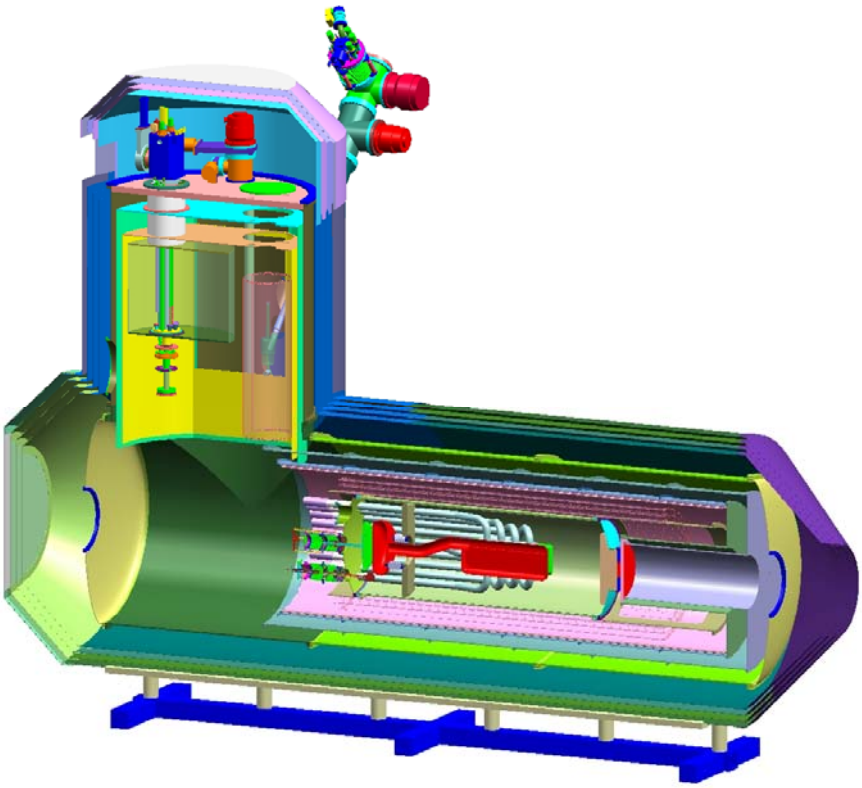
Acquisition Strategy for the Electric Dipole Moment (EDM) of the Neutron Project

(A Multi-Organizational Collaboration)



June 2006

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Lead Program Office: Office of Nuclear Physics, Office of Science
Total Project Cost Range: $15.0 million–$18.3 million

Submitted by Integrated Project Team

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1. Desired Outcome and Requirements Definition

This document lays out the acquisition strategy for the Electric Dipole Moment of the Neutron (EDM) Project at Los Alamos National Laboratory (LANL).

1.1 Approval of CD-0

Critical Decision 0 (CD-0) was approved by Raymond L. Orbach, Director of the DOE Office of Science, on November 11, 2005. There have been no material changes since its approval.

1.2 Summary Project Description and Scope

The mission of the Nuclear Physics program is to foster fundamental research in nuclear physics that will provide new insights; advance our knowledge on the nature of matter and energy; and develop the scientific knowledge, technologies, and trained manpower that are needed to underpin the Department of Energy's missions for nuclear-related national security, energy, and environmental quality. To accomplish this mission, the program supports the research of scientists, the operations of facilities and the development of forefront facilities and technology. These activities are carried out under the mandate provided in Public Law 95-91 that established the Department of Energy, and assigns the Nuclear Physics Program the lead responsibility for federal support of fundamental research in nuclear physics.

The neutron electric dipole moment experiment (EDM) studies the fundamental space-time properties of the neutron, one of the building blocks of the matter that surrounds us. The measurement is done by looking for a very small difference in the precession rate of a neutron placed in magnetic and electric fields when the electric field is oriented either "up" or "down." Precession is a phenomenon by which the axis of a spinning object "wobbles" when a torque is applied to it. The observation of a different precession rate indicates that the neutron has a significant electric dipole moment and, therefore, a Charge Parity (CP)-violating preferred arrangement of the quark charges inside the neutron. CP-violation may explain the matter excess in the universe. The proposed major item of equipment (MIE) in support of this experiment will allow the fundamental space-time properties of the neutron to be studied with two orders of magnitude greater sensitivity than ever before. This level of sensitivity does not exist in current and planned experiments and is necessary in order to measure the different rates of precession to sufficient accuracy to constrain existing theoretical models.

