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**PROPOSAL FOR RESEARCH AGREEMENT  
 PROPOSITION POUR UN ACCORD DE RECHERCHE**

NAME AND ADDRESS OF CONTRACTING INSTITUTE <i>NOM ET ADRESSE DE L'INSTITUT CONTRACTANT:</i>	Cable Address / <i>Adresse télégraphique:</i> Telephone / <i>Téléphone:</i> (001) 301-415-8521 Facsimile / <i>Télécopie:</i> (001) 301-415-8555 E-mail / <i>Messagerie électronique:</i> jrc1@nrc.gov
Nuclear Regulatory Commission ATTN: Mr. John Cook Spent Fuel Project Office (NMSS/SFPO) Washington, DC 20555-0001	DEPARTMENT WHERE RESEARCH IS TO BE PERFORMED / DEPARTEMENT OU LES TRAVAUX SERONT EXECUTES:  Office of Nuclear Materials Safety and Safeguards, Spent Fuel Project Office

**PROPOSED TITLE OF PROJECT / TITRE DU PROJET PROPOSE:**

Radiological Assessment of Doses Resulting from Non-fixed Surface Contamination on Spent Fuel Packages

Part of Co-ordinated Research Project / *Élément du projet de recherche coordonnés:*

Radiological Aspects of Package and Conveyance Non-fixed Radioactive Contamination

**PROJECT PERSONNEL / PERSONNEL CHARGE DE L'EXECUTION DU PROJET**

**Chief Scientific Investigator / Chercheur principal:**

First Name <i>Prénom</i>	Family Name <i>Nom</i>	Date of birth <i>Date de naissance</i>	Nationality <i>Nationalité</i>	Academic degrees <i>Titres universitaires</i>
John	Cook	[REDACTED]	USA	BA, Chemistry MS, Environmental and Industrial Health

**Other Scientific Staff / Collaborateurs scientifiques:**

First Name <i>Prénom</i>	Family Name <i>Nom</i>	Date of birth <i>Date de naissance</i>	Nationality <i>Nationalité</i>	Academic degrees <i>Titres universitaires</i>
Ashok	Kapoor	[REDACTED]	USA	BS, Mechanical Engineering MS, Industrial Engineering Masters of Business Administration
Richard	Rawl	[REDACTED]	USA	BS, Chemical Engineering MS, Industrial Engineering
Paul	McConnell	[REDACTED]	USA	BS, Metallurgy M.Ap.Sc., Metallurgical Engineering

**Significance of overall problem and Long-range objectives  
*Importance du problème dans son ensemble et objectifs à long terme***

The potential doses resulting from non-fixed contamination on spent fuel casks are a cause of significant concern among the general public. Since the allowable levels of contamination are already very low, it is highly desirable to thoroughly assess the doses that could arise as a result of transport. Additionally, the doses that nuclear power plant workers receive while decontaminating the casks can be significant due to the dose rates in the areas that they must work. An assessment of alternative contamination limits is needed to ensure that overall doses are being optimized. The causes for contamination on spent fuel casks and methods for minimizing it will be investigated since the avoidance of contamination problems will contribute significantly to reducing the problem.

The long-range objectives are to: provide information on the causes for contamination on spent fuel casks and methods for minimizing this; and, perform assessments of the doses to nuclear power plant workers, conveyance loading personnel, transport workers and the public resulting from surface contamination at various levels.

The focus of US participation in the CRP will involve three areas of investigation that will result in contamination-related research results that can be integrated into the overall IAEA project. US interest in this area relates to spent fuel packages that due to their size and weight are handled by

mechanical means. It is anticipated that other countries will undertake investigations related to manually handled packages (such as radiopharmaceuticals) and in areas complimentary to those of the US.

