# Report to NRDC: Status of Nuclear Data Activity in Korea

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## 1. Staff of Nuclear Data Evaluation Laboratory (KAERI/NDEL)

KAERI/NDEL has 7 regular staffs and 1 consultant now, 4 staffs for nuclear data evaluation, 3 staffs and 1 full time consultant for data processing and benchmark. Two evaluators will be hired soon.

KAERI/NDEL is performing data evaluation, data processing, and data dissemination inside Korea. However, KAERI/NDEL is also supporting measurement activity in Korea through contract and collaboration.

## 2. Experimental Facility

Three nuclear data measurement facilities were built for capability of measurements.

### 2.1. Pohang Neutron Facility

Pohang Neutron Facility (PNF) was constructed in order to measure neutron cross sections. The characteristics of PNF is as follows;

Electron Linac
Energy: 60 – 75 MeV
Peak Current: 100 – 200 mA
Pulse Width: 1 – 2 us
Frequency: 10 Hz
Target: Ta
TOF: 11 m

Measurements on well known samples are undergoing to confirm performance for the facility.

### 2.2. 1.7 MV Tandem at Geoscince Institute

A tritium target was used to generate neutrons of energy 1 – 2.3 MeV with 2% energy spread. Standard gold capture measurement confirms the maximum neutron flux as $10^8$ n/sec. This electrostatic accelerator is being improved to have a pulsing and double bunching system.

### 2.3. KAERI Hospital Cyclotron

A vacuum scattering chamber was installed at a cyclotron at Korea Cancer Hospital, MC-50. This scattering chamber was used to measure proton scattering cross section.

## 3. Measurements

Most data measurements were done at KURRI and TIT, Japan

### 3.1. Dy and Gd isotopes

Neutron cross sections of Dy isotopes was measured at KURRI linac and TIT peletron. For natural sample, total and capture cross section below 100 keV were measured at KURRI. For metalic samples of Dy-161, -162, -163, and -164, the capture below 100 keV were measured at KURRI and TIT. Capture measurement at 550 keV is planed on 2002 at TIT. Measurement for Gd isotopes, Gd-155, -156, -157, -158, and –160, were performed or undergoing.

### 3.2. Other nuclides at low energy

Total cross section of natural Hf was measured at KURRI. Capture cross section of Th was measured at JINR, Russia.

### 3.3. 1 ~ 2 MeV cross section

The total and capture cross sections of natural Cu and W were measured KIGAM neutron source. Final result is not published yet.

### 3.4. Proton cross section of C

The differential cross sections $C^{12}(p,p')$, $C^{12}(p,d)$, $C^{12}(p,\alpha)$, $C^{12}(p,He^3)$ were measured at 35 MeV. The experiment was carried at the KCCH vacuum scattering chamber. Energy spectrum at 45, 60, 75, 90 degrees were reported. Final result is not published yet.

## 4. Data Evaluation

### 4.1. Neutron Resonance Parameters

The resonance parameters for the fission nuclides are evaluated under collaboration with BNL/NNDC. The resolved resonance parameters, unresolved parameters, and the bound level parameters were evaluated. The Mughabghab compilation of 1981, many recent measurements, and new level density theory are adopted. The evaluated nuclides are Mo-95, Tc-99, Ru-101,Rh-103, Pd-105, Ag-109, I-129, Xe-131, Cs-133, Cs-135, Pr-141, Nd-143, Sm-147, Sm-149, Sm-150, Sm-151, Sm-152, Eu-153, Gd-155, Gd-157, Dy-160, Dy-161, Dy-162, Dy-153, and Dy-164. Almost all evaluations were contributed to ENDF/B-VI.

### 4.2. Neutron Cross Sections

Along with resonance parameter evaluation, higher energy part below 20 MeV were evaluated using EMPIRE-II under collabotation with BNL/NNDC.

### 4.3. Intermediate Energy Nuclear Data

Major efforts for the intermediate nuclear data above 20 MeV were to setup computation system and optical parameter search for various nuclides.

Another important work are on the soft rotator model study for the inelastic scattering cross section calculation of structure materials.

### 4.4. Charged Particle Data

Charged Particle Data including scattering cross sections were evaluated up to energy range of 60 MeV for the proton incident reactions of Al, Ti, Ni, Cu, Zn, Kr, Cd, Te, I, Xe, N, O, the deuteron incident reactions of Al, Ti, Fe, Ni, N, O, the He-3 incident reactions of Al, Ti, and the He-4 incident reactions of Al, Ti, Cu. The resulting library was published as KAERI report.

## 5. Data Service

NDEL/KAERI is providing an internet service targeting the people outside of nuclear data community. (http://atom.kaeri.re.kr/) A pointwise ENDF / MCNP library plotting web service was developed last year.