



Critical & Subcritical Experiment Design Team (C_{ED}T) Process Manual of the United States Department of Energy Nuclear Criticality Safety Program

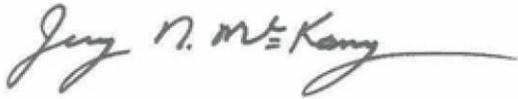
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This manual provides the Data Requestor and other C_{ED}T members all information needed to perform the tasks assigned to the team. It is updated by the C_{ED}T Manager as procedures and/or contracts change.

Critical & Subcritical Experiment Design Team Process Manual of the United States Department of Energy Nuclear Criticality Safety Program, March 28, 2016.

Approved:

A handwritten signature in black ink, reading "Jerry N. McKamy" with a long horizontal flourish extending to the right.

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Revision History

Revision	Date	Author	Description
0	08/10/12	A. Nichole Ellis	Initial issue
1	04/01/16	Douglas G. Bowen	Modifications have been made throughout the manual as a result of improvement actions from the C _{EDT} Efficiency Improvement Meeting in December 2013.

C_EdT Manual – Quick Start Guide

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1.0 Introduction

The Department of Energy (DOE) Nuclear Criticality Safety Program (NCSP) is chartered with maintaining the technical infrastructure necessary to ensure safe, efficient operations from a criticality safety perspective. The NCSP and its initiatives are planned and executed according to the Five-Year Execution Plan.

One of the five broad technical program elements that supports the NCSP and its identified goals is the Integral Experiments (IE) program element. From “The Mission and Vision of the United States Department of Energy Nuclear Criticality Safety Program,” the mission of the Integral Experiments program element states:

“The Integral Experiments (IE) program element maintains a fundamental capability for the DOE/NCSP to be able to perform critical, subcritical, and fundamental physics measurements, within the limits of its resources, to address specific needs on a prioritized basis.”

The Mission and Vision Document also states:

“The IE Element will provide a sustainable infrastructure and a systematic, interactive process to assess, design, perform, and document integral criticality safety-related benchmark-quality experiments to support safe, efficient fissionable material operations.”

In order to facilitate this task, a Critical Subcritical Experiment Design Team (C_{EDT}) process has been implemented. This Manual describes the C_{EDT} process in detail.

DOE NCSP Integral Experiment assets are also valuable to non-NCSP DOE Programs in order to accomplish other DOE missions and goals (assets include experimental machines, fissile material, trained personnel, measurement equipment, etc.). As a result, a portion of NCSP assets are available to other DOE Programs, based on the physical asset availability (machines, personnel, etc.), the priority and time required to accomplish the non-NCSP missions, and the NCSP funding available to assist with use of the NCSP assets.

Opportunities for improvement and feedback on any aspect of the NCSP C_{EDT} process should be sent via email to the C_{EDT} Manager. Contact information for the C_{EDT} Manager can be found on the NCSP website at the following link: <http://ncsp.llnl.gov/IERMain.html>. The intent is to continuously improve the C_{EDT} process to allow the DOE NCSP to provide effective and efficient support to the general Nuclear Criticality Safety Community.

2.0 C_{EDT} Process Overview

The goal of the C_{EDT} process is to provide a systematic and efficient means to identify, design, and approve all new integral experiments to ensure that the identified data need is met with the required accuracy and precision. This process ensures that the Requestor's application and data needs are well understood and met by integrating all capabilities of the NCSP to design and approve the experiment consistent with the Guiding Principles of Integrated Safety Management. Because of the unique nature of NCSP experimental work, it is necessary to apply a graded approach to the overall C_{EDT} process because some CED phases may not be applicable for each experiment, e.g., repeating a previous experiment, add-on experimental work to another experiment, etc. Additionally, the use of the Official NCSP Website (hereafter referred to as the website) to manage and maintain the C_{EDT} process is consistent with the established vision of the NCSP of an ongoing transparent process for the federal NCSP Authorization of Integral Experiments. There are tasks funded outside the NCSP that utilize NCSP assets to complete the work. These non-NCSP funded tasks are handled as described in Appendix A.

In order to meet its goal for each new integral experiment, the C_{EDT} process is divided into five phases called Critical/Subcritical Experiment Decision (CED) phases. The NCSP Manager approves each CED to ensure that the Requestor's needs and the NCSP programmatic needs are being met. The C_{EDT} process consists of:

- Justification of Integral Experiment Need (CED-0),
- Integral Experiment Preliminary Design (CED-1),
- Integral Experiment Final Design (CED-2),
- Approval to Conduct the Integral Experiment (CED-3), and
- Publication of Data (CED-4).

Appendix B provides a checklist of the minimum documentation required for CED phase approval. This process typically may take two to three years from inception to execution and publication of the experimental data, but can be significantly expedited to address high priority needs, as required. A description of each CED phase is provided in the following sections. This integral experiment request process is for unclassified experiments only. For classified experiment requests, the Requestor should contact the C_{EDT} Manager to arrange access to the classified website. The classified website works exactly the same as the open website but includes the appropriate security and access controls.

In order to facilitate the DOE non-NCSP Programs, a Non-NCSP Integral Experiment Request (IER) process has also been established. Appendix A describes the Non-NCSP IER process in detail.

3.0 Roles and Responsibilities

This section defines the roles and responsibilities to assure the objectives of each are met. Each experiment should consider having the right team of experts to ensure the customer or requestor requirements are being met and that the objectives of the experiment are met. NCSP-funded IERs that will be published in the ICSBEP handbook should consider having a C_{ED}T Lead, Requestor, Analytical Methods Member, and an NDAG member. NCSP-funded IERs that will be published as a lab report or other publication method should consist of C_{ED}T Lead, Requestor, and Analytical Methods Member, as required. Of course, the task experimenters should also be part of IER team, regardless of the publication method.

3.1 NCSP Manager

The NCSP Manager is responsible for approving the initiation and completion of each phase of the C_{ED}T Process. The NCSP Manager has full authority within the Integral Experiment (IE) Section of the website to access and/or change any part of the IE Request Form, approve each phase of the process, apply a graded approach to a request and skip phases, initiate phases, access documentation links and any other part of the C_{ED}T Process. The NCSP Manager makes the final decision regarding the status of the phases of the process. As each phase of the C_{ED}T Process is ready for review by the NCSP Manager, the website tracks the process and then prompts the NCSP Manager to take action accordingly.

The NCSP Manager may use a graded approach to the overall C_{ED}T process for any task, allowing any of the aforementioned phases to be skipped as required (e.g. for non-NCSP IERs or those not progressing to be published as ICSBEP Benchmarks).

3.2 C_{ED}T Manager

The C_{ED}T Manager is responsible for maintaining the C_{ED}T Process and interacting directly with the C_{ED}T Lead and C_{ED}T Members, as required, helping to facilitate issues, e.g., milestones, IER member reviews, disputes, technical or budget issues, etc., and addressing the needs of the NCSP Manager. The C_{ED}T Manager acts as a liaison for members of the NCSP community and for the NCSP Manager in support of the C_{ED}T Process. The C_{ED}T Manager reviews all initial Justification of Integral Experiment Need (CED-0) requests and recommends rejection or final approval of the requests to the NCSP Manager. Additionally, the C_{ED}T Manager reviews all process phases for completion prior to submission for final approval by the NCSP Manager.

The C_{ED}T Manager also has full authority to access and/or change any part of the Integral Experiment Request Form, approval phases, initiation phases, documentation links and any other phases of the C_{ED}T Process available on the NCSP website in order to assist the NCSP Manager as requested; however, the NCSP Manager makes all final decisions for approval of each phase of the C_{ED}T Process.

3.3 C_{EDT} Lead

The C_{EDT} Lead is responsible for managing the experimental preparations, e.g., safety basis implementation, experimental plan development, critical assembly preparations, part fabrication, etc., to ensure that the experiment is conducted on schedule and within budget. The C_{EDT} Lead is responsible for the publications necessary at each stage of the CED process, whether a laboratory report or an ICSBEP publication. They are responsible for ensuring the publications have been reviewed and approved as well as cleared for public release prior to being uploaded to the NCSP website. The C_{EDT} Lead is typically the experiment leader conducting the experiment.

The C_{EDT} Lead manages the C_{EDT} process for the particular experiment request and coordinates team efforts and communications. The C_{EDT} Lead is responsible for the successful completion of each phase of the C_{EDT} Process with a focus on communications with all C_{EDT} members throughout each phase. The C_{EDT} Lead is also responsible for ensuring the C_{EDT} members understand the experiment expectations, scope, and schedule for the experiment.

The C_{EDT} Lead applies a graded approach to selecting members of the team to complete the C_{EDT} process as efficiently as possible. With the help of the C_{EDT} Manager, the C_{EDT} Lead can add or remove team members as necessary throughout the C_{EDT} process. There shall be a minimum of three C_{EDT} members selected for the team to complete NCSP Benchmark experiment(s). The C_{EDT} Lead cannot override C_{EDT} member signatures during the process but works proactively with each C_{EDT} member to resolve all issues and concerns they have as the work is being completed.

The C_{EDT} Lead is also responsible for resolving team comments and issues on CED documentation prior to requesting CED approval from the NCSP Manager. All efforts should be made to ensure that all C_{EDT} members agree to move forward in the CED process. If necessary, a process has been created to document disagreements that cannot be resolved by other means, e.g., discussions between team members and the C_{EDT} Lead, which may or may not include the C_{EDT}/NCSP Manager. A formal C_{EDT} member dispute process is discussed in Appendix D to officially document a team member dispute as necessary.

