Kinney, Penelope

From: Owens, Laura [laowens@sandia.gov]
Sent: Monday, June 15, 2009 1:54 PM
To: Kinney, Penelope
Cc: Ammerman, Douglas J; Miller, David R
Subject: Re: RFP for JCN J5546 Spent Fuel Transport Risk Assessment (SFTRA)
Attachments: J5546-03-External-Submit-to-NRC.pdf

Penelope,

Attached is the completed 189 package in response to the Request for Proposal dated May 15, 2009 for the Spent Fuel Transport Risk Assessment (SFTRA), JCN J5546.

Laura Owens, 10667
NRC Contract and Budget Administrator
6700 Nuclear Technology Business Support
(505) 844-2784 - voice
(505) 844-0955 - fax
Mail Stop 0736
Sandia National Laboratories
P.O. Box 5800
Albuquerque, New Mexico 87185-0736

G-8

Sandia National Laboratories
Operated for the U.S. Department of Energy by
Sandia Corporation

Marianne C. Walck
Senior Manager, Nuclear Energy Safety Technologies Group
Nuclear Energy and Global Security Technologies Center

P.O. Box 5800
Albuquerque, NM 87185-0718

Phone: (505) 844-0121
Fax: (505) 844-0951
Internet: mcwalck@sandia.gov

JUN 15 2009

Mark J. Flynn, Director
Program Planning, Budgeting
and Program Analysis Staff
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Flynn:

Re: Request for Proposal for J5546, "Spent Fuel Transport Risk Assessment (SFTRA)", dated May 15, 2009

Enclosed is the above-referenced Sandia National Laboratories (SNL) Work for Others Proposal. We are submitting this proposal to you in parallel with submission to the Department of Energy/National Nuclear Security Administration (DOE/NNSA). This proposal is contingent upon your acceptance and written in response to the above-mentioned NRC document. Please send future funding documents/proposal requests following the enclosed Procedural Change notice.

Congress has mandated that DOE inform other Federal agencies sponsoring work at DOE laboratories of the amount of their funding that is used for Laboratory Directed Research and Development (LDRD). This is simply a reporting requirement and does not represent a new charge. Consistent with the Department of Energy's (DOE) full cost recovery policy, DOE collects, as part of its standard indirect rate, an LDRD cost levied on all monies received at SNL. The estimated amount of LDRD costs is identified in the last line of the NRC Form 189, Part I. DOE believes that LDRD efforts provide opportunities in research that are instrumental in maintaining cutting edge science capabilities that benefit all of the customers at SNL. The Department will conclude that by approving and providing funds to DOE to perform work under this proposal, you acknowledge that such activities are beneficial to your organization and consistent with appropriation acts that provide funds to you.

The Department of Energy will be accepting the funding document. For any questions in reference to the funding document, please contact Delores Lineback, DOE/NNSA/SSO, at (505) 845-6055. To assist you in working with the DOE, we have enclosed their administrative instructions for submission of interagency agreements (funding document) to DOE/NNSA for reimbursable work. Your funding document and supporting documentation should include information required by the DOE as delineated in these instructions. Technical questions regarding this proposal should be addressed to Doug Ammerman, SNL, (505) 845-8158.

Sincerely,

Marianne C. Walck

Copy to:
USNRC John Cook
USNRC Penelope Kinney

NRC FORM 189 (Part 1)
(6-1998)
NRCMD 11.7

U.S. NUCLEAR REGULATORY COMMISSION

DOE LABORATORY PROJECT AND COST PROPOSAL FOR NRC WORK

DATE PROPOSAL REC'D: JUN 15 2009

	New	FY 2009
X	Revision	Number 3

Project Title: Transportation Safety and Risk Assessment	Job Code: J5546
NRC Office: Nuclear Material Safety and Safeguards	NRC B&R Number: 95015366270
DOE Contractor: Sandia National Laboratories	NRC BOC Code: 253D
Site: Albuquerque, New Mexico	Contractor Account No.: DE-AC04-94AL85000

Cognizant Personnel	Organization	Phone No.	
NRC Project Manager: John Cook	NMSS	(301) 492-3318	DOE B&R No.: 401001050
Other NRC Technical Staff: Penelope Kinney	NMSS	(301) 492-3248	
DOE Project Manager: Dolores Lineback	DOE/NNSA/SSO	(505) 845-6055	Project Start Date: 6/30/2005
Laboratory - Project Manager: M.C. Walck/D.R. Miller	06760/06765	(505) 844-0121 (505) 284-2574	Project End Date: 11/30/2011
Principal Investigator(s): D. J. Ammerman	6765	(505) 845-8158	
Key Personnel: D. J. Ammerman	6765	(505) 845-8158	

STAFF YEARS OF EFFORT (Round to nearest tenth)	FY2009	FY2010	FY2011	FY2012	TOTAL
Direct Scientific/Technical	0.97	0.52	0.34	0.00	1.82
Other Direct (Graded)	0.0	0.0	0.0	0.0	0.0
Total Direct Staff Years	0.97	0.52	0.34	0.00	1.82
COST PROPOSAL (round to nearest thousand $)					
Direct Labor - Labor categories, labor rates and proposed hours of effort for each category	141.9	79.8	55.6	0.0	277.3
Overhead	34.0	19.2	13.3	0.0	66.5
Materials/Services	0.0	0.0	0.0	0.0	0.0
Travel Expenses - Foreign	0.0	0.0	0.0	0.0	0.0
Travel Expenses - Domestic	1.3	1.3	1.3	0.0	3.9
Subcontract(s)	0.0	0.0	0.0	0.0	0.0
Other Direct	0.0	0.0	0.0	0.0	0.0
G&A	98.2	56.0	38.5	0.0	192.7
TOTAL ESTIMATED LABORATORY PROJECT COST	275.4	156.3	108.7	0.0	540.4
DOE Federal Administrative Charge (FAC) 3% FY03+	8.3	4.7	3.3	0.0	16.3
Total DOE Project Cost	283.7	161.0	112.0	0.0	556.7
Carryover Funding from Prior FY (Includes DOE Adder)	-221.7	-91.0	-75.0	0.0	-387.7
Carryover Funding to Next FY (Includes DOE Adder)	91.0	75.0	0.0	0.0	166.0
Total Funding Required	153.0	145.0	37.0	0.0	335.0

LDRD (For Information Purposes Only)	22.0	12.3	8.6	0.0	43.0

NRC FORM 189 (Part 2)
(6-1998)
NRCMD 11.7

U.S. NUCLEAR REGULATORY COMMISSION

DOE LABORATORY PROJECT AND COST PROPOSAL FOR NRC WORK

JOB CODE: J5546

DATE: JUN 15 2009

FOR PROJECTS, EXCLUDING TASK ORDERS AND TASK ORDER AGREEMENTS

PROJECT TITLE

Transportation Safety and Risk Assessment

DOE PROPOSING ORGANIZATION

Sandia National Laboratories

ESTIMATED COST

TASK 1	TASK 2	TASK 3	TASK 4
TOTAL ESTIMATED COST FY05-FY08: $1,008.9K FY09: $298.0K FY10: $161.0K FY11: $112.0K	TOTAL ESTIMATED COST FY05-FY08: $230.1K FY09: $0 FY10: $0	TOTAL ESTIMATED COST	TOTAL ESTIMATED COST
TASK 5	**TASK 6**	**TASK 7**	**TASK 8**
TOTAL ESTIMATED COST	TOTAL ESTIMATED COST	TOTAL ESTIMATED COST	TOTAL ESTIMATED COST
TASK 9	**TASK 10**	**TASK 11**	**TASK 12**
TOTAL ESTIMATED COST	TOTAL ESTIMATED COST	TOTAL ESTIMATED COST	TOTAL ESTIMATED COST
TASK 13	**TASK 14**	**TASK 15**	**TASK 16**
TOTAL ESTIMATED COST	TOTAL ESTIMATED COST	TOTAL ESTIMATED COST	TOTAL ESTIMATED COST

