2. Specific Research Objectives

The need for evaluated fission yields

– Review the transmutation scenarios and associated data needs on safety related parameters and determine the requirements for the development of a fission yield data evaluation.

Collection of data

– Create a computer file of literature references containing experimental fission yield data.

– Create an experimental data-base required for the development of models and systematics.

Yield data measurements and evaluation

– Perform experimental studies and analysis of neutron and proton induced fission yields at intermediate energies.

– Further develop the methodology and tools for fission yield data evaluation, with emphasis on covariance matrix construction, correlation transmission and production, and evaluation systems.

– Define the requirements of evaluators for the systematics and models to be used in the evaluation process.

– Study systematic trends (from measured data) for mass and charge distribution in fission, and develop a system of equations describing these systematics for application in the evaluation of neutron induced fission yields from 10 to 150 MeV for all actinides.

Theoretical studies and model development

– Study fission modes and theoretical models for the fission cross section in the energy range 1-200 MeV, after compound nucleus formation or direct reactions, particularly the effect of multiple-chance fission.

– Study the role in the formation (projectile) of the fissioning nucleus on the fission product mass and charge distributions.

– Develop phenomenological models for the description of charge and mass distributions as functions of incident particle energy and nucleonic composition of fissioning nuclei. Utilize these models for the analysis of experimental yield distributions to determine the model parameters and to obtain the systematics of their dependencies.

– Determine from theoretical and phenomenological studies the energy dependence of pre- and post-fission particles' multiplicities as basic characteristics influencing the prediction power of the evaluation of yields from intermediate energy neutron-induced fission.

– Predict fission product yield data resulting from nucleon-induced reactions at intermediate energies, based on dedicated nuclear reaction models.

Benchmark exercise to test the quality of predictions

The prediction capabilities of the models and systematics developed during this CRP need to be tested and fully defined so that improvements and recommendations regarding their use in the development of fission yield evaluation methods and evaluated data files can be formulated. This objective can be fulfilled through a benchmark exercise designed to produce the desired results within one year. This exercise will generate uncertainty estimates for the fission yields provided by the CRP for applications.