The C_{EDT} Lead may select team members for a particular IER in addition to team members specified in Section 3.5. This will allow the C_{EDT} Lead to have the ability to select and deselect C_{EDT} members for the IER as appropriate to ensure an efficient process. A graded approach should be applied toward efforts to select C_{EDT} members for an IER, i.e., in general the team should minimize the number of staff dedicated to supporting a particular IER, in order to minimize cost and schedule for any particular IER while ensuring all technical needs are met.

3.4 NCSP Website Webmaster

The NCSP website webmaster (Webmaster) maintains the C_{EDT} process web space to provide a mechanism for Requestors to submit proposed Critical and Subcritical Integral Experiment Requests for consideration and/or processing. The Webmaster has full administrative authority to access the website forms, documents, status sheets, and any other parts of the website used for

the C_{EDT} Process in order to manage and maintain the website. Currently, the website is managed and maintained by Lawrence Livermore National Laboratory.

3.5 C_{EDT} Members

As determined by the NCSP Manager, the C_{EDT} for each NCSP benchmark experiment consists of team members to include at a minimum:

- C_{EDT} Lead Experiment Requestor,
- Experiment Member,
- Nuclear Data Advisory Group (NDAG) member, and
- Analytical Methods member.

The C_{EDT} Members support individual experiments as necessary and at the direction of the C_{EDT} Lead. Any team member that has a dispute of any kind should attempt to resolve issues directly with the C_{EDT} Lead prior to contacting the C_{EDT} Manager or NCSP Manager. The C_{EDT} Manager can facilitate C_{EDT} Member discussions to resolve C_{EDT} Member disputes, technical or publication issues, as necessary.

3.5.1 Requestor

The individual who initiated the experiment request has valuable insight into the experiment applicability and end user need of the experiment results. The C_{EDT} Lead can ask the requestor if they would prefer to either be an observer to the C_{EDT} process or participate as a reviewer to have a part in approving the experiment. Requestors who would like to observe an experiment being conducted are welcome to do so provided the expenses are covered by the requestor and not the NCSP. In many cases, the requestor's experience and background can be a valuable asset as a C_{EDT} team member and to ensure the experiment results ultimately meet the intent of the requestor throughout the C_{EDT} process. Appendix C provides instructions for filling out the "Request for Integral Experiments Form."

3.5.2 NDAG Member

The NDAG member of a C_{EDT} team affirms that no existing nuclear data meets the requestor's need, that an experiment is needed (not just a new evaluation), and to ensure that the final design actually is sensitive to the nuclear data identified by the experiment. The NDAG member of a C_{EDT} team will ensure the aspects of the experiment beneficial to the NCSP community and the requestor are part of the C_{EDT} team focus during the integral experiment. Also, as needed, the NDAG member may review and incorporate nuclear data from the experimental work back into the Nuclear Data Community.

3.5.3 Analytical Methods Member

The Analytical Methods member of the C_{ED}T team is responsible for constructing computer models and analyzing data in preparation for an integral experiment or analyzing the experimental data as necessary after the experiment. This member will work with the C_{ED}T Lead and C_{ED}T Members as necessary. This analysis is not experiment design per se, but rather analysis to ensure that the data anticipated from the experiment will meet the expected need.

3.5.4 Other C_{ED}T Members

The C_{ED}T Lead may select other C_{ED}T members as required for the experiment. These team members may consist of safety basis personnel, facility support staff, facility management, design support personnel, system engineers, etc., that are needed to support an experiment.

4.0 Overview of the Critical/Subcritical Experiment Decision Process

4.1 Justification of Integral Experiment Need (CED-0)

DOE or DOE contractors with laboratory email extensions (e.g., @lanl.gov, @inl.gov, etc.) should have automatic access to the IER portion of the NCSP Website. Otherwise, if an individual would like to submit a request and is not authorized to access this area of the NCSP website, the individual will receive a pop-up notice with the appropriate contact information and requirements for approval of access by the CEDT Manager. An individual approved for access will receive a Requestor ID and password to gain appropriate access to the IER section of the NCSP website in order to submit a request.

Once an authorized Requestor clicks the request link, the individual is directed to the “Request for Integral Experiments Form.” An example of this form is provided in Appendix C, including with instructions about how to complete the form.

Once CED-0 is approved by the NCSP Manager and the CEDT Lead has assigned team members to the IER, the NCSP Website “Approved Experiments CEDT members and Current Status” form is updated (Appendix E) automatically with the following information:

- Record Number,
- Requestor Name,
- Team Members, and
- Status.

When the NCSP Manager approves CED-0, an email is automatically sent to all registered NCSP website End-Users¹ indicating that a new CED-0 has been approved by the NCSP Manager. This informs the designated representatives in the NCSP community about a newly proposed experiment, prior to the preliminary design, and allows all registered NCSP End-Users the opportunity to propose an expansion of the experiment, if appropriate, to address closely related needs of the community or to possibly provide additional data.

4.2 Integral Experiment Preliminary Design (CED-1)

4.2.1 CEDT Formation

After formation of the CEDT, the entire team is tasked with the successful fulfillment of the Requestor’s data needs, i.e., potentially tasked with the successful completion of CED phases CED-1 through CED-4. The Requestor may also request to review the work in progress as a team member to enable them to provide guidance and feedback as necessary. In each of these phases, the entire CEDT work closely as a team. In each of these phases, the CEDT Lead is solely responsible for effective communication within the team and for all communications with the

¹ End users are those in the NCS community that may benefit from the completion of the experiment.

NCSP & C_{EDT} Managers regarding the status of the experiment. Additionally, it is the responsibility of the C_{EDT} Lead to obtain consensus and approval of each phase of the process for Requestor's data needs. C_{EDT} Member approval is documented on the Website by electronically recording their signature. If disputes arise among C_{EDT} members, the C_{EDT} Lead can resolve issues informally, utilize the C_{EDT} Manager as a mediator/facilitator, or follow the dispute resolution process in Appendix D.

4.2.2 CED-1: Experiment Preliminary Design

The CED-1 phase of an experiment is initiated once the NCSP Manager has approved the requested experiment. The preliminary design of the experiment is now started and the C_{EDT} team is formed. This process starts with thorough discussion within the C_{EDT} of the experiment objectives and the possible approaches to meet those objectives, i.e., scoping work. This discussion, together with specific details from the Requestor and the C_{EDT} Lead, should be sufficient to allow the Analytical Methods member to perform scoping calculations of candidate designs from which the C_{EDT} selects a preliminary design that will meet the experiment objectives. These calculations identify the proper facility, machine, equipment and materials to satisfy the Requestor's data needs and determine the practicalities of meeting those needs. If capability shortfalls are identified, they are reported to the C_{EDT}/NCSP Manager; and in such cases, the scoping calculations should enable reasonable estimates of "materials" and their costs necessary to obtain the desired integral data. The NCSP Manager will then direct the C_{EDT} to continue, defer or terminate the preliminary design. If directed to continue, the C_{EDT} team will develop the preliminary design for the request and submit the final CED-1 report to the NCSP Manager.

As the experimental design takes shape, it should be possible to identify authorization basis/safety basis impacts or long-lead items, such as procurements or component machining and fabrication efforts, that may have a significant effect on the task schedule. It is vitally important that preliminary design identify significant safety basis changes or long-lead procurements. This is one of the primary functions of preliminary design. The identification of these items in the preliminary design stages should be incorporated into CED-1 documentation to allow funding of these activities during the final design stage, CED-2, in order to preclude cost and schedule impacts in the latter C_{EDT} phases.

The experimental program that meets the Requestor's data needs may include one or more measurements of one or more types of experiments, such as:

- k_{eff} – (Critical and/or Sub-Critical Configurations)
- Deep Transport – (Shielding, CAAS, etc.)
- Reaction Rates – (Spectral Indices, Spatial Profiles, Dosimetry, etc.)
- Spectrum – (Neutron, Gamma)
- Reactivity Worths – (Small-sample, Doppler Temperature Coefficients, Material Replacement, Control Rods, Void or Insertion, etc.)
- Kinetic Parameters – (β_{eff} , Delayed Neutron Fractions, α_i 's and λ_i 's, etc.)

The contents of the final CED-1 report are fundamentally the same for each experiment type – though specific details will vary. An example of the required input data and calculated values for the design, execution and documentation of a criticality (k_{eff}) measurement is given in Table 5.1. The essence of this report is to provide a description of the experiment (geometry, dimensions, compositions, etc.) and a set of calculated values. All of these values should be accompanied by the corresponding values for the application.

The values (or perhaps, range of values), provided by the Requestor of the compositions, dimensions, etc., for the application, are considered precise (i.e., without uncertainties), whereas the experimental design must consider uncertainties. The example in Table 5.1 is provided as guidance for the CEDT. The requirement of the final reports for each of the CED phases is to document the successful planning and execution of the integral experiment in order to meet the Requestor's validation needs. It is expected that the CEDT will collectively have the experience to adapt to this guidance for each individual experiment and measurement. For example, it may be noted that Table 5.1 indicates that the uncertainties in the experimental k_{eff} are analyzed and reported in CED-2. Generally, this is acceptable. However, if the experiment is focused on a single material, and that material will be newly obtained for the experiment, it is important to determine the uncertainty "budget" for that material in terms of the necessary acceptance specifications (i.e., acceptable tolerances) of dimensions, masses and compositions including impurities. This must be done in a timely manner for inclusion in the procurement of that material and would be done as early as practical in the CED-1 phase.