PROJECT DESCRIPTION

Provide narrative description of the following topics in the order listed. Attach on plain paper to this NRC Form 189. If an item is not applicable, so stat

1. OBJECTIVES OF PROPOSED WORK
2. SUMMARY OF PRIOR EFFORTS
3. WORK TO BE PERFORMED AND EXPECTED RESULTS
4. PROPOSED PERSONNEL - INCLUDE RESUMES
5. MEETINGS/TRAVEL
6. NRC FURNISHED MATERIALS
7. RELATIONSHIP TO OTHER PROJECTS
8. REPORTING REQUIREMENTS AND SCHEDULE
9. SUBCONTRACTOR/CONSULTANT INFORMATION
10. SPECIAL FACILITIES, IF REQUIRED
11. CONFLICT-OF-INTEREST INFORMATION
12. CLASSICATION OR SENSITIVITY, IF APPLICABLE (e.g. safeguards, proprietary, other)
13. ADDENDUM COST AND SCHEDULE INFORMATION
14. SPENDING PLAN

SEE NRC MANAGEMENT DIRECTIVE 11.7 FOR ADDITIONAL INFORMATION

SIGNATURE - APPROVAL AUTHORITY	DATE
David R. Fuller 6765	6/15/09
SIGNATURE - APPROVAL AUTHORITY	DATE
Marianne C. Walck 6760	6/15/09

TRANSPORTATION SAFETY AND RISK ASSESSMENT
Statement of Work

1. OBJECTIVES OF PROPOSED WORK

a. Background

Spent Fuel Transport Risk Assessment (SFTRA)

The U.S. Nuclear Regulatory Commission (NRC) provided spent fuel transport impact study results in the reports entitled: (1) "Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes," NUREG-0170, December 1977; (2) "Shipping Container Response to Severe Highway and Railway Accident Conditions," NUREG/CR-4829, February 1987; and (3) "Reexamination of Spent Fuel Shipment Risks," NUREG/CR-6672, March 2000. The studies demonstrated that spent fuel shipment risks were low, but several technical factors that required further evaluation and analyses to refine and to update spent fuel shipment risk estimates were identified by NRC staff. Since 2005, Sandia National Laboratories (SNL) has assisted the NRC with analyzing spent fuel transport risk estimates and documenting findings in a NUREG report. Since the analyses of the estimates is more complex than initially anticipated, continued assistance from SNL is required to complete the NUREG document that summarizes spent fuel transportation safety (including estimated spent fuel transportation impacts using the best available technology), and that has undergone both public and peer review and comment.

This revised "Statement of Work" (SOW) reflects the current estimated level of effort and schedule required to complete this project. Task 1 and 2 under Section 5, "Work to be Performed"; Section 6, "Schedule and Deliverables"; Section 7, "Period of Performance"; and Section 8, "Level of Effort," have been revised accordingly.

Transportation Safety Visualizations

The Division of Spent Fuel Storage and Transportation (SFST) in the Office of Nuclear Material Safety and Safeguards (NMSS) frequently engages in outreach activities in meetings with state, local and Tribal officials in order to explain NRC's safety role in the transport of radioactive material, especially with regard to spent fuel transport. Often, these meetings include presentaions by individuals that focus on highlighting transport routine and accident consequences, without providing the balancing perspective of the probabilities of those consequences. It then falls to NRC representatives to reassure the public regarding the adequacy of NRC's transportion safety regulations to provide protection of public health and safety. NRC has produced many technical studies that establish the adequacy of its regulations. However, these studies are based on engineering and probabilistic risk evaluations that can be difficult to convey to the public. The visualizations are intended to facilitate safety communication without overly complicated discussions.

b. Objectives

A. Perform an updated SFTRA, including modeling of spent fuel canisters and package impact limiters, prepare a draft final NUREG, and support the related public comment, peer review, and publication processes.

B. Provide technical support in the preparation of materials, including animations and graphics, to better inform the public on the level of safety provided by NRC's transportation safety regulations.

C. Enhance public acceptance of spent fuel transportation risk estimates. Enhance staff understanding of code parameters. Perform analysis in fuel and material behavior and properties. Provide other technical support as assigned.

c. Purpose

The purpose of this agreement is to obtain an updated spent fuel shipment risk assessment and explanatory materials that will enhance NRC's outreach efforts (see background).

2. SUMMARY OF PRIOR EFFORTS:

The work in this project builds upon expertise and analyses conducted on prior NRC and DOE projects. Specifically, the activities in Task 1 will directly follow from the analyses performed for NUREG/CR-6672 and the experience in performing past generic Environmental Impact Statements (EISs), such as NUREG-0170, and analyses performed to support the development of the draft test protocols for the Package Performance Study (NUREG-1768). Also, canister analyses performed in support of the NRC spent fuel transportation and storage cask vulnerability assessment and the Private Fuel Storage licensing confirmatory analyses will be used as a starting point for evaluating the effect of a canister on cask release rates. The analyses performed for the Package Performance Study included both a spent fuel canister and a detailed model of the impact limiters for the HI-STAR 100 cask.

Task 2 activities will utilize work conducted for DOE/EM-NTP that developed the SafeRAM website, http://www.sandia.gov/tp/SAFE_RAM/RAMHOME1.HTM. This site contains many examples of analyses, tests, and explanations intended to inform the public about the safety of radioactive material transportation. In addition, analyses performed for DOE/RW-Office of National Transportation, such as impact by a locomotive, impact by a falling viaduct, and impact into soil and rock will be used. Past work for the NRC that will provide information used in Task 2 include the analyses performed for NUREG/CR-6672, which examined the response of spent fuel casks to extra-regulatory impacts and fires and analyses for initial development of the Package Performance Study test protocols (NUREG-1768), which examined the response of two real casks to extra-regulatory impacts.

3. WORK TO BE PERFORMED

Work requirements are delineated under the tasks below. Since specific needs in terms of these subject areas cannot be completely forecast in advance, this agreement will be modified to include additional tasks and to revise work requirements whenever other work is required under the tasks identified below. A proposal will be requested for any revisions to the updated work .

Task 1. Spent Fuel Transport Risk Assessment

SNL will conduct a SFTRA updates the spent fuel transportation risk estimates in NUREG/CR-6672. This will be a generic risk assessment, not a facility-specific assessment, although specific package designs and routes may be employed in the analysis. To the maximum extent practicable, SNL will use cask design models already developed by the NRC for structural and

thermal analyses. These models will be specified by the TPM, and include, for example, the truck and rail cask models developed for the NRC by the Pacific Northwest National Laboratory. The assessment will be informed by results of relevant security assessments, but will not evaluate security-related scenarios or impacts. This assessment will be performed primarily by using computer analysis (although small-scale or bench testing might be included at the direction of the SFST TPM). This will be a useful tool in out-reach efforts on communicating transport risks, and will complement the work done on the Baltimore and Caldecott tunnel fires.