The existence of an EDM constrains a wide variety of theories of nuclear and particle physics. The increased sensitivity will permit researchers to achieve greater precision measurements in order to probe CP violation in the strong interaction at sufficient levels needed to help understand the matter/anti-matter asymmetry of the universe.

A promising experimental approach called the superthermal method of ultra cold neutron (UCN) production would use liquid helium (LHe) in a novel cryogenic technique to obtain an improved sensitivity of two orders of magnitude better than existing experiments. This first exploitation of LHe is to produce very high densities of UCN in an experimental bottle by down scattering cold neutrons from He atoms, resulting in a UCN and a phonon. LHe is a very good dielectric. This property of LHe will permit the experimenters to apply very high electric fields to the measurement volume. The cryogenic temperatures will allow for long storage, and, thereby, measuring times of the UCN. These three factors will enable the great improvement in sensitivity. This is currently the only experimental approach being proposed in the U.S.

1.3 Performance Parameters Required to Obtain Desired Outcome

The components of the EDM detector will pass all applicable quality checks, including measured sensitivities to systematic errors. The installation of the EDM detector in the Fundamental Neutron Physics Beamline (FNPB) at the Spallation Neutron Source facility will be carried out on-project. No construction of any new buildings or facilities is necessary. In order to meet its physics goals, EDM must accumulate and identify high-statistics samples of polarized neutron captures on polarize ^{3}He nuclei. This data requires a sophisticated cryogenic system, highly-uniform magnetic fields, and ^{3}He handling systems. System testing, to be carried out

at North Carolina State University, will ensure the detector's response is capable of meeting these goals. Furthermore, the goal of isolating the dipole moment of the neutron requires scheduling cooperation between the EDM project, the FNPB project, and the SNS as well as a generous allotment of beam time at the FNPB.

2. Cost and Schedule Range

2.1 Total Project Cost Range

The EDM project is a Major Item of Equipment (MIE). The EDM Project has not yet been baselined, but the pre-baseline total estimated cost (TEC) for EDM is expected to be in the range $15.0 million to $18.3 million in FY 2006 dollars.

The life-cycle costs of the EDM Project include installation, operations, maintenance and disposal of the detector. The project life-cycle cost reflecting the TPC for design and construction, operation for the 5-year design life, and eventual decommissioning is estimated to be $20.8 Million.

Since the detector will not be located in an area where radio activation of its components is a concern, no serious waste disposal issues are anticipated. It is possible that recycling of some materials, e.g., steel, may partially offset the decommissioning costs.

2.2 Funding Profile

The baseline funding profile for EDM has not yet been established. Figure 2-1 shows a preliminary estimate in thousands of Then-Year dollars.

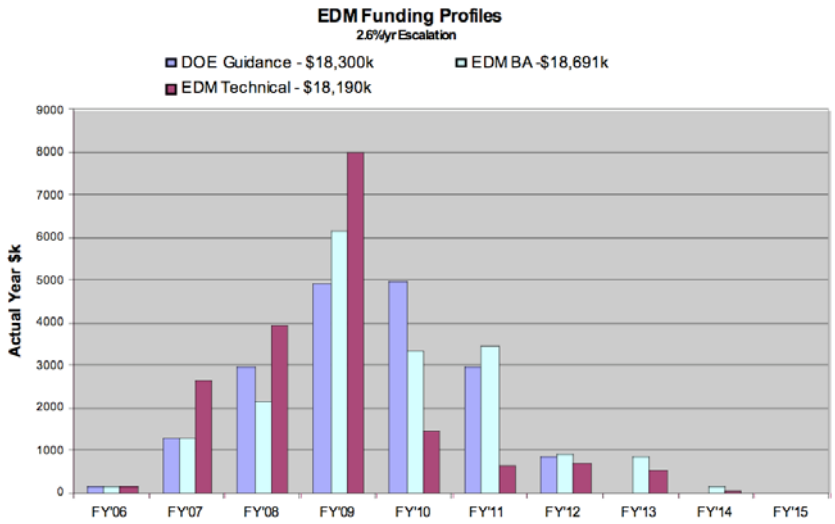

Figure 2-1. Preliminary funding estimate for the EDM project.