Table 5.1. Example of Required Input and Calculated Values for Design, Execution and Documentation of Criticality (k_{eff}) Measurement

Input Parameters	Application (CED-0)	Preliminary Design CED-1	Final Design CED-2	Experiment CED-3	Experiment Report CED-4
Masses (m, σ_m) ^a	✓	✓	✓, ✓	✓, ✓	✓, ✓
Compositions (N, σ_N)	✓	✓	✓, ✓	✓, ✓	✓, ✓
Dimensions (x, σ_x)	✓	✓	✓, ✓	✓, ✓	✓, ✓
Positions (y, σ_y)	✓	✓	✓, ✓	✓, ✓	✓, ✓
Calculated Parameters	Application (CED-0)	Preliminary Design CED-1	Final Design CED-2	Experiment CED-3	Experiment Report CED-4
Eigenvalue (k_{eff}, σ_k)	✓	✓	✓, ✓	✓, ✓	✓, ✓
Material Worth ^b ($\Delta k_{eff}, \sigma_{\Delta k}$)	✓ ^b	✓ ^b	✓, ✓ ^b	✓, ✓ ^b	✓, ✓ ^b
Neutron Energy Spectrum	✓	✓	✓	✓	✓
Neutron Balance ^{c, d} (by Isotope, Region)	✓ ^d	✓ ^d	✓ ^d	✓ ^d	✓ ^d
Isotope Sensitivities ^c (by Reaction)	✓ ^d	✓ ^d	✓ ^d	✓ ^d	✓ ^d

^a The corresponding check marks indicate the input parameter (first check) and the uncertainty in the input parameter (second check).

^b If relevant.

^c Production, Absorption and Leakage Fractions.

^d Perhaps not required, but desirable.

4.2.3 CED-1 Completion

The CED-1 completion checklist in Appendix B should be used to satisfy the requirements of the CED-1 phase. As the team is being created for new tasks, the CEDT Lead works with the CEDT Manager to update the “Approved Experiments CEDT Members and Current Status” form on the website with each team member’s name. The CEDT Members use all of the relevant data to develop a recommendation for an appropriate experiment and document this recommendation in a summary or report that includes all relevant data generated during the development phase (e.g., input files, memos, etc.). Documents uploaded to the NCSP website as CED-1 phase closure evidence must be unclassified and cleared for unlimited distribution to the public. Additionally, for subcritical experiment designs, multiple measurement methods should be considered as needed or as desired by the requestor.

Prior to transmittal of the recommended preliminary design summary or report, all CEDT Members should reach consensus and that consensus documented (e.g., signature page, email

approval, etc.). Each C_{EDT} Members is required to enter an electronic signature in CED-1 that acknowledges at a minimum:

1. The member has reviewed the CED-1 documentation,
2. Any unreviewed Safety Question Determination/Authorization Bases Changes (USQD/AB) changes required are identified and/or initiated,
3. That the Requestor data need(s) can be met by the preliminary experiment design,
4. The data need(s) are adequately matched to the application (by a general assurance that the nuclear data sensitivity of the conceptual experiment matches the sensitivity of the application), and
5. The experiment could be performed as designed.

It may be necessary to procure long-lead items, e.g., parts that require quality assurance, such as borated polyethylene and machined parts, or perform time-constrained activities, such as the generation of safety basis documentation to support the proposed experiment. Upon NCSP Manager approval, funds may be released to initiate necessary procurements and time-constrained items.

In cases where the experiment is rather straightforward, or if the experiment being designed is similar to one already performed, a graded approach can be applied to the preliminary design CED-1 design summary or report to request approval from the NCSP Manager to move directly from CED-1, "Preliminary Design," to CED-3, "Approval to Conduct the Critical Experiment". The basis for the request should be documented in the summary report along with projected costs and resource-loaded schedule information if the C_{EDT} Lead decides to proceed directly to CED-3b to execute the experiment. If a graded approach is to be applied to the preliminary design of an experiment destined to be published in the ICSBEP Handbook, the C_{EDT} Lead needs to ensure all ICSBEP requirements are met prior to the experiment execution. The C_{EDT} Team members should reach consensus on this decision to skip CED phases and should sign the IER form if they agree to proceed directly to CED-3. If an experiment design warrants detailed schedule/cost analysis prior to the execution of the experiment, the C_{EDT} Lead should only request NCSP Manager approval for CED-3a, rather than CED-3b.

The recommended preliminary design summary or report and all supporting documentation shall be reviewed for public release by the documentation generator(s). The summary/report, supporting documentation and public release review verification is then sent to the C_{EDT} Manager who verifies that all pertinent documentation has been included, all necessary reviews performed and signatures obtained prior to transmitting the CED-1 package to the NCSP Manager, via the website (see the documentation checklist in Appendix B) for approval.

The NCSP Manager reviews the CED-1 preliminary design package and iterates with the C_{EDT} Lead, as necessary, prior to approving CED-1. To formally approve CED-1, the NCSP Manager changes the C_{EDT} Process Status: CED-1 form to "Approved" and submits the form. An automatic email is sent to the Requestor, C_{EDT} Lead, C_{EDT} members, and the C_{EDT} Manager stating that the NCSP Manager has approved CED-1, and a C_{EDT} Process Status: CED-2 form is automatically created in the computer database for use by the C_{EDT}. At this point, the "Approved

Experiments C_{EDT} members and Current Status” form will be updated automatically on the website. The C_{EDT} Manager also reviews and updates the “Approved Experiments C_{EDT} members and Current Status” form on the website, as needed, and ensures that all relevant documentation is uploaded onto the website and accessible to the C_{EDT} members for downloading.

If, during the CED-1 phase, the C_{EDT} concludes that the proposed experiment will not meet the Requestor’s need and/or application, the C_{EDT} Lead shall inform the NCSP Manager of this conclusion. The NCSP Manager may then choose to return the CED process to the CED-1 “Pending” phase to allow the Requestor and remaining C_{EDT} members to work together to find another experiment or method to meet the Requestor’s need.

Also the NCSP Manager has the option to return the C_{EDT} process back to the CED-0 submittal “Unlock CED-0” phase. However, if the C_{EDT} concludes that the proposed experiment will not meet the Requestor’s need and/or application, most likely the NCSP Manager will change the current experimental request to “Completed”, and a revision number will be assigned if another variation of the request is submitted. Any documentation generated or data collected by the C_{EDT} up to this point in the process shall be reviewed for public release by the documentation generator(s) and then sent to the C_{EDT} Manager who verifies necessary reviews were performed prior to archiving the “Completed” package, including the uploading of the generated documents for archival.

If the C_{EDT} cannot find a solution that will meet the Requestor’s need or cannot find an experiment that can be performed with available resources, the C_{EDT} Lead informs the NCSP Manager who will decide how to proceed. Anytime that the NCSP Manager returns to a previous phase in the C_{EDT} process, the website generates an automatic email that is sent to the Requestor and other members of the C_{EDT} indicating that the NCSP Manager has reset the process.

4.3 Integral Experiment Final Design (CED-2)

4.3.1 CED-2: Integral Experiment Final Design

Once the CED-1 phase has been approved by the NCSP Manager, a C_{EDT} Process Status: CED-2 form indicating “Pending” is automatically created in the website for use by the C_{EDT}. The NCSP Manager decides the appropriate time in which to authorize CED-2 initiation (based on current funding levels, priorities within the NCSP, schedule of the Requestor’s need, facility availability, material availability, etc.) and marks the CED-2 form as “Initiated”. At this point, an automated email is sent to the C_{EDT} Lead and C_{EDT} Members indicating CED-2 initiation is authorized and the website is updated. After CED-2 initiation, the C_{EDT} Lead determines what, if any, changes may be required in the preliminary design to define the final experiment plan by consulting with his/her team members.

The focus of CED-2 is on eliminating all experiment uncertainties to the degree possible and identifying all the experimental uncertainties inherent in the design. CED-2 generates final specifications for procurement and ensures that the projected total experimental uncertainty is small compared to the data quality needed to test the underlying nuclear data, reactions, etc. The results of the CED-2 phase provide for a funding hold point for the NCSP Manager to consider if the experiment can be achieved with available funding.

This phase of the process requires all team members to work together to create a final design of the experiment that will meet the needs of the Requestor. As applicable:

- Review and adjust schedules based on the time needed for Safety Basis changes and the acquisition of long lead procurements,
- The Analytical Methods member makes any revisions necessary in the model of the final experiment design and, if necessary, re-calculates the reported (predicted) values,
- As applicable, the C_{ED}T Lead utilizes the design and tolerances of all experiment components provided by the C_{ED}T Lead and the analytical models of the final experiment design provided by the Methods member to estimate all components of the experiment uncertainty, and
- The C_{ED}T critically reviews all values for the final design for inclusion in the final experiment plan, with particular attention to minimization of the major uncertainties.

During this phase, special consideration should be given to minimize experimental uncertainties and to maximize the utility of the integral measurements, such as measurement of a reference configuration or other systematic configuration variations.

As applicable, the C_{ED}T Lead should direct the preparation of a draft version of Sections 1.0 and 2.0 of the ICSBEP Evaluation in accordance with the guidance provided in the “International Handbook of Evaluated Criticality Safety Benchmark Experiments.” If the experiment will be documented, evaluated and published in a method other than the preferred method of the ICSBEP, a draft report should be prepared with the specifications of the experiment and related issues and/or uncertainties identified. This draft document is reviewed by the C_{ED}T prior to submitting it as part of the CED-2 package. If, during the final experiment design phase of an experiment, the C_{ED}T members conclude that the proposed final experiment design will not meet the Requestor’s need and/or application the NCSP Manager may direct the Requestor and remaining C_{ED}T members to work together to find another experiment or method to meet the Requestor’s need or take action to revise the experiment or initiate another request.