The SFTRA task will include the following subtasks:

Subtask 1a. SNL will provide support, as needed, for publication of the revised transportation risk assessment as a NUREG document. SNL will prepare and provide to the NRC, the revised SFTRA, as a draft NUREG in the appropriate format for (sequential) public comment and peer review.

Considering the end use of the document by the public, the clarity of explanation of the method used and results obtained, accessibility to the underlying assumptions and data, and overall readability of the NUREG are paramount objectives of this effort. SNL will carefully plan and structure the document to meet the challenge of achieving these objectives. The NUREG report will be the primary focus of the entire task, and SNL management and staff will focus its efforts from the outset on the utility and quality aspects of the NUREG report.

SNL will prepare responses to comments and reviews, and revise the draft NUREG in consultation with the Division of Spent Fuel Storage (SFST) TPM. With respect to explaining the relationships between the various components of the risk assessment to the public, SNL will consider and advise the SFST TPM on the utility of a hyperlinked version of the document, to be web- published at the draft NUREG/public comment stage. SNL will subsequently provide the SFST TPM with a draft final NUREG document to NRC in the appropriate format.

The revision includes an increase in the estimated level of effort for the Principal Investigator role in authoring the draft NUREG report, and for SNL response to peer review and group and public comments. The change in the estimated level of effort for this subtask is 10 staff-weeks.

Subtask 1b. SNL will analyze high-fidelity models of two rail cask designs (one with, and one without, an inner spent fuel canister) and one truck cask design (without an inner spent fuel canister), and their respective (fuel) contents, and their respective impact limiters.

Several current and proposed spent fuel transportation package designs include inner thin-walled canisters to facilitate spent fuel handling and loading. These structures are not considered in the safety evaluation of the package design (i.e., no credit is given to the canister with respect to containment of package contents under either routine or accident conditions). Packages are certified as satisfying the regulatory requirements, regardless of the presence of canisters. Thus the canister has no bearing on safety determinations.

However, when performing risk assessments, the presence of canisters could affect risk-informed assessment of impacts from transporting spent fuel under accident conditions. The basic consideration is that a thin-walled canister is likely to readily deform during severe accidents. In some severe accidents, a leak path for fuel volatile or particulates that might otherwise be generated could be blocked if the inner canister does not fail. If the canister does fail, the additional time required for materials to escape from the canister to the cask interior and then from the cask interior to the environment is likely to increase the amount of deposition on

interior cask and canister surfaces, thus reducing the quantity of material released from the cask to the environment. This effect could lower risk estimates for impact accidents.

Under fire conditions, an inner canister would have to be heated to the point of failure before any fuel material could be released to the interior of the cask, whose seals would also have to fail before material could be released outside the cask. Heating the canister to this point could require more severe thermal conditions than those needed to fail the cask seals alone. The more severe the thermal conditions for release are, the less likely it is that an accident will generate those conditions. Thus the use of canisters may lower the already low risks for release from casks involved in accidents with fires.

However, canisters might also produce effects that would not be favorable to lower risk estimates. SNL will evaluate the overall impact of the use of spent fuel canisters on spent fuel shipment risk estimates.

Additionally, previous SFTRA did not model impact limiters, or modeled them as pre-crushed (i.e., no credit was taken for the impact limiters). Impact limiters are known to provide protection during the majority of impact accidents, but were omitted from previous analyses because of the complexity in modeling the structure and deformation of the impact limiters. Impact limiters will be included in the finite element modeling and evaluation of spent fuel cask behavior under accident conditions in this subtask.

Finally, under this subtask, SNL will evaluate available information and update assumptions and parametric values used to estimate the behavior of fuels under impact-and/or fire-accident conditions.

Subtask 1c. SNL will perform 3-D thermal analysis, including 3-D modeling of fuel assemblies, to improve predictions of spent fuel cask behavior during accidents involving fire.

Subtask 1d. SNL will perform other analyses to reduce uncertainty in the risk estimates and/or to corroborate previously used values, based on SNL review of previous and related work, SNL recommendation and consultation with SFST staff, and as directed by the TPM. This work may include scale testing of packaging components (e.g., bolt/closure system, calorimeter test on ground, etc.).

Subtask 1e. SNL will calculate spent fuel shipment risk estimates, under routine and accident conditions, using RADTRAN 6. SNL will address both population and (maximum) individual risks (the latter may involve the use of RISKIND). SNL will use available and appropriate event trees and shipment route models, including event trees with new wayside surface frequencies, and Transportation Routing Analysis Geographic Information System (TRAGIS)-based routes, with the most recently available Census population data.

Subtask 1f. Since past SFTRAs have used the uniform thermal boundary condition specified in 10 CFR 71.73 and only adjusted the duration of the fire, the NRC now requires a full-scale rail-cask sized calorimeter test to measure the heat flux that is applied to a cask in a real fire. Real fires have non-uniform heating of the package both spatially and temporally and the CAFE fire code of SNL is capable of modeling this behavior. To provide higher defensibility of the results calculated by the CAFE code, SNL shall compare the calculated heat flux to that measured in the calorimeter tests.

Subtask 1g. SNL shall determine a package's response to impacts onto yielding targets. The primary analyses will be for impacts onto rigid targets. Since all real world accidents involve impacts onto (or into) a target that has some degree of deformation, a way to correlate the damage of the package determined from the analyses of package impacts onto rigid targets to higher speed impacts onto yielding targets will be developed. In NUREG/CR-6672 this correlation was carried out using an energy balance method. In this task finite element analyses of cask impacts onto select yielding targets will be performed to validate the energy balance method.

A key component of the SFTRA is the response that spent fuel casks will have to impact accidents. Previous work (from NUREG/CR-6672, and the "Package Performance Study") indicated that the cask closure is the region of the cask, which, if significantly damaged, could lead to release of radioactive contents. Therefore for a highly defensible risk assessment, it is imperative to determine the response of this region of the package in the most accurate manner possible. The use of bolt sub-models with several hundred elements in a cross-section would be required for this type of assessment, but bolt models with this level of refinement cannot be used in the entire package model because the analysis requires too many computer resources (even the fastest computers in the world working solely on this problem would take many days for each simulation). Therefore, the results from a detailed bolt model should be incorporated into the entire package model with a spot-weld which is a single connection that represents the load-deflection behavior of the detailed bolt model.

Since no transportation risk assessment in the past has included this accuracy of closure response and the technique is new, this subtask has been incorporated into this agreement.

Task 1 modification: SFTRA differs from all prior transportation risk assessments in that it uses NRC-certified casks instead of generic casks. For this reason, it is imperative that the analytical models very closely match the actual cask design. It is not possible to make simplifying assumptions about geometry or to leave out complex details. Results of NUREG/CR-6672 and subsequent analyses have indicated the two aspects of cask design that have the greatest influence on package behavior in extra-regulatory accident scenarios are the closure region and the impact limiter. For the HI-STAR 100 cask used in SFTRA, these are the two areas of the design that are the most complex. In the initial planning for SFTRA, it was recognized that the complexity of these two regions must be included in the cask models. The planning also included a change in the structural finite element analysis code that treats the interaction in a more physically correct manner. The interaction between the complexity of the structure and the added analysis code precision was not clearly understood by either the analysts or the code developers at SNL and required substantial unplanned efforts both to adjust the cask model code and to achieve analytical success.