Table 2-1. Proposed Annual Budget Authority for the EDM Project

	Prior Years	FY2006	FY2007	FY2008	Out Years	Total
TEC (Design/LLP)	$0K	$0K	$496K	$535K	$234K	$1265K
TEC(Construction)	$0K	$30K	$1872K	$3426K	$11,146K	$16,474K
OPC Other than D&D	$0K	$150K	$295K	$0K	$69K	$4514K
Offsetting D&D Costs	$0K	$0K	$0K	$0K	$0K	$0K
Total, Project Costs	**$0K**	**$180K**	**$2663K**	**$3961K**	**$11,449K**	**$18,253K**

Other costs incurred after CD-0 are costs that would be categorized as Other Project Costs (OPC). The Total Estimated Cost (TEC) + the OPC are combined to give the Total Project Cost (TPC) to the DOE.

2.3 Key Milestones and Events

Table 2-2 shows the tentative dates of the Critical Decisions.

Table 2-2. Preliminary Level 1 Milestone Schedule

Major Milestone Events		Preliminary Schedule (CD-0)	Forecast Schedule (CD-1 Basis)
0-1.	CD-0 (Approve Mission Need)	Qtr 1, 2006	Qtr 1, 2006
0-1b.	CD-1 (Approve Alt. Selection and Cost Range)	Qtr 1, 2007	Qtr 1, 2007
0-2a.	CD-2a (Approve Long-lead Procurement Budget)	Qtr 3, 2007	Qtr 3, 2007
0-2b.	CD-2b (Approve Performance Baseline)	Qtr 3, 2008	Qtr 3, 2008
0-3a.	CD-3a (Approve Start of Long-lead Procurement)	Qtr 3, 2007	Qtr 3, 2007
0-3b.	CD-3b (Approve Start of Construction)	Qtr 1, 2009	Qtr 1, 2009
0-4.	CD-4 (Approve Start of Operations)	Qtr 2, 2012	Qtr 1, 2014

Table 2-3 shows recommended key Level 2 (L2) and Level 3 (L3) milestones for the EDM Project.

Table 2-3. Recommended Level 2 and Level 3 Milestones

Milestone Level	Date	Description	WBS
3	16-May-07	Helium liquefier ordered	1.3
2	24-Dec-07	R&D finished	1.1
3	15-Jul-08	Second DR tested	1.3
3	20-Sep-08	Cryogenic vessel ordered	1.3
3	3-Dec-08	Conventional shield delivered	1.5
3	19-Feb-09	Guide contract awarded	1.2
3	5-Mar-09	^{4}He purifier and valves ready for testing	1.4
3	10-Jun-09	Measurement cells ready for installation	1.6
3	12-Jan-10	B-shields commissioned	1.5
3	18-Jan-10	^{3}He collections system tested	1.4
3	9-Feb-10	HV ready for installation	1.6
2	21-Mar-10	Coil package ready to ship	1.5
2	22-Mar-10	Cryogenics system tested	1.3
2	5-May-10	Beam line ready for neutrons	1.2
2	14-Jun-10	^{3}He full system test passed	1.4

Table 2-3. Recommended Level 2 and Level 3 Milestones

Milestone Level	Date	Description	WBS
2	29-Jul-10	Central detector full system test passed	1.6
3	23-Sep-10	Coil package commissioned	1.9
3	3-Jun-11	Insert commissioned	1.9
3	9-Jun-12	^{3}He system commissioned	1.9
1	10-Feb-13	Begin commissioning experiment	1.0
1	13-Jan-14	End of project	1.0

3. Major Applicable Conditions

3.1 Environmental, Regulatory and Political Sensitivities

No significant environmental, regulatory or political sensitivities are affected by this project. All work done at ORNL will be in compliance with Federal, state, and local regulations. Environmental protection will be integrated in all aspects of work performed at ORNL in accordance with ORNL's DOE-approved Environmental Management System, which is part of the Laboratory's Integrated ES&H Management Plan. In compliance with the National Environmental Policy Act (NEPA), the EDM Project will submit an Environmental Evaluation Notification Form, through the ORNL channels.

All work done at collaborating universities will be performed in accordance with existing university policies and applicable national, state, or local regulations.