4.3.2 CED-2 Approval

The team members use all relevant data to develop an experiment final design that meets the Requestor’s needs and documents this design in a summary or report that includes all relevant data generated during the development phase (e.g., draft evaluations, input files, memos, etc.). Documents uploaded to the Website as CED-2 phase closure evidence must be unclassified and cleared for unlimited distribution to the public.

Prior to transmittal of the recommended experimental final summary or report, all C_{EDT} Members should reach and document consensus (e.g., signature page, email approval, etc.). Each C_{EDT} member is required to enter an electronic signature in CED-2 that acknowledges at a minimum:

1. The member has reviewed the CED-2 documentation,
2. The Requestor data need(s) can be met by the final experiment design,
3. The design specifications, tolerances, and chemical compositions of all experiment components are finalized,
4. The final experiment design appropriately calculates the reported (predicted) values (the expected precision and systematic bias are acceptably small for all observables important to the experiment),
5. The experiment can be performed as designed,
6. All major components of the experiment uncertainties are quantified,
7. All procurement specifications for the experiment are specified,
8. Any long lead procurements have been identified,
9. Any required USQD/AB changes have been identified, and
10. The baseline budget estimate required for conducting the experiment is developed.

The final design summary or report and all supporting documentation (or copies as appropriate) shall be reviewed for public release by the documentation generator(s). The summary/report, supporting documentation and public release review verification are then sent to the C_{EDT} Manager who verifies that all pertinent documentation (or copies as appropriate) has been included, all necessary reviews performed and signatures obtained prior to transmitting the CED-2 package to the NCSP Manager via the website (see documentation checklist in Appendix B) for approval.

The NCSP Manager reviews the final design package for CED-2 and iterates with the C_{EDT} Lead, as necessary, prior to approving CED-2. To formally approve CED-2, the NCSP Manager changes the C_{EDT} Process Status: CED-2 form to “Approved” and submits the form. An automatic email is sent to the Requestor, C_{EDT} members, and the C_{EDT} Manager stating that the NCSP Manager has approved CED-2, and a C_{EDT} Process Status: CED-3 form is automatically created in the computer database for use by the C_{EDT}. At this point, the “Approved Experiments C_{EDT} members and Current Status” form will be updated automatically on the website. The C_{EDT} Manager also reviews and updates the “Approved Experiments C_{EDT} members and Current Status” form on the website, as needed, and ensures that all relevant documentation is uploaded onto the website and accessible to the C_{EDT} Members for downloading.

If the C_{EDT} cannot find a solution that will meet the Requestor’s need or cannot find an experiment that can be performed with available resources, the C_{EDT} Lead informs the NCSP Manager who will decide how to proceed. Anytime that the NCSP Manager returns to a previous phase in the C_{EDT} process, an automatic email is sent to the Requestor and other members of the C_{EDT} indicating that the NCSP Manager has reset the process.

4.4 Approval to Conduct the Integral Experiment (CED-3)

CED-3 has been subdivided into two sub-phases CED-3a: Integral Experiment Initiate Facility Plan/Cost Estimate and CED-3b: Integral Experiment Execution. Two sub-phases allow the NCSP Manager to define funding requirements and acquire funding prior to actual experiment execution.

4.4.1 CED-3a: Integral Experiment Initiate Facility Plan/Cost Estimate

After CED-3a initiation, the C_{ED}T Lead and C_{ED}T Members prepare a detailed cost estimate with justification of all necessary funding for experiment execution, a detailed facility plan, a final resource loaded (baseline) schedule for execution of the experiment², data analysis, and publication based on the priority of the experiment requestor's data need, and ensures the completion and implementation of any necessary USQD/AB and experiment plan changes.

4.4.2 CED-3a Initiation

Once the CED-2 form is marked "Approved" by the NCSP Manager, a C_{ED}T Process Status: CED-3a form indicating "Pending" is automatically created in the computer database for use by the C_{ED}T. The NCSP Manager decides the appropriate time in which to authorize CED-3a initiation (based on current funding levels, priorities within the NCSP, schedule of the Requestor's need, facility availability, material availability, etc.) and marks the CED-3a form as "Initiated". At this point, an automated email is sent to the C_{ED}T members indicating CED-3a initiation is authorized and the website is updated.

4.4.3 CED-3a Approval

The C_{ED}T Members use all relevant data to develop a facility experiment plan and associated cost estimate and final resource loaded schedule that meets the Requestor's needs. The team also ensures all necessary USQD/AB changes have been completed. The team members document this information in a summary or report that includes all relevant data generated during the development phase (e.g., facility plan, draft evaluations, input files, memos, schedules, cost estimates, etc.). Documents uploaded to the Website as CED-3a phase closure evidence must be unclassified and cleared for unlimited distribution to the public.

Prior to transmittal of the summary or report, all C_{ED}T Members should reach consensus and that consensus documented (e.g., signature page, email approval, etc.). Each C_{ED}T Member is required to enter an electronic signature in CED-3a that acknowledges at a minimum:

1. The member has reviewed the CED-3a documentation,
2. A detailed cost estimate is provided with justification of necessary funding,

² Budgets and schedules are typically front-loaded into the Integral Experiment section of the NCSP 5-year plan.

3. A resource loaded (baseline) schedule is provided for execution of the experiment, data analysis, and publication based on the priority of the experiment requestor's data need(s) (CED-3a must be approved prior to making material moves or equipment modifications), and
4. All necessary USQD/AB changes have been completed.

The experiment summary or report and all supporting documentation (or copies as appropriate) shall be reviewed for public release by the documentation generator(s) and sent to the C_{EDT} Manager who verifies that all pertinent documentation (or copies as appropriate) has been included, all necessary reviews performed and signatures obtained prior to transmitting the final CED-3a package to the NCSP Manager for approval via the website (see documentation checklist in Appendix B).

The NCSP Manager reviews the facility plan, detailed cost estimate, final baseline schedule, and any necessary USQD/AB changes and iterate with the C_{EDT} Lead, if necessary. The NCSP Manager will decide the appropriate time in which to approve CED-3a initiation (based on current funding levels, priorities within the NCSP, schedule of the Requestor's need, facility availability, material availability, etc.) and marks the CED-3a form as "Approved". At this point, an email is sent to the Requestor and other members of the C_{EDT} indicating approval of CED-3a initiation based upon the approved schedule for conducting the experiment.

4.4.4 CED-3b: Integral Experiment Execution

The initiation of CED-3b allows the facility to begin the planned experimental work. Experimental work is only permitted at the CED-3b step. Once the NCSP Manager approves CED-3a, an automated email is sent to the C_{EDT} members indicating the approval of the CED-3a phase based upon the approved schedule for conducting the experiment. Additionally, a C_{EDT} Process Status: CED-3b form indicating "Initiated" is automatically created by the website, and CED-3b initiation is authorized.

At this point, the experiment can be performed in accordance with the approved baseline schedule. This phase of the process requires, at a minimum, that the C_{EDT} Lead works together with the Requestor regarding the publication requirements for the experiment (ICSBEP or lab report) to ensure that the experiment does not deviate from the intended purpose and that all relevant data are appropriately recorded for later evaluation. During this phase of the process, the C_{EDT} Lead should notify all C_{EDT} Members of any differences from the actual planned experiment (CED-2), in particular, any changes that might diminish the usefulness of the experiment, such as increasing the measurement uncertainties or shifting the energy spectrum. Additionally, the C_{EDT} Lead is responsible for the development of a final draft version of Section 1.0 of the experiment, by the C_{EDT} Lead in accordance with the guidance provided in the "International Handbook of Evaluated Criticality Safety Benchmark Experiments" or a report detailing experiment specifications/results, should be documented.

4.4.5 Restarting Previously Completed IERs for Execution (CED-3b)

At the discretion of the NCSP Manager, a graded approach may be applied to new experiments that are similar to previous experiments, e.g., foil irradiation experiments on Flattop, or reflector experiments with the BeRP ball. The intent here is to save time and money if IERs are closely related. If the CED-1, CED-2, and CED-3a phases are applicable to the experiment, the experiment requestor can initiate a request for a new experiment based on the close-alignment of scope with a previous experiment. The request shall include the applicability of the previous IER to the proposed experiment. Based on a review of proposed experiment by the C_{ED}T Manager, more documentation may be required to ensure the complete applicability of the phases up to CED-3b. If the applicability between the previous experiment and the proposed experiment is not closely aligned, i.e., cost, schedule, machine, documentation, etc., the NCSP Manager may decide not to approve the proposed experiment for execution (CED-3b), and the IER request may be moved back to CED-0 for review as discussed in the CED-0 process. This process applies to both NCSP. The NCSP Manager has the authority to unilaterally approve any requested IER.

4.4.6 CED-3b Approval

The purpose of approving the CED-3b phase is to signify the completion of the experimental work in the facility and the beginning of the final data analysis and publication. After completion of the experiment, the team members use all relevant data to develop, as appropriate, documentation of Section 1.0 and 2.0 of the ICSBEP evaluation or experiment specifications, and the C_{ED}T Lead develops a summary or report that includes all relevant data generated during the experiment, e.g., final draft evaluation Section 1.0 and 2.0, all ICSBEP references, logbook records, input files, memos, etc. (or copies as appropriate). Documents uploaded to the NCSP website as CED-3b phase closure evidence must be unclassified and cleared for unlimited distribution to the public.