Task 2. Transport Safety Visualizations

SFST staff has identified a need for visualizations, including graphics and animations, that could be used in public meetings, websites, and other venues, to facilitate the explanation of the public health and safety protection afforded by the current transportation safety system. The visualizations needed by the NRC are in the areas of regulatory provisions and risk assessment.

The regulatory provision and risk assessment visualizations must be effective (i.e., they must convey the safety information in a fashion that is easy for the intended audience to grasp). The

visualizations must be factual, rigorously accurate, and without promotional aspect. The visualizations will be subject to close scrutiny and critique by governmental and non-governmental organizations alike.

Subtask 2a. Regulatory Provision Visualizations

With regard to regulatory provisions, the visualizations must translate for the public what the 10 CFR Part 71 hypothetical accident conditions mean to safety in terms with which the public can readily identify and understand. Animations may be particularly well-suited for these visualization needs.

The point of these visualizations is to convey how rigorous and challenging the hypothetical accident test conditions are when compared to real-world (historical) transport accident conditions. In other words, why do we believe the regulations provide adequate safety when some real-world accident conditions (e.g., accident speed or fire duration) exceed those specified in the regulations?

A large part of the answer involves explaining those aspects of the test conditions and acceptance criteria that are not obvious (e.g., unyielding surfaces, engulfing fires, activity release rates). Another part of the answer includes the assumptions used, in assessing package performance, that impart additional forces to the package, but that are unlikely to occur in real-world accidents (e.g., worst-case orientations, orthogonal impacts, etc.), and also includes ignoring factors that provide additional protection, for the package, that are likely to occur in real-world accidents (e.g., collapse of vehicle structures before package impact, contact with the ground, and other heat sinks, etc.). The performing organization will consider and recommend the extent to which these considerations should be addressed in the visualizations.

Specific example topics for visualizations include:

- Free drop through a distance of 30 ft. onto an essentially unyielding surface: The public may often focus only on the impact speed condition. Visualize protection afforded by certified packages during real-world, higher-speed, but onto yielding-surfaces to determine accident impacts.

- Fully engulfing fire test: The public may often focus only on the fire-temperature, or the fire duration, condition. Visualize protection afforded by certified packages during real world, higher-temperature, longer-duration, but non-engulfing accident fires.

- Test acceptance criteria: The public often overlooks the stringent post hypothetical accident-test-activity release and radiation-level limits that must be satisfied for package certification. Visualize minimum post-test releases/radiation levels that would result in rejection of package design.

In addition to considering the examples above, the performing organization will review all the hypothetical-accident test conditions and acceptance criteria and will provide and discuss alternatives as how best to clearly and simply depict and convey the real-world safety afforded by the regulatory provisions, to the public. This review will include discussions with the SFST TPM and NRC staff on difficulties that have been encountered in public meetings related to this and related topics.

Subtask 2b. Risk-Assessment Visualizations

With regard to risk assessment, the visualizations must define what risk means in the context of spent fuel shipments, with equal weighting to the consequence and probability components. We believe that risk comparisons should be avoided in the visualizations. For example, perhaps some form of progressive consideration of risk could be illustrated:

- What portion of expected shipments will be involved in an accident?
- What portion of accidents will be severe?
- What portion of severe accidents will be mitigated by the package?
- What portion of severe accidents will be severe enough to cause any release?
- How long between such accidents at expected shipping rates?
- What is the chance of still more severe accidents, and how frequently might they occur?
- How does the magnitude of these latter transport risks compare with the risks of operating facilities also regulated by the NRC?
- Why do we believe that, on balance, likely actual risks are less than the (small) estimated risks?
- When does the NRC conclude that risks are acceptably small?

The performing organization will consider these and other examples, and provide alternatives for visualizations for spent fuel shipment risk assessments, such as those presented in previous risk assessment studies and in environmental impact statements.

Actual topics for the regulatory provision and risk assessment visualizations will be selected by the SFST TPM, and may include topics other than the examples provided above. The performing organization will obtain approval from the SFST TPM, of visualization content, before production of final visualizations begins.

Task 2 modification: SNL developed a web-based visualization tool which was not developed for posting on the NRC website. Since NRC web protocols were not met, the visualization tool will be changed to electronic brochure. This web-based interactive electronic document entitle, "Understanding Cask Basics," will better demonstrate the robustness of the casks used for transportation of spent nuclear fuel. An electronic brochure, that the NRC will issue, will maintain the basic content and format of the information and make it readily available and accessible to members of the public. Development of the brochure, which was reviewed and commented on internally at NRC, will include content and format revision that SNL will complete.

visualizations must be factual, rigorously accurate, and without promotional aspect. The visualizations will be subject to close scrutiny and critique by governmental and non-governmental organizations alike.

Subtask 2a. Regulatory Provision Visualizations

With regard to regulatory provisions, the visualizations must translate for the public what the 10 CFR Part 71 hypothetical accident conditions mean to safety in terms with which the public can readily identify and understand. Animations may be particularly well-suited for these visualization needs.

The point of these visualizations is to convey how rigorous and challenging the hypothetical accident test conditions are when compared to real-world (historical) transport accident conditions. In other words, why do we believe the regulations provide adequate safety when some real-world accident conditions (e.g., accident speed or fire duration) exceed those specified in the regulations?

A large part of the answer involves explaining those aspects of the test conditions and acceptance criteria that are not obvious (e.g., unyielding surfaces, engulfing fires, activity release rates). Another part of the answer includes the assumptions used, in assessing package performance, that impart additional forces to the package, but that are unlikely to occur in real-world accidents (e.g., worst-case orientations, orthogonal impacts, etc.), and also includes ignoring factors that provide additional protection, for the package, that are likely to occur in real-world accidents (e.g., collapse of vehicle structures before package impact, contact with the ground, and other heat sinks, etc.). The performing organization will consider and recommend the extent to which these considerations should be addressed in the visualizations.

Specific example topics for visualizations include:

- Free drop through a distance of 30 ft. onto an essentially unyielding surface: The public may often focus only on the impact speed condition. Visualize protection afforded by certified packages during real-world, higher-speed, but onto yielding-surfaces to determine accident impacts.

- Fully engulfing fire test: The public may often focus only on the fire-temperature, or the fire duration, condition. Visualize protection afforded by certified packages during real world, higher-temperature, longer-duration, but non-engulfing accident fires.

- Test acceptance criteria: The public often overlooks the stringent post hypothetical accident-test-activity release and radiation-level limits that must be satisfied for package certification. Visualize minimum post-test releases/radiation levels that would result in rejection of package design.

In addition to considering the examples above, the performing organization will review all the hypothetical-accident test conditions and acceptance criteria and will provide and discuss alternatives as how best to clearly and simply depict and convey the real-world safety afforded by the regulatory provisions, to the public. This review will include discussions with the SFST TPM and NRC staff on difficulties that have been encountered in public meetings related to this and related topics.

Subtask 2b. Risk-Assessment Visualizations

With regard to risk assessment, the visualizations must define what risk means in the context of spent fuel shipments, with equal weighting to the consequence and probability components. We believe that risk comparisons should be avoided in the visualizations. For example, perhaps some form of progressive consideration of risk could be illustrated:

- What portion of expected shipments will be involved in an accident?
- What portion of accidents will be severe?
- What portion of severe accidents will be mitigated by the package?
- What portion of severe accidents will be severe enough to cause any release?
- How long between such accidents at expected shipping rates?
- What is the chance of still more severe accidents, and how frequently might they occur?
- How does the magnitude of these latter transport risks compare with the risks of operating facilities also regulated by the NRC?
- Why do we believe that, on balance, likely actual risks are less than the (small) estimated risks?
- When does the NRC conclude that risks are acceptably small?