3.2 Others

To determine the assembly location, two scenarios were examined initially with the final realization that the project would be both less costly and require a shorter amount of time if a significant fraction of the integration occurred at NC State/TUNL. The two scenarios considered were assembly and commissioning at ORNL using current personnel and likewise at NC State/TUNL. Given that the operations resources at ORNL are not presently available, the decision to perform the integration at NC State/TUNL has been made. Additional details regarding this analysis are provided in the Conceptual Design Report.

In addition, due to the proximity of the EDM experiment at ORNL to the Fundamental Neutron Physics Beam (FNPB), the installation of the EDM detector must be coordinated with Spallation Neutron Source (SNS) operations group and possibly with the SNS accelerator schedule as well.

4. Risk and Alternatives (Technical, Location, & Acquisition Approach)

The alternatives to the EDM Project are primarily in the technical approach to the physics goals to be addressed. That these goals should be addressed, as opposed to a "no action" alternative, is strongly suggested by the growing emphasis on neutron physics in the U. S. and world-wide neutron physics programs. Since it is the high neutron flux of the SNS beam at ORNL that makes possible the high-statistics studies that EDM proposes, there is no realistic alternative for the location. Given that the experiment will take place at ORNL but be led by Los Alamos with University participation, the most efficient acquisition approach is to rely on Los Alamos National Security, LLC, the operating contractor of LANL, to act as the prime contractor for the EDM Project.

4.1 Cost and Schedule Range

To the extent feasible, procurements will be accomplished by fixed-price contracts awarded on the basis of competitive bids. Detailed cost estimates of the major procurements for the EDM Project have been made from vendor quotes and experience from earlier, similar procurements. These include cost estimates of the conventional magnetic shielding, the He liquifier, a second dilution refrigerator, and the outer cryogenic vessel. The remaining cost risk of these items lies in fluctuations in market price (nickel), fluctuations in the dollar, the potential impact of rising fuel costs on shipping, and the overall strength of the economy.

There is some risk to the EDM schedule from the planned number of cool-downs needed to de-bug the cryogenic systems. Additional cool downs needed may add 6-8 weeks each to the schedule. The Assembly and Commissioning Subsystem manager is factoring this possibility into the schedule, and project management will be negotiating with laboratory and university management to ensure that adequate manpower is available for essential tasks and that sufficient contingency is available.

4.2 Funding Range and Budget Management

Funding for the project comes primarily from the Department of Energy through the Nuclear Physics program. The possibility of additional funding through the National Science Foundation is being explored. The budgets for work done at collaborating institutions will controlled through Memoranda of Understanding (MOU), university contracts and annual funding packages.

At this time the Integrated Project Team (IPT) assumes that all funding will come from DOE. Contributions from other sources, such as NSF, may be identified by the time of CD-2. The currently envisioned scale for non-DOE contributions could be about 30% of the MIE, in addition to off-project R&D contributions.

4.3 Technology and Engineering

The EDM Project will employ well-established technologies in several subsystems (see Conceptual Design Report) that have been used in other experiments in the past. In addition, an aggressive R&D program is planned for other high-risk technical areas of the project to further minimize design risk. Furthermore, many of the EDM collaborators are experienced in the design, assembly and installation of detector systems using new technologies. Hence the technology and engineering risks for EDM are moderate. The technical alternatives considered include:

1. Placement of the PMTs inside the cryostat at 4 K or outside at room temperature;
2. Use of laser fluorescence to supplement ordinary light collection;
3. Pressurization of the liquid helium to increase the HV attainable;
4. alternate designs for controlling superfluid-helium film flow;
5. the heat flush method of ^{4}He purification if the evaporative method fails; and
6. a variety of valve designs to meet the varying needs and high reliability required by the project.

The extant technological risks are:

- Optimizing the detector's sensitivity for the EDM Project's scientific goals;
- The ^{3}He relaxation time
- The neutron storage time
- The light collection efficiency
- Valve reliability
- Magnetic field uniformity
- High voltage attainable at 0.5K

Technological risks are minimized by the preparation and review of subsystem specifications and the implementation of Quality Assurance provisions and design reviews.

