity data are generated as a result of running the code SAMMY using several measured data (total, capture, fission cross sections, etc.). Each experimental data requires an input to SAMMY describing the experimental conditions in which the data were taken. Several tests are needed before a final set of covariance and sensitivity data can be issued for use in criticality safety application.

Evaluation of the oxygen-16 cross section up to 6 MeV continues. The completion of the evaluation has been delayed to allow the improvement of the differential elastic scattering angular distribution representation. The elastic cross section impacts the calculation of the system neutron leakage, which is an important factor in safety calculations.

The evaluation of aluminum-27 is nearly completed. A technical issue regarding the cross section representation for this isotope in the ENDF library has been addressed and resolved. The set of resonance parameters for this evaluation is being tested with integral benchmark calculations.

#### Evaluation development activities:

**SAMMY:** Modifications and tests were made for the unresolved-resonance portion of SAMMY for the simultaneous incorporation of several sets of experimental fission, or capture, or total cross sections with internormalization of the data. The new code is named SAMMY/URR. Equations were developed, programmed, and tested to generate Bondarenko group-average cross sections and covariance matrix. Documentation for Revision 5 of the SAMMY manual is being prepared.

**RSAP:** Cross-section evaluation techniques have been enhanced by the development of RSAP, a code for display of neutron cross section data and SAMMY predictions.

**Unresolved region self shielding:** Preliminary Monte Carlo generation of resonance parameters shows that the average cross section obtained from SAMMY using the generated set of parameters can differ by more than 10 percent for the fission and the capture cross section when using the Breit-Wigner single level formalism (current ENDF option) versus the Reich-Moore formalism. This calculation will allow us to check the accuracy of the average cross section obtained by two different methods: individual resonance parameters with SAMMY/RES and equivalent average parameters with SAMMY/URR.

The ANL continues development on the unified resonance theory. The efforts towards establishing a new probability table method for the unresolved range has made significant progress: analytical expressions have been derived for the probability density function of total cross section and the conditional means of the partial cross section for Breit-Wigner resonances. These expressions are currently being tested and verified.

A presentation "ICSBEP Benchmark HEU-MET-FAST-035, ZPR-9 Assembly 34, the U/Fe Benchmark Assembly," was presented at the 1999 Nuclear Criticality Technology Safety Project Workshop at Albuquerque, New Mexico.

The ANL is also providing support for a criticality safety analysis that will be performed at ORNL. The ANL has developed a simple methodology for generating covariance files for existing evaluations and has generated 44-group covariances for the following materials: U, Pu, Zr, Mg, Gd, Hf, Fe, H, C, N, O, Al, Si, and B.

### **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 B). The standard three-day and five-day courses have been rescheduled during the remainder of Fiscal Year 1999. The Department recognizes the importance of this training and has directed LACEF to place a high priority on resuming nuclear criticality safety training.

Training development activities continued at a somewhat reduced level this quarter. The two training units developed last quarter were split into several modules which are being reviewed and reformatted. Additional explanation of the problem solutions is being added to better help the student understand the material. The first three modules have been placed on the web site. They are: (1) Introductory Nuclear Physics; (2) Neutron Interactions; and (3) The Fission Chain Reaction. The remaining modules will be added as they are completed.

Progress has been made in the development of qualification guidance for Federal and contractor criticality safety professionals. However, three milestones are still 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 ended on June 19, 1999, and all comments have been received. After the 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 B).



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. The Office of Management and Administration 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.

Field Managers have been notified in writing by Dr. Weigand, DP-10, about qualification requirements for Federal criticality safety staff members. However, 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 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 first advanced five-day course could not be scheduled until November 1999. The date by which all Federal employees should be qualified is now projected for December 2000 (see Recovery Plan in Attachment B).

### **Information Preservation and Dissemination**

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

Progress has been made during this quarter in a number of CSIRC task areas. Contracts were let with both ORNL and the Lawrence Livermore National Laboratory (LLNL) to scan their logbooks and related holdings. The scanned page images will be transferred to Los Alamos and made available on the Los Alamos (CSIRC) web site. It is forecast that this effort will be completed this Fiscal Year. Translation of the Reference Set data base (the report LA-10860 and all 195 references thereto) from its original Docutek format to portable document files continued. The product of this effort, some 8,000 page images, will be put on the CSIRC web site yet this

Fiscal Year and also made available as a three CD set to those who prefer to have this information in this format. Criticality safety personnel attended the DOE/Defense Programs Nuclear Weapons Archiving Project meetings to keep abreast of possible beneficial developments in scanning, archiving, etc. technology.