The performing organization will consider these and other examples, and provide alternatives for visualizations for spent fuel shipment risk assessments, such as those presented in previous risk assessment studies and in environmental impact statements.

Actual topics for the regulatory provision and risk assessment visualizations will be selected by the SFST TPM, and may include topics other than the examples provided above. The performing organization will obtain approval from the SFST TPM, of visualization content, before production of final visualizations begins.

Task 2 modification: SNL developed a web-based visualization tool which was not developed for posting on the NRC website. Since NRC web protocols were not met, the visualization tool will be changed to electronic brochure. This web-based interactive electronic document entitle, "Understanding Cask Basics," will better demonstrate the robustness of the casks used for transportation of spent nuclear fuel. An electronic brochure, that the NRC will issue, will maintain the basic content and format of the information and make it readily available and accessible to members of the public. Development of the brochure, which was reviewed and commented on internally at NRC, will include content and format revision that SNL will complete.

4. PROPOSED PERSONNEL

NRC

Technical Direction will be provided by

Technical Assistance Project Manager: Penny Kinney
Technical Project Manager: John Cook

The NMSS TAPM is the focal point for all contract-related activities. All work assignments and program funding actions are initiated by the NMSS TAPM. All proposed work scope or schedule changes must be processed through the NMSS TAPM.

The NMSS TPM is responsible for providing technical guidance to the performing organization regarding staff interpretations of the technical aspects of regulatory requirements along with copies of relevant documents (e.g., Regulatory Guides) when requested by the performing organization. All work products must be reviewed and approved by the NMSS TPM before they are submitted as final documents. All technical direction given to the performing organization must be consistent with the work scope and schedule. The NMSS TPM is not authorized to unilaterally make changes to the approved work scope or schedule or give the performing organization any direction that would increase costs over approved levels. Directions for changes in cost or the period of performance will be provided by the DOE Operations Office after receipt of an approved Standard Order for DOE Work (SOEW) (NRC Form 173) from NMSS. If the performing organization receives guidance which is believed to be invalid under the criteria cited above, the performing organization shall immediately notify the NMSS TAPM. If the NMSS TAPM and the performing organization are unable to resolve the question within five days, the performing organization shall notify the DOE Operations Office.

SNL

SNL PERSONNEL:

Douglas. J. Ammerman, a Ph.D. Civil Engineering graduate of the University of Minnesota, is the technical lead for this project. For the past fifteen years, Dr. Ammerman has served as project leader for structural analysis studies related to radioactive material transportation packages. While serving as the technical lead for these studies, he has directed and/or performed (a) structural testing of transportation packages including crash tests of semi- and full-scale packages, (b) evaluations of the structural response of packages to transportation accident conditions, (c) benchmarking studies of structural analysis codes, (d) non-linear dynamic analyses of transportation packages, (e) determination of the safety factors for NRC Reg. Guide 7.6 designed packages, and (f) investigation of package response to environments resulting from actual "real world" accidents. He will server as Key Personnel and Principal Investigator for this project.

Mona. L. Aragon is a visualization specialist for the Nuclear Energy Safety Technologies Group a Sandia National Laboratories. She received a Masters in Art from the University of New Mexico in (b)(6) In her 16 years of experience, Mona has produced award-winning CD-ROM and web-based interactive multimedia applications, web sites, orthographic/isometric/technical graphics, and photo manipulation for the interpretation, conceptualization, and communication of complex scientific and engineering research/testing/analysis information to various stakeholder and public audiences. Examples of program areas she has managed and teamed

with include: "Safe Transportation of Radioactive Material Packages", "U.S. DOE Strategic Petroleum Reserve, A Look Inside", NRC's Package Performance Study web site, Sandia's Transportation Program, Sandia's Water Initiative, Sandia's Longer-Term Environmental Stewardship web site, and "Marine Safety Systems, Inc., Central Ballast Tanker Interactive CD". Her work involves computer programming, instructional design, graphic user interface (GUI) development, storyboarding, interactive multimedia development, 3-dimensional modeling and animation, digital video technology, database management, networking administration, and World Wide Web development.

Dr. Robert J. Kalan holds a PhD in Mechanical Engineering from Rensselaer Polytechnic Institute, where he worked as a graduate assistant and developed a computational model, using the finite element method, to calculate residual stresses developed during crystal growth. Prior to this, he was a graduate assistant at the University of Florida, where he used the finite element method to investigate residual stresses in welded plates. In addition, he has over 14 years of SNL and industrial experience performing finite element analyses. He worked as a structural analyst for Lockheed Martin on the Regenerative Liquid Propellant Gun (RLPG) and as design engineer for the Beloit Fiber Systems Inc. and the U.S. Navy. He supports the development of PRONTO cask models and the performance of PRONTO calculations for the PPS program and the Vulnerability study. He will be doing the structural analysis, Task 2.

Carlos Lopez has an M.S. in Mechanical Engineering from the University of New Mexico. For the last four years, he has been responsible for the development of highly detailed three-dimensional finite-element computer models for use in analyzing the response of transportation casks to complicated thermal environments. Currently, Mr. Lopez is the project leader for thermal issues related to transportation packages for the Material Transportation Testing and Analysis Department of Sandia National Laboratories. He will provide the thermal information for visualization and perform thermal analyses for Task 2.

Dr. Jeffrey A. Smith is a Principal Member of Technical Staff at Sandia National Laboratories and has been at Sandia for more than 10 years. He received his Ph.D. in Civil Engineering from the University of Kansas, (b)(6) Prior to coming to Sandia he spent two years as a structural designer followed by graduate work at the University of Kansas working on research sponsored by the Pressure Vessel Research Council (PVRC) and the Welding Research Council (WRC) related to constraint effects on fracture toughness. Since coming to Sandia he spent two years in the Corrosion and Mechanical Metallurgy group investigating the application of fracture mechanics design principals to radioactive material transportation casks. The next four years he was in the International Nuclear Safety/Nuclear Technology Programs group conducting finite element analyses for programs such as the Capacity of Degraded Containments, Seismic Behavior of Spent Fuel Storage Cask Systems, OECD Lower Head Failure Program, Structural Risk-Informed Assessment Containment Degradation project for the NRC, and a variety of other projects. During the latter part of 2001 and early 2002 he was leading the "overall structural response" effort for the Integrated Vulnerability Assessment of Nuclear Power Plants project for the NRC, assessing the structural vulnerability of nuclear power plants to aircraft threats. For the last 4 years he has been principally working on the programs related to the vulnerability of spent nuclear fuel storage and transportation casks to a variety of potential terrorist threats. Dr. Smith will provide technical support for the project.