Prior to transmittal of the summary or report, all C_{ED}T Members should reach and document consensus (e.g., signature page, email approval, etc.). Each C_{ED}T member is required to enter an electronic signature in CED-3b that acknowledges at a minimum:

1. The member has reviewed the CED-3b documentation,
2. The experiment was performed and did not deviate from the intended purpose (the Requestor's requested data need was met with the experiment), and
3. All relevant data generated during the experiment (e.g., final draft evaluation Section 1.0 and 2.0 for ICSBEP, logbook records, input files, memos, etc.) are appropriately recorded for evaluation.

Once the CED-3b operations are complete and C_{ED}T members have entered an electronic signature in CED-3b, the C_{ED}T Lead can request NCSP Manager approval to proceed to the CED-4a phase. The C_{ED}T Lead is responsible for submitting an experiment summary or report and all supporting documentation (or copies as appropriate) to the C_{ED}T Manager who verifies that all pertinent documentation (or copies as appropriate) has been included, all necessary reviews performed and signatures obtained prior to transmitting the final CED-3b package to the

NCSP Manager for approval via the website (see documentation checklist in Appendix B). All documentation submitted to the C_{EDT} Manager shall be reviewed for public release by the documentation generator(s) before uploading to the NCSP website or sending to the C_{EDT} Manager via email unless the email message and attachment are encrypted, e.g., via Entrust. If necessary, prior to ceasing operations, the C_{EDT} Lead should also work with other C_{EDT} Leads to ensure that experimental data for all add-on experiments has been collected.

The NCSP Manager reviews the package for CED-3b and iterates with the C_{EDT} Lead, as necessary, prior to approving CED-3b. To formally approve CED-3b, the NCSP Manager changes the C_{EDT} Process Status: CED-3b form to “Approved” and submits the form. An automatic email is sent to the Requestor, C_{EDT} members, and the C_{EDT} Manager stating that the NCSP Manager has approved CED-3b, and a C_{EDT} Process Status: CED-4 form is automatically created in the computer database for use by the C_{EDT}. At this point, the “Approved Experiments C_{EDT} members and Current Status” form will be updated automatically on the website. The C_{EDT} Manager reviews and updates the “Approved Experiments C_{EDT} Members and Current Status” form on the website, as needed, and ensures that all relevant documentation is uploaded onto the website and accessible to the C_{EDT} Members for downloading.

4.5 Publication of Data (CED-4)

CED-4 has been subdivided into two sub-phases, CED-4a, Integral Experiment Evaluation, and CED-4b, Integral Experiment Publication.

4.5.1 CED-4a Initiation of Publication Evaluation (CED-4a)

Once the NCSP approves CED-3b, a C_{EDT} Process Status: CED-4a form indicating “Pending” is automatically created in the computer database for use by the C_{EDT}. The NCSP Manager decides the appropriate time in which to authorize CED-4a initiation (based on current funding levels, priorities within the NCSP, schedule of the Requestor’s need, evaluator availability, etc.) and marks the CED-4a form as “Initiated”. At this point, an automated email is sent to the C_{EDT} members indicating CED-4a initiation is authorized and the website is updated.

Once CED-4a is “Initiated”, the experiment is appropriately evaluated and then reviewed internally via the appropriate method. There are three possible methods of review and publication currently identified: ICSBEP International Technical Review Group evaluation and review publication method, time sensitive ICSBEP evaluation and review publication method, and other publication methods, as appropriate.

4.5.2 CED-4a: Integral Experiment Evaluation

The CED-4a phase consists of the analysis and publication preparations after the experiment has been completed. For ICSBEP evaluations, CED-4a endures for the review cycle until the evaluation is completed for international and time sensitive ICSBEP evaluations or classified (US) experiments. The C_{EDT} Lead uses the internal/peer reviewed documented experiment

evaluation to complete the publication of the data. The C_{EDT} Lead shall ensure all facility requirements for publication of a facility document are performed.

4.5.3 CED-4a Approval

The team members use all relevant data to determine that the draft experimental publication has been appropriately evaluated and internally reviewed via the appropriate method that meets the Requestor's needs. The C_{EDT} members document this in a summary or report that includes all relevant data generated during the development phase (e.g., draft evaluations, input files, memos, etc.). Documents uploaded to the NCSP website as CED-4a phase closure evidence must be unclassified and cleared for unlimited distribution to the public.

Prior to transmittal of the summary or report, consensus should be reached by all C_{EDT} Members and that consensus documented (e.g., signature page, email approval, etc.). Each C_{EDT} Member is required to enter an electronic signature in CED-4a that acknowledges the member has reviewed the CED-4a documentation, the evaluation adequately meets the requestor's needs, and the appropriate internal/peer review has been completed.

The experiment summary or report and all supporting documentation (or copies as appropriate) shall be sent to the C_{EDT} Manager who verifies all pertinent documentation (or copies as appropriate) has been included, all necessary reviews performed and signatures obtained prior to transmitting the final CED-4a package to the NCSP Manager for approval via the website (see documentation checklist in Appendix B).

4.5.4 CED-4: Integral Experiment Publication (CED-4b)

Once CED-4a has been approved for completion by the NCSP Manager, CED-4b is initiated to archive the final reports and closing the IER. Once CED-4b is "Initiated", the experiment evaluation is appropriately reviewed, approved, and published via the appropriate method. There are three possible methods of review and publication currently identified: ICSBEP International Technical Review Group evaluation and review publication method, time sensitive ICSBEP evaluation and review publication method, and other publication methods, as appropriate.

4.5.5 CED-4b Approval

At the completion of this phase, the approved publication and any additional remaining relevant data generated during the C_{EDT} process shall be reviewed for public release by the documentation generator(s) and sent, with the public release review documentation, to the C_{EDT} Manager who verifies that all pertinent documentation (or copies as appropriate) for the entire C_{EDT} Process has been included, all necessary reviews performed and signatures obtained, prior to informing the NCSP Manager that the experiment is published and ready for completion.

The C_{EDT} Manager ensures that all relevant documentation for the 'completed experiment' is available on the website and the comprehensive NCSP online archive for access by C_{EDT}

members and, as appropriate, registered members of the NCSP community. The relevant information generated for the experiment during the CED process can include the following types of documentation, which is unique to the particular experiment conducted.

- Experiment plan or procedure for conducting the experiment
- A scanned copy of the experimenter's logbook
- Various experimental data (linear channel data, startup channel data, temperature data, burst data, experiment data/evaluation, material data, procurement data, etc.)
- Drawings and/or pictures pertinent to experiment
- Presentations
- Benchmark Evaluations
- Journal Articles

Any documentation uploaded at the CED-4b stage or beyond should only include documents that have been approved by the site as approved for unlimited distribution to the public. It is recommended that information be added to the website as appropriate to assist the C_{ED}T team with document reviews as the IER proceeds through the CED process. An automated email notification will be sent from the Website when a document has been uploaded for verification purposes. The date and time that a document is uploaded to the website will be indicated. Upon satisfactory review of the C_{ED}T Process for the experiment and the experiment publication, the NCSP Manager formally approves the completion of CED-4b on the website. A final email is sent to the C_{ED}T members indicating that the experiment is officially complete.

Appendix A: Non-NCSP IER Process

A1.0 Introduction

The DOE Nuclear Criticality Safety Program (NCSP) is chartered with maintaining the technical infrastructure necessary to ensure safe, efficient operations from a criticality safety perspective. The NCSP and its initiatives are planned and executed according to the Five-Year Execution Plan, technical program element for Integral Experiments. However, the DOE NCSP Integral Experiment assets are also valuable to non-NCSP DOE Programs in order to accomplish other DOE Missions (these assets include experimental machines, fissile material, trained personnel, measurement equipment, etc.). As a result, a portion of the NCSP assets are available to other DOE Programs, based on the physical asset availability (machines, personnel, etc.), the priority and time required to accomplish the non-NCSP missions, and the NCSP funding available to assist with use of the NCSP assets.

In order to facilitate the DOE non-NCSP Programs, a non-NCSP IER process has been established. This Appendix describes the non-NCSP IER process in detail.

A2.0 Non-NCSP IER Process Overview

The goal of the non-NCSP IER process is to provide a systematic and efficient means to identify, prioritize, and approve non-NCSP IER requests. This process ensures that the Requestor's non-NCSP mission needs are understood, reviewed, and prioritized as applicable by the NCSP while maintaining the integrity of the DOE NCSP Integral Experiment C_{ED}T process of designing and approving NCSP experiments consistent with the Guiding Principles of Integrated Safety Management. Additionally, the use of the Official NCSP Website, to manage and maintain the non-NCSP IER process in coordination with the C_{ED}T process, is consistent with the established vision of the NCSP of an ongoing transparent process for the federal NCSP Authorization of Integral Experiments (NCSP and non-NCSP experiments using NCSP assets).

A3.0 General Procedure to Process Non-NCSP IERs

A requestor submits a non-NCSP task just like any other NCSP IER resulting in a pending CED-0 submittal and the C_{ED}T and the NCSP Manager is notified. The requestor will typically be a point of contact at one of laboratories performing the work for a sponsor other than the NCSP. The C_{ED}T Manager reviews the non-NCSP task request and ensures the following information is clearly provided by the requestor:

- The task title and body clearly define the scope of work,
- The critical assembly/fissile material to be used for the work,
- The experiment/task dates of execution (to ensure priority NCSP tasks are not affected by the non-NCSP task and to piggy-back on other work, if possible), and
- The task is clearly marked as a non-NCSP sponsor.