Regarding web site development, the U.S. DOE NCSP web site 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 web sites which are important to the NCSP. During the third quarter of Fiscal Year 1999, site improvements included: (1) development of an e-mail directory of criticality safety practitioners using an interactive voluntary registration form; (2) installation of the first Nuclear Criticality Safety Engineer Training module on the subject of criticality safety nuclear physics; and, (3) refinement of the layout of the web site pages based on feedback from the community. Demonstrations of the NCSP web site were given at the May NCTSP workshop in Albuquerque and at the summer ANS meeting in Boston. Response to the NCSP site continues to be positive and efforts (such as the presentations noted above) are being made to further publicize the availability of the site.

Progress has been made in another area related to information preservation and dissemination. Following CSSG approval of SAFT-0071, "Review Guide for Criticality Safety Evaluations" (IP Commitment 6.5.2, Milestone 1), the 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 be published by the end of September 1999 (see Recovery Plan in Attachment B).

### **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 the DOE NCSP, 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. The AROBCAD program develops a technically justifiable methodology to criticality safety practitioners for validating calculations in areas where benchmark data is unavailable or excessively sparse. In conjunction with validation efforts, the methodology will also aid in the selection of appropriate benchmarks, thereby providing greater confidence in the calculational validation. Additionally, an element of the AROBCAD task provides a methodology for (semi-automating) optimization codes (currently SWAN-SCALE) for the development of bounding curves and data useful for safety analyses.

Much progress was made during the quarter in each of the following AROBCAD Technical Program Plan (TPP) Task areas:

### TPP Task 1 - Implement use of optimization techniques for establishing bounding values.

The prototypic SWAN-SCALE one-dimensional material-optimization code has been completed and incorporated into an ORNL SCALE driver system. Test problems for the prototypic SWAN-SCALE code have been identified and partially completed. ORNL and University of California Berkeley staff met to refine contractual expectations for completion of SWAN-SCALE code, potential future work, contents of SWAN-SCALE user manual, and issuance of future publications regarding the work. The issuance of the draft SWAN-SCALE user manual, with example problem applications, is on track for its scheduled completion by the end of next quarter.

### TPP Task 2 - Investigate means to resolve or incorporate anomaly and discrepancy effects into bounding values.

The prototypic sensitivity and uncertainty (S/U) codes (SEN1 and CANDD), evolving from AROBCAD TPP 3, below, have been used to calculate the National Institute of Standards (NIST) and Technology neutron leakage experiments from water spheres. Results from this calculation will be compared with historic reported results and the S/U of anomalous computed-to-measured reaction rates will be examined, with particular attention given to the cadmium covered plutonium and U-235 fission reaction rates. ORNL has acquired the historic computational input decks for the NIST experiments from LANL for re-evaluation and documentation. Completion of the draft technical report on the investigation of neutron slowing down and leakage discrepancies in the NIST experiments is on track to be issued the second quarter of Fiscal Year 2000.

### TPP Task 3 - Investigate utilization of S/U and statistical methods for identifying experimental needs.

In concert with the DOE Rocky Flats Environmental Technology Site, Idaho National Engineering and Environmental Laboratory (INEEL), and Hanford operational nuclear criticality safety personnel, ORNL obtained detailed information and code input descriptions for validation and safety evaluation calculations for the application of S/U methods to determine the ranges of applicability of the validation benchmark experiments to specific safety evaluations.

Several essential code modules were further developed in support of AROBCAD. A One-Dimensional Cross-Section Sensitivity and Uncertainty Module (SEN1) for Criticality Safety Analysis report NUREG/CR-5719 (a product under NRC Job Code W6479) was issued for publication. The SEN1 module/code was applied to obtain preliminary results in support of TPP 2. A Three Dimensional Sensitivity Analysis Module for the SCALE Code System (SAMS), which is being developed as a dissertation project supported by DOE FWP EMSP102, was applied to obtain preliminary results for DOE applications. A post-processing code, CANDD, was developed, tested, and applied for automating review of sensitivity and uncertainty computational results. Confirmatory comparisons between the standardized generalized linear least squares method (GLLSM) and the CANDD calculated  $C(k)$  demonstrated that the values of  $C(k)$  were calculated correctly. ORNL has requested ANL to provide evaluated covariance data files for 19 various elements or isotopes of potential importance to DOE safety evaluations