4.4 Interfaces and Integration Requirements

A large fraction of the work on the EDM Project is being done at universities. MOUs between LANL and the universities are the primary tools for coordinating and integrating this work. Subsystem and integration reviews are performed by project management to define the interfaces between and within subsystems and to ensure that they are smoothly integrated into the final product. Schedule integration, especially as it concerns cryogenic system cool-downs, is an important element of the EDM commissioning schedule. EDM project management will work with NCSU and ORNL management to ensure that the schedule impact is minimized.

Additional integration methods within the project include the monthly report issued by the EDM Project Manager, regular meetings, approximately bi-weekly, of the Level 2 managers with members of the project office and regular EDM Collaboration Meetings, approximately quarterly. The monthly report will be submitted to the Federal Project Director (FPD).

The FPD will provide quarterly reports on the EDM Project to the Office of Nuclear Physics. Monitoring of the EDM Project will occur through established mechanisms among project participants. The FPD will submit monthly entries to PARS.

4.5 Safeguards and Security

Safeguards and security will be covered under LANL's and ORNL's existing DOE-approved programs. The EDM Project will create no new security issues during design, fabrication, or final installation. No laboratory safeguards and security requirements will need to be changed for installation or operations subsequent to project completion. Access to ORNL is controlled to ensure worker and public safety and property protection. None of the work on the EDM Project is classified. The risk of safeguards and security issues is, therefore, small.

4.6 Location and Site Conditions

The site selection for EDM is driven by the availability of an intense neutron beam, due to the requirements of the detector. The FNPB beam at SNS will provide the most intense neutron beam in the world at present; there is no alternative in the United States.

Since the completed EDM detector will be placed in the FNPB beamline, ORNL is the only viable site for the bulk of the installation work on the project. However, the primary location for fabricating and testing the components of the EDM detector will be at NCSU, where the cryogenic systems will be commissioned. There is an existing structure with the necessary infrastructure and technical staff support to carry out the project.

Certain subsystems will be fabricated and tested at universities belonging to the EDM Collaboration. In these cases, LANL prepares a Memorandum of Understanding with the institution to minimize risk both to the project and to the university. The Memorandum of Understanding specifies precisely what resources are required of each party, the schedule for the subsystem production and what the deliverables are to be.

4.7 Legal and Regulatory

No legal or regulatory problems are foreseen, and LANL has historically completed similar contracts and projects with minimal exposure to claims. The project will be in full compliance with all applicable federal, state, and local requirements. There are no known legal or regulatory issues that could impact the project. The risk of legal and regulatory issues is, therefore, considered small.

4.8 Environmental, Safety and Health

The ES&H impact of the EDM Project is expected to be minimal. As stated in section 0, documentation will be submitted in accordance with NEPA and a Categorical Exclusion will be requested for the project. The work to be conducted at the ORNL site will be covered under ORNL's DOE-approved Integrated Safety Management Program. In addition, a Safety Assessment Document specific to EDM will be produced prior to sustained operations. The risk of environmental, safety, and health issues is, therefore, considered small.

4.9 Stakeholder Issues

There are no stakeholder issues anticipated for the EDM Project. EDM will have no significant impact on the local community. The principal stakeholders in the project are the members of the EDM collaboration and LANL and ORNL. Work done on the EDM Project at collaborating institutions will be done in accordance with the guidelines established by those institutions, as well as any applicable local, state, or federal regulations. Hence, the risk of any stakeholder issues from this quarter is very small. The EDM Collaboration will submit an impact statement to ORNL, estimating the impact and cost of the project on the laboratory. Upon Project completion, the EDM Collaboration will prepare a Memorandum of Understanding with the ORNL to address the installation and operation of the detector.

The SNS is also a stakeholder, insofar as the EDM detector will provide beam to the FNPB where EDM will be housed. The two laboratories are preparing an MOU which will establish protocols to encourage cooperation between the two projects and minimize the potential for interference with FNPB operations due to EDM. Hence, no serious stakeholder issues with the SNS collaboration are anticipated. Any issues that do arise will be resolved by the LANL Director or his designee.