After the C_{ED}T Manager has thoroughly reviewed the non-NCSP request, NCSP Manager approval for CED-0 is requested. Once CED-0 approval from the NCSP Manager has been received, phase CED-1 is set to pending, and the C_{ED}T Manager adds team member's names to the form.

Next, the CED-1 phase for non-NCSP tasks requires the verification of sponsor funding prior to executing the experiment, i.e., initiating CED-3b, by C_{ED}T Management. Once the facility owner and experimenter have verified that funding has been allocated for the experiment, the C_{ED}T Manager uploads the funding verification documentation to the CED-1 page for the IER, and the item is approved by the NCSP Manager. When the experiment has been completed, a report or executive summary for the non-NCSP IER should be uploaded to the website. This report or executive summary must be approved for unlimited distribution to provide some background on the particular experiment. The C_{ED}T Manager then closes the IER. Reports or papers written for non-NCSP work should have an acknowledgement that the work was completed with NCSP assets or supported by the NCSP (in part). This acknowledgement is as follows:

"This work was supported by the DOE Nuclear Criticality Safety Program, funded and managed by the National Nuclear Security Administration for the Department of Energy."

Appendix B: C_{ED}T Documentation Checklist

C_{ED}T Approval Checklist

IER #:	IER Title:	
C_{ED}T Lead:	C_{ED}T Team Members:	
C_{ED}T Phase Gate Checklist		
CED-0	Complete?	
The documentation for the CED-0 process is internal to the official NCSP website (website); therefore, there is no checklist for this phase.	N/A	
CED-1 – INITIATION OF PRELIMINARY DESIGN	Complete?	
NCSP Manager Approval of CED-0 obtained?	<input type="checkbox"/>	
Experimenter lead shall send the proposed C _{ED} T members to the C _{ED} T Manager for input into the CED-1 form prior to the NCSP Manager Initiation.	<input type="checkbox"/>	
CED-1 – PRELIMINARY DESIGN APPROVAL	Complete?	
All IER team members have approved progress through this phase by signing next to their name on the NCSP website. [Disputes must be resolved prior to completing this phase.]	<input type="checkbox"/>	
C _{ED} T Management has been provided appropriate documentation to demonstrate the preliminary design of the experiment has been thoroughly developed to allow for a successful experiment in the execution phase. Appropriate documentation consists of, but is not limited to, the following: <ul style="list-style-type: none"> • An Experiment Preliminary Design Report or Summary document that demonstrates the requestor's data needs are met by the proposed experiment design, • Any applicable analytical method input files or other methods verifying that the data needs are adequately matched to the application, • Any requestor supporting documentation explaining experiment data application, • Documentation that verifies the experiment could be performed with the proposed design, and • Documented derivative classifier review of all documentation generated (release for unlimited distribution) being transmitted to the NCSP Manager for review. <p>[The C_{ED}T Management reviews the package for completeness prior to being sent to the NCSP Manager for approval. The NCSP Manager reviews the package for CED-1 and iterates with the C_{ED}T Lead and/or C_{ED}T Manager as required for approval. The NCSP Manager approved CED-1 via the website, and the C_{ED}T Manager ensures all relevant documentation is uploaded onto the website and accessible to the experiment C_{ED}T members on the website.]</p>	<input type="checkbox"/>	
CED-2 – FINAL DESIGN APPROVAL	Complete?	
All IER team members have approved progress through this phase by signing next to their name on the NCSP website. [Disputes must be resolved prior to completing this phase.]	<input type="checkbox"/>	
C _{ED} T Management has been provided appropriate documentation to demonstrate the	<input type="checkbox"/>	

<p>preliminary design of the experiment has been thoroughly developed to allow for a successful experiment in the execution phase. Appropriate documentation consists of, but is not limited to, the following:</p> <ul style="list-style-type: none"> • An Experiment Final Design Report or Summary including proof that the Requestor data need(s) are met by the proposed design, • Final design specifications, tolerances, and chemical compositions of all experiment components, • Preliminary resource loaded schedule for the experiment, • Baseline budget estimate for conducting the experiment, • Any applicable Analytical Methods input files or other method verifying that the data need(s) are adequately matched to the application, • Documentation that verifies the experiment could be performed with the final design, • Draft Section 1.0 and draft Section 2.0 ICSBEP Evaluation/draft publication with experiment specifications (reviewed by all C_{ED}T members for general concurrence), as applicable, • Documentation demonstrating final experiment design appropriately calculates the reported (predicted) values (the expected precision and systematic bias are acceptably small for all observables important to the experiment), • Any applicable ICSBEP/Publication member input files, • Any Requestor supporting documentation verifying the Area of Applicability by the Requestor, • Procurement specifications defined, • Verification that long lead procurements have been acquired, • Verification that required USQD/AB changes have been identified and/or initiated, and • Documented review for public release by the documentation generator(s) of all information being transmitted to the NCSP Manager. <p>[The C_{ED}T Management reviews the package for completeness prior to being sent to the NCSP Manager for approval. The NCSP Manager reviews the package for CED-2 and iterates with the C_{ED}T Lead and/or C_{ED}T Manager as required for approval. The NCSP Manager approves CED-2 via the website, and the C_{ED}T Management ensures all relevant documentation is uploaded onto the website and accessible to the experiment C_{ED}T members on the website.]</p>	
<p>CED-3A– FACILITY PLAN/COST ESTIMATE APPROVAL</p>	<p align="center">Complete?</p>
<p>All IER team members have approved progress through this phase by signing next to their name on the NCSP website. [Disputes must be resolved prior to completing this phase.]</p>	<p align="center"><input type="checkbox"/></p>
<p>C_{ED}T Lead submits a final resource-loaded baseline schedule for the execution of the experiment, data analysis, and final publication. The resource loaded schedule is submitted directly to the NCSP Manager after being reviewed by C_{ED}T Management.</p>	<p align="center"><input type="checkbox"/></p>
<p>C_{ED}T Management has been provided appropriate documentation to demonstrate the facility plan and a cost estimate for the experiment has been thoroughly developed to allow for a successful experiment in the execution phase. Appropriate documentation consists of, but is not limited to, the following:</p> <ul style="list-style-type: none"> • An Experiment Completion Report or Summary including an approved facility experiment plan or procedure, • A detailed cost estimate with justification of necessary funding, • A resource loaded (baseline) schedule for execution of the experiment, data 	<p align="center"><input type="checkbox"/></p>

<ul style="list-style-type: none"> analysis, and publication, • Verification of completion of all necessary USQD/AB changes, and • Documented review for public release by the documentation generator(s) of all information being transmitted to the NCSP Manager. <p>[The C_{EDT} Management reviews the package for completeness prior to being sent to the NCSP Manager for approval. The NCSP Manager reviews the package for CED-3a and iterates with the C_{EDT} Lead and/or C_{EDT} Manager as required for approval. The NCSP Manager approves CED-3a via the website, and C_{EDT} Management ensures all relevant documentation is uploaded onto the website and accessible to the experiment C_{EDT} members on the website.]</p>	
CED-3B – EXPERIMENT EXECUTION APPROVAL	Complete?
All IER team members have approved progress through this phase by signing next to their name on the NCSP website. [Disputes must be resolved prior to completing this phase.]	<input type="checkbox"/>
<p>The CED-3b approval process requires the submission of the experiment execution data and experiment data analysis documentation. This is prepared by the C_{EDT} Lead and is sent directly to the NCSP Manager.</p> <p>C_{EDT} Management has been provided appropriate documentation to demonstrate the facility plan and a cost estimate for the experiment has been thoroughly developed to allow for a successful experiment in the execution phase. Appropriate documentation consists of, but is not limited to, the following:</p> <ul style="list-style-type: none"> • An Experiment Completion Report or Summary including proof that the experiment did not deviate from the intended purpose, • Verification that the Requestor’s data need(s) was met by the executed experiment, • Any experiment data records such as logbook pages, material reports, drawings, etc. (or copies as appropriate), • Any applicable Analytical Methods input files, • Final draft Section 1.0 and draft Section 2.0 of the ICSBEP Evaluation/final experiment specifications (reviewed by all C_{EDT} members for general concurrence), as applicable, • Any applicable ICSBEP/Publication member input files, • A copy of all publication references, and • Documented review for public release by the documentation generator(s) of all information being transmitted to the NCSP Manager. <p>[The C_{EDT} Management reviews the package for completeness prior to being sent to the NCSP Manager for approval. The NCSP Manager reviews the package for CED-3b and iterates with the C_{EDT} Lead and/or C_{EDT} Manager as required for approval. The NCSP Manager approves CED-3b via the website, and the C_{EDT} Management ensures all relevant documentation is uploaded onto the website and accessible to the experiment C_{EDT} members on the website.]</p>	<input type="checkbox"/>
CED-4A – PUBLICATION EVALUATION APPROVAL	Complete?
All IER team members have approved progress through this phase by signing next to their name on the NCSP website. [Disputes must be resolved prior to completing this phase.]	<input type="checkbox"/>
The CED-4a approval process requires the submission of the experiment execution data and experiment data analysis documentation. This is prepared by the C _{EDT} Lead and is sent directly to the NCSP Manager.	<input type="checkbox"/>