Douglas Osborn holds a BS in Chemical Engineering and an MS in Nuclear Engineering from Ohio State University, Columbus, OH. He is a Member of Technical Staff at Sandia National Laboratories assisting in the development and maintenance of the radioactive material transportation risk assessment code, RADTRAN, and in the development and maintenance of the

Graphical User Interface, RadCat. He also is a Qualified Assessment Scientist for the National Consequence Management Home Team. As a research intern at Batelle Memorial Institute, he assisted in designing a short-term high-level radioactive waste storage area; public health and transportation risk calculations concerning with the remediation of uranium mill tailings in and near Moab, Utah; technical reviews with the Nuclear Regulatory Commission; and transportation modeling of spent nuclear fuel to Yucca Mountain, NV. Between December 1993 and October 1997, Mr. Osborn was Radioactive Material and Work Coordinator with the U.S. Navy, Norfolk, VA, attending the Naval Nuclear Power Training. He was instrumental in saving the U.S. Navy over 3 million dollars in a 1 month period; a qualified Senior Supervisory Watch Stander, and Quality Assurance Inspector; provided shipboard training for radioactive awareness and prevention; maintained steam and reactor plant chemistry, providing technical assistance for radiological work and work procedures; and maintained personnel radiological documentation for over 500 shipboard personnel. His skills include the following: Operation of reactor plant, steam plant, and supporting systems; Chemical testing and processing of steam plant reactor plant and pure water systems; knowledge in radioactive work processes and dosimeter processing; and proficient with PC software including word processing, spreadsheets, MathCAD software, WebTRAGIS, RADTRAN, RISKIND, Microshield, MicroSkyshine, HOTSPOT, and VENTSAR. Mr. Osborn will provide technical support for the project.

Nicole L. Breivik received her Ph.D. in Engineering Mechanics from Virginia Tech in (b)(6) Since then, she has spent over 7 years at Sandia National Laboratories and 4 years at NASA-Langley Research Center. She is currently in the Solid Mechanics department at Sandia working as a structural analyst. Recent projects have included quantification of margins and uncertainties resulting from abnormal drop environments for nuclear weapon qualification. She is part of the user support team for Sandia's transient dynamic finite element code Presto. During her time at NASA-Langley, she conducted research on thin walled composite structures for aerospace applications.

Ruth F. Weiner. Dr. Weiner is a Ph.D. chemistry graduate of the Johns Hopkins University. Before coming to Sandia National Laboratories she was Professor of environmental chemistry at Florida International University and Western Washington University. She has 35 years' experience in management and oversight of research projects and a total of 10 years experience at Sandia National Laboratories managing and performing safety, risk, and consequence assessments for radioactive waste and radioactive materials transportation. Dr. Weiner is currently task leader for development of the RADTRAN transportation risk assessment code Her other major assignments include assessment of risk of transporting TRIGA fuel, consolidating uranium scrap from DOE sites, transportation of Silo 3 material from Fernald, transportation of PWR fuel to a high-level waste repository, chemistry of actinides in basic and saline solution, decision analysis for disposition of aluminum-based fuels, and regulatory analysis of 10 CFR Part 60 and 40 CFR Part 191. She was the Principal Investigator for DOE/EA-1290: Environmental Assessment for Return of Russian Federation-Titled Natural Uranium Hexafluoride and task leader for Appendices WAC and SOTERM of the Waste Isolation Pilot Plant Compliance Certification Application. She is a co-author of NUREG/CR-6672, the senior author of Weiner and Matthews Environmental Engineering (Butterworth-Heinemann, 2003), a co-author of four other environmental engineering texts, and has more than 100 technical publications to her name.

Subcontractors:

Dr Ahti J. Suo-Anttila is a mechanical engineer with over 30 years experience in the fields of nuclear reactor safety, heat transfer, with significant expertise in computational modeling of a

wide range of physical phenomena. He has developed the Isis-3d and CAFE-3d computational fluid dynamics codes that are used for analysis of heat transfer in fires associated with hazardous cargo in a wide range of environments such as enclosures, tunnels, and open pools with wind effects. These CFD codes have been used in the analysis of shipping casks in numerous transportation related fire scenarios. Dr. Suo-Anttila obtained his PhD. in (b) MS in (b) and BS in (b)(6 All three degree's are in the field of Mechanical Engineering, with a minor field in Nuclear Engineering. He will provide support to Thermal Analysis.

Sandia National Laboratories (SNL) can remove or substitute any personnel from an NRC work order, including "Key Personnel," however, removals or substitutions for "Key Personnel" shall be made in accordance with NRC MD 11.7, Part XI-4.

5. MEETINGS AND TRAVEL:

It is estimated that one trip each year to Rockville, MD will be made to consult with and brief NRC staff during FY09, FY10, and FY11.

SFST personnel may meet periodically at the performing organization's facilities, as mutually agreed, to review interim progress on tasks throughout the period of performance. SNL will prepare meeting notes including identification of Action Items. Disposition of Action Items will be tracked in the Monthly Letter Status Reports (MLSRs). Meeting notes will be distributed in accordance with Section 11.0 of this SOW.

Deviations from the travel submitted as part of NRC form 189 and accepted by issuance of an NRC form 173 will be coordinated with the NRC project manager as soon as the need for such a deviation is identified to ensure it will not interfere with the timely completion of proposed work.

6. NRC-FURNISHED MATERIALS:

None

7. RELATIONSHIP TO OTHER PROJECTS:

This work does not relate to any of the current activities being conducted by Sandia for the NRC.

8. REPORTING REQUIREMENTS AND SCHEDULE

a. DELIVERABLES AND SCHEDULE

The deliverables required under each subtask with the anticipated time for delivery are provided below. All deliverables will be provided to the SFST TPM.

Deliverables:

Task 1.

The deliverable for Task 1 will be a comprehensive NUREG report that provides spent fuel shipment risk estimates, including the analytical (and testing, if any) results. The report will also describe the approach, methods, assumptions, input data, and calculations used. A

comparative analysis with previous studies of spent fuel package behavior and shipment risks will be included. The report will also contain an overall assessment of the confidence in the results provided, including a discussion of any caveats that may apply, as well as any sensitivities or uncertainties associated with the results. SNL will organize, illustrate and write the report for the general public.

The deliverable will be provided to the SFST TPM initially as a draft NUREG report; this report should comply with applicable NRC format requirements and be suitable for web posting. After SNL has responded to public and peer review comments and revised the draft NUREG report in consultation with SFST staff, SNL will provide the TPM with a draft final NUREG in the applicable NRC format.

Task 2.

Provide support for development of the electronic brochure to be issued in concert with SNL's draft NUREG document.

Schedule of remaining milestones for Task 1:

1/5/10	SNL submits draft "Spent Fuel Transport Risk Assessment" NUREG to NRC
3/2/10	SFST completes review of draft report and provides comments to SNL
3/30/10	SNL provides revised draft SFTRA NUREG based on SFST comments
5/25/10	NRC publishes draft NUREG (in Federal Register Notice)
7/5/10	SFST provides public comments to peer review group
7/27/10	Public comment period closes
9/23/10	Peer review group requests clarifications from SNL, including SNL proposed responses to public comments
11/18/10	Peer review group provides final findings to SFST and SNL
12/15/10	SNL provides responses to public and peer comments to SFST
1/27/11	SFST provides final comments to SNI
4/21/11	SNL submits final report to NRC

It is anticipated that the deliverables from Task 2 will include both animations and static graphics, with supporting text and documentation. These deliverables will be provided to the SFST TPM in a letter report. The format for animation deliverables should be amenable both for PowerPoint presentations and web pages with selected stills usable for printed output. Static graphics should also be provided in a format suitable for these applications.

Schedule:

Tasks 1 and 2 are to proceed concurrently, although work may initially focus on Task 2. Task 2 will require interactions to develop alternative visualizations, provide for revisions, and obtain approvals to produce the final deliverables. The schedule that follows provides details for the first year of effort, and major milestones thereafter. Note that this schedule, and the distribution of the level of effort, may be revised, based on discussions with SNL.
(The following schedule is complete.)