5. Business and Acquisition Approach

As discussed in the acquisition alternatives of Section 0, there is no realistic site alternative to ORNL, nor lead Laboratory option to LANL. LANS, LLC will serve as the prime contractor, due to its recent award by DOE/NNSA to manage Los Alamos National Laboratory. LANS is also able to provide technical support and advice, shops, local ES&H oversight and laboratory facilities. Thus, LANS will have primary responsibility for oversight of all contracts required to execute this project. LANS will pursue a strategy that mixes the purchase of components from vendors with assembly at NCSU and placing contracts with university groups to fabricate some of the detector subsystems. This model brings additional technical expertise to the project and possible cost savings. Universities will be selected based on the detector development experience, commitment to the physics goals of the project, and cost of the contract.

The following is a list of major procurements for EDM, with the institution responsible for procurement:

- Conventional magnetic shield – Caltech
- Dilution refrigerator – NCSU
- He liquefier – NCSU
- Outer cryogenic vessel – NCSU

5.1 Acquisition and Contract Types

The EDM Project requires the procurement of a wide variety of components. The IPT has reviewed and evaluated the feasible acquisition alternatives, taking into account LANL's extensive in-house capabilities and the capabilities of the participating institutions. LANL procurement will use competitive bidding for fixed-price contracts, soliciting Requests for Information and Requests for Quotes via the Federal Business Opportunities website.

Several components and materials will be provided by universities. The scope and procedures will be described in MOUs and SOWs developed by the project and funding will be provided incrementally on a yearly basis. In general, the MOU allows a university the option of procuring materials through LANL or through the university procurement procedures. Ultimate technical, schedule, and cost will be controlled by the project team. Labor will come from both university and LANL staffs.

5.2 Competition

All of the TPC will be managed by LANL. The LANL contracting officer makes the final decision on the justification of sole source procurements for LANL contracts. All major actions will be competitive and fixed price procurements unless specifically authorized by the Project Manager. They will be in accordance with the DOE-approved LANL procurement policies and procedures. Contract incentives are not planned, but may be used if project management believes they are essential to keep the project on schedule. Incentives, if used, will

include specific performance measures to assure that the desired outcome is achieved. LANL's new contract with the DOE is a performance-based contract with fee-bearing measures related to project performance.

6. Management Structure and Approach

6.1 Identify IPT, Organization Structure and Staffing Skills

The highlighted members of the Integrated Project Team (IPT) participated in the preparation of the Acquisition Plan:

Table 6-1. EDM Integrated Project Team

Functional Area	Name	Location/Organization
Federal Project Director	Eugene Colton	Los Alamos/LASO
Deputy FPD	John Gallegos	Los Alamos/LASO
Program Manager	Jehanne Simon-Gillo	Germantown/SC
Science Program Manager	Gene Henry	Germantown/SC
Industrial Safety & Health	John Pearson	Oak Ridge/ORO
Contract/Acquisition Support	Caroline Crooks	Los Alamos/LASO
NEPA Support	Mark Belvin	Oak Ridge/ORO
Quality Assurance	Dave Rosine	Oak Ridge/ORO
Fire Protection	Patrick Smith	Oak Ridge/ORO
Site Representative	David Arakawa	Oak Ridge/ORO
LANL Contract Project Manager	Martin Cooper *	Los Alamos/P-25
LANL Chief Engineer	Jan Boissevain	Los Alamos/P-25
LANL ESSH Lead	P-25 Safety Officer	Los Alamos/P-25
Technical Coordinator	Paul Huffman	Los Alamos/P-25
ORNL Operations Manager	Vince Cianciolo	Oak Ridge/ORNL
FNPB Scientific Director	Geoff Greene	Oak Ridge/ORNL

* Served as primary author of the Acquisition Strategy.

As the EDM Project progresses, membership of the IPT may change to fit the project's needs.

6.2 Approach to Performance Evaluation and Validation

The performance management system is defined in the Preliminary Project Execution Plan (PPEP), in compliance with DOE O 413.3. The PEP also contains the Work Breakdown Structure to Level 2. A resource-loaded schedule is under development.

