Data Development Project Proposal # 1

1. Proposed Title of the Project

NEW INTERNATIONAL REACTOR DOSIMETRY FILE, IRDF-2000

2. Scientific Background and Objectives

The last tested version of the reactor dosimetry file IRDF-90 V2 was released in 1993. Most of the evaluations for this file were prepared in the mid-eighties. Since then a large number of new experimental data have been measured, and two new national reactor dosimetry libraries have been produced (RRDF-98 and JENDL/D-99). Reaction cross sections and uncertainties included in these libraries may be of better quality than the data in the older IRDF-90 file. Some laboratories have started to use data from the newer libraries, which is creating difficulties in comparing neutron fluences and spectra that have been evaluated using different dosimetry data. There are strong requests from the reactor dosimetry user community for an updated standardised version of the IRDF-90 file.

The objective of the project is to prepare and distribute standardised, updated and benchmarked neutron dosimetry reaction cross section library (IRDF-2000) for use in nuclear power lifetime management assessments.

3. Scope of Project

Intercomparison of various dosimetry reaction cross sections libraries, including IRDF-90, RRDF-98, and JENDL/D-99. Evaluation and generation of new data required by reactor dosimetry community. Assembly of the new internationally-recommended library IRDF-2000. Benchmark IRDF-2000 in the NPP full-scale exercises.

4. Deliverables

A benchmarked and extended International Reactor Dosimetry Library (IRDF-2000) for nuclear power reactor lifetime management assessments.

5. Implications for the Future

With the ageing of nuclear power reactors, reliability of their life time management assessment is of international concern. Hence, the availability and accuracy of dosimetry cross sections are of increased importance. An update and extension of the older IRDF-90 file is long overdue. Lack of an up-to-date standardised and benchmarked dosimetry data library creates difficulties in comparing and verifying the reliability of power reactor lifetime assessments that results in societal and safety implications.

6. Endorsement

The role of the IAEA in co-ordinating the project is endorsed by Dr. P. D'hondt, Chairman of European Working Group on Reactor Dosimetry (EWGRD), by P.J. Griffin, Chairman ASTM E10.05, Nuclear Reaction Metrology, and by 10th International Symposium on Reactor Dosimetry (Osaka, Japan, September 12 – 17, 1999).

7. Strategy and Action Plan

The project could be completed within two years through a few (one year) research contracts and one consultants' meeting with the participation of 4–5 experts.

- Start with an intercomparison of reactor dosimetry cross section data and their uncertainties in various libraries including IRDF-90.2, JENDL/D-99 and RRDF-98. The reaction rates in a standard neutron field will be compared.
- Select best data, based on the above comparison of data for IRDF-2000.
- Evaluate and test new reaction cross sections requested by reactor dosimetry community for extension of the data base.
- Benchmark the important dosimetry reactions (used for ex-vessel neutron spectrum unfolding) with data from full-scale measurements.