<p>C_{EDT} Management has been provided appropriate documentation to demonstrate the facility plan and a cost estimate for the experiment has been thoroughly developed to allow for a successful experiment in the execution phase. Appropriate documentation consists of, but is not limited to, the following:</p> <ul style="list-style-type: none"> • An Experiment Completion Report or Summary including proof that the experiment did not deviate from the intended purpose, • Verification that the Requestor’s data need(s) was met by the executed experiment, • Any experiment data records such as logbook pages, material reports, drawings, etc. (or copies as appropriate), • Any applicable Analytical Methods input files, • Final draft Section 1.0 and draft Section 2.0 of the ICSBEP Evaluation/final experiment specifications (reviewed by all C_{EDT} members for general concurrence), as applicable, • Any applicable ICSBEP/Publication member input files, • A copy of all publication references, and • Documented review for public release by the documentation generator(s) of all information being transmitted to the NCSP Manager. <p>[The C_{EDT} Management reviews the package for completeness prior to being sent to the NCSP Manager for approval. The NCSP Manager reviews the package for CED-3b and iterates with the C_{EDT} Lead and/or C_{EDT} Manager as required for approval. The NCSP Manager approves CED-3b via the website, and the C_{EDT} Management ensures all relevant documentation is uploaded onto the website and accessible to the experiment C_{EDT} members on the website.]</p>	
<p>CED-4B – PUBLICATION EVALUATION APPROVAL</p>	<p align="center">Complete?</p>
<p>All IER team members have approved progress through this phase by signing next to their name on the NCSP website. [Disputes must be resolved prior to completing this phase.]</p>	<p align="center"><input type="checkbox"/></p>
<p>C_{EDT} Management has been provided appropriate documentation to demonstrate the facility plan and a cost estimate for the experiment has been thoroughly developed to allow for a successful experiment in the execution phase. Appropriate documentation consists of, but is not limited to, the following:</p> <ul style="list-style-type: none"> • Final approved ICSBEP Evaluation/Experiment Publication (or copy as appropriate), • Additional applicable ICSBEP/Publication member input files, • Copies of each publication reference, • Any additional experiment data records such as logbook pages, material reports, drawings, etc. (or copies as appropriate), • Any remaining relevant data generated during the C_{EDT} process for the experiment (or copies as appropriate), and • Documented review for public release by the documentation generator(s) of all information being transmitted to the NCSP Manager. <p>[After review and approval of the final CED-4b documentation, the NCSP Manager authorizes the experiment status to be changed to “Completed”.]</p>	<p align="center"><input type="checkbox"/></p>

Notes:



Appendix C: Example “Request for Integral Experiments Form”

REQUEST FOR INTEGRAL EXPERIMENTS FORM
NOTICE: The End User must verify all information is UNCLASSIFIED

Please provide the following information:

Form Status:

Requestor Name:
 Last Name: [*] First Name: [*] Middle Name:

Affiliation: [*]

E-mail Address: [*]

Retype E-mail Address: [*]

Telephone No.: [*]

[*] Required fields

Experimental Request Title: [*] *[80 chars max]*

Type of IER process:

Non-CEDT Process Experiment (this type of 'experiment' includes 1) use of any NCSP fissile material of a significant quantity within the DAF not fully funded by requestor organization outside NCSP 2) any maintenance/fix cost tasks or 3) non-NCSP type experiments/tasks as determined by NCSP Manager)

Full CEDT Process Experiment (experiment/task where NCSP provides any partial/full funding - this includes providing NSTec funding if not provided by requestor organization)

Organization(s) of benefit:
 NCSP NCT NP NR SS Other__

Description of Application/Purpose (same level of detail as in DOE-STD-3007-2007): *[6000 chars max]*

Type of Publication Method and Review:

ICSBEP International Technical Review Group evaluation and review publication method

Time sensitive ICSBEP evaluation and review publication method

Other publication methods (LA-UR-xxxx, facility report, etc.)

Select Those That Apply and Explain:

Programmatic Funding Available (optional):

User Assessment of Available Integral Data (ICSBEP, Published, UnPublished, etc.):*[6000 chars max]*

Suggested Experiment Concept (optional):*[6000 chars max]*

CEdT Manager Comments:*[6000 chars max]*

NDAG Reviewer Comments:*[6000 chars max]*

NCSP Manager Comments:*[6000 chars max]*

CEdT MANAGER Section Only

Tracking/Unique Number:

Meets Requirements to Submit to NDAG
 Does Not Meets Requirements to Submit to NDAG

NDAG Section Only

NDAG Actions:

Concurrence (Type Name):

No New Experiment Needed
 Recommend IER-0 Approval

NCSP Approval

NCSP Manager Approval IER-0:

The Requestor acknowledges all information is approved for public release. [*] I Agree

DC Name or Review and Release Number:

Instructions for “Request for Integral Experiments Form”

A detailed explanation for filling out the “Request for Integral Experiments Form” is given below.

After reviewing these instructions, any remaining questions can be directed to the CEdT Manager by clicking the “Submit question” button and entering the question(s) in the comment field. This action sends the question via email directly to the CEdT Manager who will respond to the Requestor as soon as possible.

Requestor

At the top of the form to the left is a toggle button labeled “Form Status” and contains the following two choices: “Working Draft” (default) and “Final”. Once a request has been filled out completely and to the satisfaction of the reviewer, the requestor should change the label to “Final”. This indicates to the CEdT Manager that the form is ready for submittal. At the top of the form to the right is a toggle button labeled “Status” that will indicate “Pending” during the drafting and approval process of the request and is used exclusively by the NCSP Manager and will be discussed in a later section.

The next part of the form requires the Requestor to enter their basic information (name, affiliation, email address, and telephone number) and is self-explanatory.

The following part of the form requires the Requestor to enter the appropriate information for the type of application need that is to be met by an integral experiment.

Experimental Request Title: The Requestor is required to enter an appropriate title to clearly identify the type of experiment needed (e.g., Vanadium as a Reflector or Absorber).

Description of Application/Purpose: The Requestor is required to enter, in 6000 characters or less, the need of the application that the requested experiment is intended to fulfill (e.g., what problem is the Requestor trying to solve). This description is the most important field on the request form as it explains the exact data needs of the Requestor. This enables the NCSP Manager to determine if the need has already been met in other areas of the NCSP or can be met by means other than a critical or sub-critical experiment, as well as whether or not the NCSP has the capability to meet the need via an Integral Experiment. This information will also be used as a baseline to aid the CEDT in determining an appropriate experiment to ensure that the Requestor's application will be satisfied by the designed experiment if the request is approved. If the requested experiment is for specific material(s), it would be helpful for the Requestor to include a statement of the importance or reactivity worth of these material(s) in their application. The requestor should also provide information about the desired timeframe for the experiment and publication to be completed.

Type of Publication Method and Review: The Requestor is required to identify the preferred method needed for data evaluation and documentation at a minimum, based on their data need and the associated time requirement for documentation of the evaluated data. There are three publication and review options for the requestor to propose:

- “ICSBEP International Technical Review Group evaluation and review publication method”,
- “Time sensitive ICSBEP evaluation and review publication method”, or
- “Other publication methods” (such as LA-UR-XXXX, facility report, etc.)

Each of these publication options are described in detail in Section 4.5.4 “CED-4 Publication Process.”

Programmatic Funding Available: This field is optional; however, if outside funding is available (funding not directly provided by the NCSP), the Requestor should provide this information. This information will aid in the determination of the priority of experiments performed by the NCSP. At the request of the site task manager, the NCSP Manager can approve discretionary funding for an experiment request that does not have full programmatic funding from a sponsor to be completed if there is a benefit to the nuclear criticality safety community.

Requestor Assessment of Available Integral Data: The Requestor is required to identify, in 6000 characters or less, all data previously found by the Requestor that are applicable to the requested experimental need. This entry should also include the source (ICSBEP

Handbook, ARH-600, Published, Unpublished, etc.) of the information. The information in this field helps determine if adequate information to meet the Requestor's need already exists and to what extent the Requestor has identified the existing integral data, as well as the gaps in the existing data that may need to be filled by the requested experimental need. It will also aid the C_{ED}T in design and analysis of the experiment if approved.

Suggested Experiment Concept: This field is optional; however, if the Requestor has an idea of the type of experiment that would meet their need, the requestor may enter that information here, in 6000 characters or less.

Note: Experience has shown that most data requests are submitted with little or no quantitative information in the "Description of Application" field. It is reasonable for the C_{ED}T to question the importance of any request or data need, if the Requestor has never performed a calculation for the application having the data need. The requestor should provide any information that can help with the request, such as material fractions, neutron energy spectrum, and estimation of the approximate worth of materials involved in the request should also be provided. Furthermore, if the data request proceeds beyond CED-0 to CED-1 (as discussed below in Section 5.3), the Requestor will have to provide details of the application and participate in the subsequent phases of the experiment design. It is recommended the requestor attempt to justify the need for the experimental data by performing sensitivity and uncertainty (S/U) calculations using the TSUNAMI (SCALE) or WHISPER (MCNP) packages.

File Attachment: Any documents, input files, etc. of relevance to the requested experimental need should be uploaded here. Documents uploaded to the NCSP website must be unclassified and cleared for unlimited distribution to the public. An email message will be sent out to provide documentation and verification that a document was indeed uploaded to the NCSP website.

Once a Requestor has completed the aforementioned fields, the requestor is required to acknowledge that all information is approved for public release by clicking the "I Agree" box and entering the appropriate approver Name or the Review and Release Number in the associated field. After this field has been completed and the box checked, the Requestor will be able to submit the request by clicking the "Submit" button on the bottom of the form. A "Reset" button can also be clicked to clear all fields of the form, as desired.

Prior to submitting a request, the Requestor must change the left toggle button labeled "Form Status" from "Working Draft" to "Final" in order to indicate to the C_{ED}T Manager that the form is ready for review and approval. If an Integral Experiment Request is left as a "Working Draft" for more than 30 days, the C_{ED}T Manager will send an email to the Requestor indicating that the request must be completed within 30 days in order to complete the request, change it to "Final", and "Submit" the form, or the request will be cancelled, removed from the active section of the database, and archived.