The Change Control process is documented in the PPEP. The project baselines and control levels are defined in a hierarchical manner that provides change control authority at the appropriate level. The highest level of baseline change control authority is defined as level 1. Changes are approved as follows:

Table 6-2. Acquisition Executive Controls

Baseline (Level 1)	Change Threshold
Site: Oak Ridge National Laboratory Oak Ridge, Tennessee	Site change requiring a supplemental EA/EIS
Neutron EDM experimental apparatus achieving the baseline performance criteria approved at CD-2b.	Changes impacting level 0 scope
Critical Decision 0 (CD-0) Critical Decision 1 (CD-1) EA Record of Decision Critical Decision 2 Critical Decision 2a (CD-2a) Critical Decision 2b (CD-2b) Critical Decision 3 Critical Decision 3a (CD-3a) Critical Decision 3b (CD-3b) Critical Decision 4	Changes ≥6 months
Total Project Cost $15.0-18.3 Million	Changes to the TPC

The EDM Federal Project Director will update the project status in PARS monthly and provide quarterly reports on the EDM Project to HQ. Monitoring of the EDM Project will occur through established mechanisms among project participants. LANL will provide formal monthly reports to the EDM Federal Project Director. The requirements of the monthly reports are included in the EDM Project Controls Manual.

6.3 Interdependencies and Interfaces

The EDM Project will involve interfaces between LANL, other national laboratories, U.S. universities, and industry in the procurement and installation of the detector elements.

LANL will use an ORNL operations manager assigned to the project to act as an interface between the project and ORNL laboratory operations and services. Sponsorship and support will be provided by the Project Manager, the affected division heads, and the lab director or deputy director. The purpose of the Operations Manager is to provide oversight for and enable efficient execution of the EDM Project by fostering appropriate communication between the elements of the ORNL organization, EDM project management, and the DOE.

Coordination between the project and the collaborating institutions is the responsibility of EDM Project Manager. It is achieved through the use of purchase orders, MOUs and Statements of Work (SOW). MOUs are approved by the LANL Director or his designee, the LANL EDM Project Manager and authorized financial officers and EDM collaborators from the collaborating institution.

Appendix A

Advanced Procurement Plans

Eugene Colton Date
LASO, Federal Project Director

Advance Procurement Plan Checklist

Project/Procurement REQ # _____

Description _____

Contents

Applicable (x)	Nonapplicable (x)	Item
____	____	1. Item or System Description
____	____	2. Responsible Organization Identification
____	____	3. Estimated Cost
____	____	4. Delivery Requirements
____	____	5. Proposed Sources
____	____	6. Selection Criteria
____	____	7. Award Criteria
____	____	8. Contract Type
____	____	9. Other Considerations
____	____	10. Quality/Safety Requirements
____	____	11. Milestone Chart
____	____	12. Milestones for Updating
____	____	13. DOE Approval
____	____	14. Members of Planning Team

Approved:		Signature	Date
Required Approvals (x)	(x)	_____ Procurement Rep	_____
	(x)	_____ Technical Rep	_____
	(x)	_____ LANL Project Administrator	_____
	>$50 K (x)	_____ Subsystem Manager	_____
	>$100 K (x)	_____ EDM Project Leader	_____

Business Sensitive: **Project Internal Use Only**

1. Item Description

2. Responsible Organization Identification

3. Estimated Cost

Quantity _____ Unit Price _____ Total _____

4. Delivery Requirement Date

   4a. Location

5. Proposed Sources

6. Selection Criteria

7. Award Criteria

8. Contract Type

9. Other Considerations
   - Quality and Safety Requirements
   - Milestone Schedule and Chart
   - Milestones for Updating Plan
   - DOE Approval
   - Members of the Planning Team
     - Technical Representative:
     - Procurement Specialist:
     - EDM Project Administrator:

Advance Procurement Plan Guideline Milestones >$50K

Milestones	Dates (Inclusive)		Revision	Revision
1. Approval of Advance Procurement Plan		TBD		
2. Preparation of Procurement Package				
Contract Request				
Statement of Work				
Specifications				
Data Requirements				
Other _____				
Sole-Source Justification				
Evaluation Criteria				
3. Preparation for RFP/RFQ				
Contract Specification				
Terms & Conditions				
Special Clauses				
Bid List				
4. Issuance of Solicitation				
5. Opening/Closing Date of Solicitation				
6. Due Date of Audit/Field Price Analysis				
7. Evaluation of Proposals, Audits &				
Field Reports (if applicable)				
(Req. EEO Compl. Review, if required)				
8. Prenegotiation Briefing				
9. Beginning & Completion of Negotiations				
10. Contract Preparation				
11. Pre-Award Survey				
12. Contract Award				
13. Execution by Contractor				
14. Contract Distribution				
15. First Delivery				