Areas that have been identified for inclusion within the scope of US participation include:

1. Investigations into the relationships between contamination limits (for both fixed and non-fixed contamination) and the doses to workers at nuclear power plants resulting from cask decontamination activities necessary to comply with these limits;
  - 1.1. time and motion evaluations of survey and decontamination activities and dose rates in the vicinity of the spent fuel casks,
  - 1.2. occupational doses (internal and external) resulting from decontamination activities performed on loaded spent fuel casks in order to meet the current limits,
  - 1.3. relationships between achievable contamination levels and resultant occupational exposures, and
  - 1.4. normalization factors which can account for the effects of cask design (e.g., measures of ease of decontamination, surface area, etc.) on occupational doses resulting from decontamination activities;
2. Investigations into the deposition of surface contamination on packages as a result of cask immersion in spent fuel pools and phenomena related to the dispersion of contaminants into the environment during transport;
  - 2.1. determining the mechanisms by which both fixed and non-fixed contamination are deposited on package surfaces and phenomena which convert fixed contamination to non-fixed during transport (i.e., the cause of "weeping");
  - 2.2. investigating techniques to reduce contamination such as surface treatments (painting, plating, polishing, etc.); and,
  - 2.3. effects of weathering (rain, snow, ice, etc.) and other factors in the dispersion of surface contamination to the environment.
3. Development of dose pathway models to calculate exposures to transport workers and members of the public resulting from surface contamination present during transport;
  - 3.1. identification and determination of critical parameters for calculating potential doses to power plant workers during handling and loading/unloading of the cask onto the conveyance and to transport workers and members of the public during transport. These parameters include consideration of resuspension factors for contaminants on cask surfaces, external dose contributions from loaded casks, transfer of contamination to accessible surfaces, etc.;
  - 3.2. developing "Q-system"-like dose pathways and exposure parameters which will allow calculation of potential doses to transport workers and members of the public from given levels of contamination; and,
  - 3.3. performing calculations to quantify the relationships between contamination levels and doses, including consideration of multiple journeys over the same routes and possible buildup of contaminants on conveyances and railways/highways.

Work plan for the coming year  
*Programme de travail pour l'année à venir*

Preliminary investigations will be undertaken in all three areas of research identified above.

Brief description of facilities available  
*Brève description des installations disponibles*

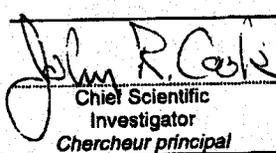
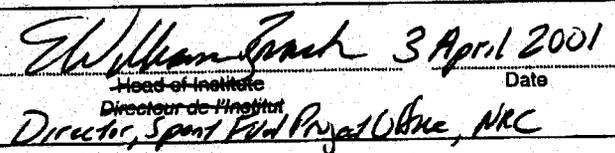
Oak Ridge National Laboratory and Sandia National Laboratories have extensive facilities, however, most of this research will not require specialized facilities.

Date at which project would commence  
*Date à laquelle l'exécution du projet commencerait*

30 May 2001

It is understood that close contact would be maintained on matters of mutual interest and that our institute would participate in any exchange of scientific information with other institutes participating in the project in this field. We would agree to furnish at the end of the year a technical report on the work done, it being understood that this report may be in the form of a re-print, pre-print, or report normally prepared for other purposes. The information so provided may be made freely available throughout the world.

*Il est entendu que nous maintiendrions des contacts étroits sur toutes les questions d'intérêt mutuel et que notre institut participerait aux échanges de renseignements scientifiques qui pourraient avoir lieu entre les instituts qui prennent part à l'exécution du projet de travaux dans ce domaine. Nous accepterions de soumettre à la fin de l'année un rapport technique sur les travaux exécutés, étant entendu que ce rapport pourrait être présenté sous la forme d'un tiré à part, d'un avant-tirage ou d'un rapport rédigé normalement à d'autres fins. Les renseignements ainsi fournis pourraient être diffusés librement dans le monde entier.*

 Chief Scientific Investigator Chercheur principal	3 April 2001 Date	 Head of Institute Directeur de l'Institut Director, Spent Fuel Project Office, NRC	3 April 2001 Date
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