C_{EDT} Manager Initial Review

Upon submittal of the request form to the C_{EDT} Manager, an email is sent to the Requestor, the NCSP Manager, and the C_{EDT} Manager stating that a request is ready for review by the C_{EDT} Manager. The C_{EDT} Manager reviews the request and determines if it should move forward or not. The C_{EDT} Manager may, in 6,000 characters or less, enter appropriate comments into the request form comment field. The C_{EDT} Manager then checks either the “Meets Requirements to Submit to NDAG” box or the “Does not Meet Requirements to Submit to NDAG” box and “Submit”, and the form is automatically forwarded to the NDAG Chair or “Return to User”, and the form is automatically returned back to the Requestor, as appropriate.

There is a check box labeled “Limited” to be used by the C_{EDT} Manager as needed as well as a check box labeled “Facility” for the C_{EDT} Manager to indicate, when appropriate, which facility will be the primary facility for experiment execution.

NDAG Chair Review

Upon submittal to the NDAG Chair, an email is sent to both the Requestor and to the NDAG Chair stating that a request is ready for review by NDAG. The NDAG Chair starts the review process of the request to determine if a new experiment is required to meet the Requestor’s need.

In order to perform this review, the NDAG Chair may communicate with the ICSBEP Project Manager, a knowledgeable experimenter and/or a knowledgeable Analytical Methods member, as well as with the Requestor and C_{EDT} Manager, as necessary, to determine if a critical or sub-critical experiment is required to meet the request and if the request is a need by both the Requestor and the NCSP community. The NDAG Chair communicates with the Requestor as necessary to review the application of the data, the need for the data, the time frame of the data need, and any other relevant information necessary to make an appropriate determination whether or not to move forward with the experiment request or not. If the NDAG Chair determines there are data within the NCSP community not identified on the Request Form that sufficiently meet the Requestor’s needs, references to these data are provided to the Requestor and no new experiment will be pursued. The NDAG Chair could also determine that experimental data already exists but new evaluations are in progress that could satisfy the requestors experimental data need and conclude a new experiment is not necessary. The NDAG Chair may also be aware of experimental data set of which the requestor may not be aware and make this information available to them.

Next, if the NDAG Chair determines that there is a need for new experimental integral data and that the request should move forward, the chair also reviews whether or not the “Preferred Publication Method” selected is appropriate for the NCSP programmatic needs. If the Requestor selects “ICSBEP Publication”, the method of publication cannot be downgraded; however if the Requestor selects the option “Internal Documentation”, the NDAG Chair should determine if other NCSP programmatic needs would necessitate a publication method upgrade and then select “ICSBEP Publication”. Because of the additional expense for ICSBEP publication generation, the NDAG Chair should carefully ensure there is a community need for this type of publication,

i.e., the benefit to the NCS community justifies the expense of generating the ICSBEP publication. If there is a benefit to the community, the costs to produce an ICSBEP publication should be submitted to the NCSP Manager for inclusion on the NCSP task list to ensure it is included in the NCSP budget.

After this review, the NDAG Chair uses the scroll down box to indicate their decision of concurrence or not with the request and then either checks the “No New Experiment Needed” box or the “Recommended CED-0 Approval” box. If the NDAG Chair determines that no new experiment is needed, the Chair will provide full justification for the decision to the C_{EDT} Manager and NCSP Manager.

C_{EDT} Manager Review

Upon submittal of the reviewed form to the NCSP Manager and C_{EDT} Manager, an email is sent to the Requestor, the NCSP Manager, and the C_{EDT} Manager stating that a request is ready for approval or rejection. The C_{EDT} Manager reviews the request and determines if it should move forward or not for final decision by the NCSP Manager. The C_{EDT} Manager may, in 6000 characters or less, enter appropriate comments into the request form comment field. The C_{EDT} Manager then sends an email to the NCSP Manager stating that the request is ready for final review by the NCSP Manager.

NCSP Manager Approval

After the NDAG Chair’s and C_{EDT} Manager’s final review of the IER, the C_{EDT} Manager sends an email to the NCSP Manager stating that the IER is ready for review with any relevant comments and/or additional information provided in the email (i.e., facility availability, material issues, similarity in other requests that could be performed as a set, etc.). The NCSP Manager reviews all relevant information and determines whether or not to approve the request or not.

Additionally, if the NCSP Manager determines that the experiment request will move forward and the publication method of “Internal Documentation” is selected, the NCSP Manager can determine if other NCSP programmatic needs would necessitate a publication method upgrade and can select “ICSBEP Publication” as a result.

If the request is approved, the NCSP Manager uses the “Status” scroll down menu and selects “Approved” and submits the IER form. An automatic email is sent to the Requestor, the NDAG Chair, and the C_{EDT} Manager stating that the NCSP Manager has approved the experiment request and a C_{EDT} Process Status: CED-1 form is automatically created in the computer database for use by the C_{EDT}.

If the NCSP Manager does not approve the request, he/she will provide justification for the decision in the NCSP Manager Comment section, use the “Status” scroll down menu, select “Return to User” and submit the IER form. An automatic email is sent to the Requestor, the NDAG Chair, and the C_{EDT} Manager stating that the NCSP Manager has not approved the Integral Experiment Need form.

The NCSP Manager has the option of sending an email directly to the Requestor from the CED-0 form. By clicking the “Email” button, a pop-up window is created that allows the NCSP Manager to insert a comment via email directly to the Requestor.

The NCSP Manager has the authority to unilaterally approve any experiment for execution (CED-3b).

Appendix D: Team Member Dispute Process

D1.0 Introduction

A process has been developed to document a Team member dispute that may occur as part of the C_{ED}T process. A dispute may arise during the generation of CED documentation, documentation review and comment period, or during the execution of an integral experiment.

D2.0 Documenting and Resolving a Disagreement or Dispute

The Team member with a dispute should fill out the “Team Member Dispute Form” shown in Fig. 3 and submit the form to the C_{ED}T Lead, and the C_{ED}T Manager/NCSP Manager for consideration. The issue will be discussed and proposed resolutions will be discussed by the Team member, C_{ED}T Lead, and C_{ED}T/NCSP Manager as necessary. The ultimate goal is to achieve unanimous approval to continue moving the IER activity through the CED process.

The form created to document disagreements (Fig. 3) includes the following information to ensure the issue is clearly understood by all parties involved in the dispute.

- IER Number, e.g., IER-226
- Date
- Originator Name/Site, e.g., John Smith, Atomic Power National Laboratory
- Description of the Disagreement or Dispute, e.g., includes the CED stage, document being generated or reviewed, and concise statements regarding the dispute.
- Proposed resolutions, e.g., if action X is done, the dispute will be resolved
- Signature of the Originator
- Final Resolution of the Disagreement or Dispute with sufficient detail for all parties to understand the resolution, e.g., implement action X that includes (...XXX...) in the next draft of the CED-1 documentation
- Signature of all parties accepting the resolution (includes the C_{ED}T/NCSP Manager, C_{ED}T Lead, Team member)

Team Member Dispute Form
(Instructions provided in the CEdT Manual)

IER Number:	Date:	Originator:
Description of the Disagreement or Dispute:		
Proposed Resolutions:		
	Date	Signature
Signature of Originator		
Final Resolution of the Disagreement or Dispute:		
Signature of All Parties Accepting the Resolution, e.g., Team member, CEdT Lead, CEdT Manager, NCSP Manager		
Name and Title:	Signature	Date

Figure 1. Team Member Dispute Form

Appendix E: Example “Approved Experiments C_{ED}T Members and Current Status” Form

Record No.	Priority-Year	User Name	C _{ED} T Lead	Experiment Member	NDAG Member	Methods Member	C _{ED} T Member	Status			
109	1-2008	Hutchinson, Jesson	Hutchinson, Jesson	Hutchinson, Jesson	McKnight, Dick	Hopper, Calvin					CED-3 approved
106	1-2009	Mattingly, John Kelly	Mattingly, John Kelly	Hayes, Dave	McKnight, Dick	Hopper, Calvin	Myers, William L.				CED-2 initiated
110	2-2009	Hutchinson, Jesson	Hutchinson, Jesson	Hutchinson, Jesson	McKnight, Dick	Hopper, Calvin					CED-2 initiated
112	1-2010	Hutchinson, Jesson	Hutchinson, Jesson	Hutchinson, Jesson	McKnight, Dick	Hopper, Calvin					CED-1 initiated
111	2-2010	Hutchinson, Jesson	Hutchinson, Jesson	Hutchinson, Jesson	McKnight, Dick	Hopper, Calvin	Will, Rashelle	Lewis, Jeffrey M			CED-1 initiated
104	1-2011	Heinrichs, David	Heinrichs, David	Hayes, Dave	McKnight, Dick	Hopper, Calvin	Will, Rashelle	Lewis, Jeffrey M			CED-1 initiated
107	2-2011	Saylor, Ellen	Saylor, Ellen	Hayes, Dave	McKnight, Dick	Hopper, Calvin	Will, Rashelle	Lewis, Jeffrey M			CED-1 initiated
105	1-2012	Heinrichs, David	Heinrichs, David	Hayes, Dave	McKnight, Dick	Hopper, Calvin					CED-1 initiated
113		Hutchinson, Jesson	Hutchinson, Jesson	Hutchinson, Jesson							CED-0 approved
114		Hutchinson, Jesson	Hutchinson, Jesson	Hutchinson, Jesson	McKnight, Dick	Hopper, Calvin					CED-4