5/8/06	SNL will provide the TPM with a preliminary markup of its Task 2 ideas as how best to clearly and simply depict and convey regulatory safety and risk assess-

	ment information. SNL will also describe its planned method for Task 1 analyses for evaluating the spent fuel shipment risks. Initial progress on this action has been completed.
5/8/06	Review meeting 1 SNL will present and discuss its options for Task 2 visualizations, identify any issues, and describe its plans for obtaining external review and input on the effectiveness of its proposed visualizations. SNL will also describe its Task 1 progress on the risk assessment task, and any preliminary issues regarding that work. This will include its thorough and complete review of sources for identifying issues and topics to address in the risk assessment and proposed final identification of the risk assessment scope and topics.
5/8/06	SNL will provide the TPM with a revised markup of its Task 2 ideas that clearly and simply depict and convey regulatory safety and risk assessment information. SNL will also provide Task 1 preliminary results from its analyses and any proposed revisions for the spent fuel shipment risk assessment
5/8/06	Review meeting 2 SNL will present and discuss its Task 2 progress, identify any issues, and describe its plans for preparing the first draft of its proposed visualizations. SNL will also describe its Task 1 progress on the risk assessment task and any issues regarding that work.
5/8/06	SNL will provide the TPM with a first draft of Task 2 visualizations that clearly and simply depicts and conveys regulatory safety and risk assessment information. SNL will also provide a draft of Task 1 results as available from its computer code runs and analyses for the spent fuel shipment risk assessment.
5/8/06	Review meeting 3 SNL will present and discuss its Task 2 draft visualizations and Task 1 draft canister risk assessment impacts in detail. SNL will also describe its plan for identifying and resolving comments on the drafts, and any difficulties in obtaining the necessary approvals to prepare final deliverables. At the meeting SNL will provide a written detailed schedule leading to on-time production of all visualizations.
8/30/06	SNL will provide the TPM with a second draft of Task 2 visualizations that clearly and simply depicts and conveys regulatory safety and risk assessment information. SNL will also provide a second draft of Task 1 results from its computer code runs, any testing, and analyses, as available, for evaluating the impact of the use of inner spent fuel canisters on spent fuel shipment risk assessments.
9/06	Review meeting 4 SNL provides Task 2 final visualization deliverables to SFST. SNL provides status of ongoing Task 1 risk assessment testing and analyses
	All future schedule items are under Task 1. Task 2 is completed.
3/2/09	SNL provides "Draft Spent Fuel Transport Risk Assessment" NUREG to the NRC.
4/27/09	SFST review of draft report.

10/21/09	SNL provides revised Draft NUREG to NRC.
7/22/09	[NRC published Draft NUREG published in Federal Register Notice for public comment]
8/29/09	[SNL supports SFST public meeting on Draft NUREG]
9/24/09	[Comment period closes.]
9/27/09	[SFST provides Draft NUREG and public comments to peer review group.]
12/20/09	[Peer review group provides preliminary findings to SFST]
2/1/10	SNL provides clarifications to peer review group.
2/28/10	[Peer review group provides final findings to SFST, SNL.]
4/9/10	SNL provides responses to public and peer comments to SFST.
4/10/10	SNL consults with SFST staff.
6/6/10	SNL revises Draft NUREG.
6/30/10	SNL provides Final NUREG to SFST.

The SFST TPM will provide comments to the performing organization to be considered in the preparation of the draft and final task reports. These comments will identify potential problem areas, discrepancies, and technical insights on the draft materials and reports. The comments will be for the purpose of clarification only and will not be construed as to prejudge the performing organization's work or technical findings. SNL will provide draft documents of the NUREG technical report and the responses to public and peer-reviewed comments. All reports will be edited and reviewed by the performing organization and checked in accordance with the quality assurance requirements addressed under Section 13.0. Within the above schedule and after receipt of NRC comments, the performing organization will revise the interim materials, results and draft reports, incorporating resolution of comments, and submit an NRC-compatible, electronic media copy of the final materials and reports.

S. Andrew Orrell, Director, Nuclear Energy Programs, Center 6800, and/or Marianne C. Walck, Senior Manager, Nuclear Energy Safety Technologies, Organization 6760, Sandia National Laboratories, Albuquerque, NM, are designated as the authorizing officials for publications of NRC Form 426A.

No more than 30 copies of any interim report will be furnished to the NRC project manager.

B. MONTHLY LETTER STATUS REPORT (MLSR)

A Monthly Letter Status Report (MLSR), following the Management Directive 11.7 instructions, will be submitted to the NRC by the 20th of each month. The MLSR shall be delivered to the Project Manager, Penelope Kinney for the Office of Nuclear Material Safety and Safeguards and the Division of Contracts (DC), Office of Administration

The Financial Status section of the MLSR will follow NRC Management Directive 11.7's MLSR Financial Status Report format to the extent permitted by the current SNL Financial System.

Distribution of Deliverables

The following summarizes the required report distribution under this SOW. The NMSS TPM shall provide the performing organization with current NRC mailing addresses for this distribution.

Tasks 1 and 2

Distribution	Monthly Letter Status Reports	Meetings Workshops & Trip Reports	Draft Formal Tech, Reports	Final Formal Tech. Reports
NMSS TPM	1	1	1	1
NMSS TAPM	1	1	5	1*
SFST Program Coordinator	1			
Div. of Freedom of Info. and Pub. Services (FIPS)	0	0	0	1

* Camera-ready and electronic media

Period of Performance

The period of performance for this project started in June 2005, and will continue until November, 2011.

Estimated level of Effort

The estimated level of effort for this project is identified below.

Task 1. 185 staff-weeks

Task 2. 21 staff-weeks

9. SUBCONTRACTOR/CONSULTANT INFORMATION:

Resumes for proposed subcontractors, if applicable, have been provided under Section 4 of this proposal. Acceptance of this proposal indicates approval of personnel proposed herein. Subsequent subcontractor efforts not described in this proposal will be managed per NRC Management Directive 11.7, Part XI. Conflict of interest issues are covered in section 11 of this proposal that addresses all proposed personnel, including subcontractors.

10. SPECIAL FACILITIES, IF REQUIRED:

N/A

11. CONFLICT-OF-INTEREST INFORMATION:

DOE recognizes that Section 170A of the Atomic Energy Act of 1954, as amended, requires that NRC be provided with disclosures on potential conflicts when NRC obtains technical, consulting, research and other support services. DOE further recognizes that the assignment of NRC work to DOE laboratories must satisfy NRC's conflict standards. Accordingly, when NRC enters into

an agreement with a DOE laboratory to perform work for NRC, and during the life of the agreement, the laboratory shall review and promptly disclose its current work, planned work and where appropriate, past work for DOE and others (meaning, organizations, in the same/similar technical area as the NRC project scope of work), e.g. (included but not limited to), NRC licensees, vendors, industry groups or research institutes that represent or are substantially comprised of nuclear utilities for work in the same or similar technical area as the proposed NRC project. Disclosures for current or planned work for DOE or others in the same or similar technical area as the proposed work, are to include (1) the name of organization; (2) dollar value; (3) period of performance of the work identified; and (4) statements of work for the projects. NRC will then determine whether a conflict would result and, if one does, determine, after consultation with the laboratory and DOE, the appropriate action NRC or DOE should take to avoid the conflict, or when appropriate under the NRC procedures, waive the conflict. If the laboratory determines there is no applicable work in the same or similar technical area, it should be stated in its proposal.