performed with ENDF/B-V nuclear data. Six of these materials have no covariance data available in ENDF/B-V and the remaining data require re-evaluation considering new data from ENDF/B-VI or other international sources or experiments. Some of the 19 requested data files have been received by ORNL for use in the Hanford and Yucca Mountain S/U and range-of-applicability analyses. A preprocessor code was developed to prepare input for the FORSS sensitivity and uncertainty analysis code system UNCOVERS that performs the GLLSM analysis. This new preprocessor automatically determines the nuclear reactions to be included in the analysis. Currently, ORNL has not obtained sufficient descriptions of experimental configurations to make comparisons among proposed LANL critical experiments (i.e., U-235, SiO<sub>2</sub>, and polyethylene) and presumed bounding conditions for Yucca Mountain disposal conditions. The available proposed Russian Institute of Physics and Power Engineering critical experiments (i.e., U-235, SiO<sub>2</sub>, and polyethylene) are sufficient and will be evaluated for their estimated ranges-of-applicabilities to potential safety evaluations. The results of these comparisons and assessment of the estimated ranges-of-applicabilities are on schedule for documentation in a draft report by September 1999. The draft report for the range-of-applicability study about the application of AROBCAD to INEEL and Hanford safety evaluations is scheduled for issuance by the end of September 1999 and is currently on track.

#### TPP Task 4 - Develop guidance for interpolating and extrapolating bounding values.

Effort on this subtask will not begin until relevant information is generated and evaluated using the AROBCAD tools of TPP Task 3 and the results from TPP Task 5.

#### TPP Task 5 - Develop guidance for establishing bounding margins of subcriticality.

Extensive polling of the US nuclear criticality safety community, commercial and contractor, by ORNL has resulted in a broadened range of approaches for establishing bounding margins of subcriticality for safety. The feedback from the pole has been preliminarily reviewed and categorized for consideration in the development of guidance. Also, two ORNL statisticians began review and study of statistical results from the S/U evaluations for recommending statistical methods for establishing bounding margins of subcriticality for safety.

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 2. Archive logbook(s) and calculation(s) for that experiment 3. Videotape the original experimenter 4. Digitize data and calculations 5. Publish data and calculations	November 1997 December 1997 January 1998 February 1998 April 1998	Completed Completed Completed Completed Completed
6.2.2 Continue to implement the CSIRC program	1. Collocate logbooks (copies or originals) from all U.S. critical mass laboratories 2. Screen existing logbooks with original author/experimenter 3. CSIRC program plan	December 1998 December 1998 December 1998	Completed Completed Completed
6.3 Continue and expand work on ORNL sensitivity methods development	1. Technical program plan 2. Document initiation of priority tasks from the program plan in the quarterly report to the Board	July 1998 January 1999	Completed 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 2. Y-12 evaluations on DOE web site 3. Calculations compiled by the Parameter Study Work Group on DOE web site 4. Nuclear Criticality Information System Database on DOE web site	March 1998 June 1998 September 1998 March 1999	Completed Completed Completed 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	Overdue: Expected completion date is September 1999 - See Recovery Plan in Attachment B

<b>Commitment</b>	<b>Deliverable/Milestone</b>	<b>Due Date</b>	<b>Status</b>
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 B
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 B
	3. Guidance to procurement officials specifying qualification criteria for contractor criticality safety practitioners	September 1998	Overdue: 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 B
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: RECOVERY PLANS FOR OVERDUE AND DELAYED MILESTONES

### OVERDUE MILESTONES

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

<u>Milestone</u>	<u>To Be Completed By</u>	<u>Responsibility</u>
1. Issue Guide for Department Wide Coordination	April 19, 1999	Completed
2. Receive All Comments	June 20, 1999	Completed
3. Disposition Comments and Revise Guide	July 30, 1999	Near Completion
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 6.6.1.1: Expand the LACEF training course (was due in July 1998).**

<u>Milestone</u>	<u>To Be Completed By</u>	<u>Responsibility</u>
1. Finalize critical assembly demonstrations	June 30, 1999	Completed
2. Finalize curriculum	July 31, 1999	Completed
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).**

<u>Milestone</u>	<u>To Be Completed By</u>	<u>Responsibility</u>
1. Issue Guide for Department Wide Coordination	April 19, 1999	Completed
2. Receive All Comments	June 20, 1999	Completed
3. Disposition Comments and Revise Guide	July 30, 1999	Near Completion
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 MILESTONE**

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

<u>Milestone</u>	<u>To Be Completed By</u>	<u>Responsibility</u>
1. DP will inform the Field Management Counsel (FMC) about Fed Qual Program	June 30, 1999	Completed
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