No contractual or organizational relationships of Sandia National Laboratories, its employees, or anticipated subcontractors and/or consultants have been identified with industries regulated by NRC and suppliers thereof that might give rise to a potential or actual conflict of interest.

US Nuclear Regulatory Commission (NRC) recognizes that Sandia National Laboratories will perform the work assigned to DOE under this project pursuant to the "Non-Department of Energy Funded Work" provision of the DOE/Sandia Corporation contract for the management and operation of Sandia National Laboratories.

The DOE-approved Sandia Corporation OCI Management Plan governing access to and flow of information between Sandia Corporation and its Lockheed Martin affiliated corporate entities will apply to all work performed under the terms of this project. This Sandia Corporation OCI Management Plan and the procedures resulting from the plan are subject to DOE audit at all times. A copy of the Sandia Corporation OCI Management Plan is available upon request to David L. Goldheim, LMCO Relations, MS- 0185, Sandia National Laboratories, Albuquerque, NM 87185-0185, (505) 845-7730.

In accordance with the Organizational Conflicts of Interest terms of the DOE/Sandia Corporation contract, Sandia Corporation, including any of its officials who may acquire information as part of their management responsibilities, is prohibited from further disseminating any third-party proprietary data or government sensitive data or information (as indicated by restrictive markings identifying the data and information so protected) to its Lockheed Martin affiliated corporate entities.

12. CLASSIFICATION OR SENSITIVITY, IF APPLICABLE:

This work is unclassified, unsensitive.

13. ADDENDUM COST AND SCHEDULE INFORMATION:

N/A

14. SPENDING PLAN:

A Spending Plan, NRC Form 189 (Part 3), is included.

15. DOE FEDERAL ADMINISTRATIVE CHARGE:

DOE departmental overhead charges of 3 percent will be added on all billings.

16. DOE-ACQUIRED MATERIAL:

Purchase of items $500 or greater not identified in this proposal will be requested separately in writing. When property is purchased, it will be reported in the MLSR. Property will only be tracked at the $5,000 or greater level by DOE, or if property is sensitive. Additionally, NRC-funded software with a useful life of 2 years or more and a development cost of $500 or more will be reported in the MLSR in the month the development of the software is completed.

17. FUNDING REQUIRED

The Department of Energy (DOE) requires that Sandia National Laboratories request, from other federal agencies, funding for the first fiscal year plus the first three months of the following year if the work transcends fiscal years. However, the NRC's Office of Nuclear Regulatory Research (RES) has published guidelines that only allow continuity funding through the first two months of the subsequent fiscal year (end of November), with new fiscal year funding requested by mid-November for on-going projects.

18. RESEARCH QUALITY

The quality of NRC research programs are assessed each year by the Advisory Committee on Reactor Safeguards. Within the context of their reviews of RES programs, the definition of quality research is based upon several major characteristics:

Results meet the objectives (75% of overall score)
- Justification of major assumptions (12%)
- Soundness of technical approach and results (52%)
- Uncertainties and sensitivities addressed (11%)

Documentation of research results and methods is adequate (25% of overall score)
- Clarity of presentation (16%)
- Identification of major assumptions (9%)

It is the responsibility of the contractor to ensure that these quality criteria are adequately addressed throughout the course of the research that is performed. The NRC project manager and technical monitor will review all research products with these criteria in mind.

NRC FORM 189 (PART 3)
(5-1998)
NRCMD 11.7

U.S. NUCLEAR REGULATORY COMMISSION

SPENDING PLAN

Complete as part of the Laboratory's Cost Proposal for each new project or task order.

JOB CODE: J5546

MODIFICATION NUMBER (If applicable): Number 3

NAME OF LABORATORY: Sandia National Laboratories

PERFORMANCE PERIOD

FROM	TO
6/30/05	11/30/11

TITLE OF PROJECT: Transportation Safety and Risk Assessment

John Cook NMSS

Total estimated costs of the proposed project or modification at the time of proposal submission: $1810K

Provide cost details by month for the total project or modification.

MONTH	Actuals thru May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09
TOTAL ESTIMATED COSTS ($K)	$1438.2K	$5.8K	$11.1K	$40.4K	$41.5K	$53.9K
PROJECT COMPLETION (%) (cumulative)	79.5%	79.8%	80.4%	82.6%	84.9%	87.9%
MONTH	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10
TOTAL ESTIMATED COSTS ($K)	$37.1K	$17.4K	$0.6K	$12.7K	$8.5K	$0.7K
PROJECT COMPLETION (%)	89.9%	90.9%	90.9%	91.6%	92.0%	92.0%
MONTH	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10
TOTAL ESTIMATED COSTS ($K)	$9.9K	$3.3K	$6.0K	$0.7K	$12.2K	$42.1K
PROJECT COMPLETION (%) (cumulative)	92.6%	92.8%	93.1%	93.1%	93.8%	96.1%
MONTH	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11
TOTAL ESTIMATED COSTS ($K)	$32.9K	$28.5K	$8.5K	$0.0K	$0.0K	$0.0K
PROJECT COMPLETION (%)	98.0%	99.5%	100.0%	100.0%	100.0%	100.0%
MONTH	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11
TOTAL ESTIMATED COSTS ($K)	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
PROJECT COMPLETION (%) (cumulative)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
MONTH	Nov-11					
TOTAL ESTIMATED COSTS ($K)	$0.0K					
PROJECT COMPLETION (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

NOTE: The Spending Plan will be submitted with the NRC Form 189 initially. Thereafter, it will be updated and submitted with the "Monthly Letter Status Report" (MLSR), as required in Handbook 11.7, Part III, B.2.

NRC FORM 189 (Part 4)
(6-1998)
NRCMD 11.7

U.S. NUCLEAR REGULATORY COMMISSION

DOE LABORATORY PROJECT COST PROPOSAL FOR NRC WORK
FORECAST MILESTONE CHART

Complete as part of the Laboratory's Cost Proposal for new project or task order.

JOB CODE
J5546

Modification Number
(If applicable)
Number 3

DATE
JUN 15 2009

TITLE OF PROJECT
Transportation Safety and Risk Assessment

DOE PROPOSING ORGANIZATION
SANDIA NATIONAL LABORATORIES

FORECAST MILESTONE CHART – SCHEDULE TO START = Δ ———— Δ = COMPLETE
PROVIDE ESTIMATED DOLLAR COST FOR EACH TASK FOR EACH FISCAL YEAR.

TASK		FY 2005-2008	FY 2009	FY 2010	FY 2011	FY 2012	. TASK TOTAL
		1st 2nd 3rd 4th	1st 2nd 3rd 4th	1st 2nd 3rd 4th	1st 2nd 3rd 4th	1st 2nd 3rd 4th	
	SCHEDULE						
1	COST	$1008.9K	$298.0K	$181.0K	$112.0K	$0.0K	$1579.9K
	SCHEDULE						
2	COST	$230.1K	$0.0K	$0.0K	$0.0K	$0.0K	$230.1K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
	SCHEDULE						
	COST	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K	$0.0K
TOTAL ESTIMATED PROJECT COST		$1239.0K	$298.0K	$181.0K	$112.0K	$0.0K	$1810.0K