

SCALE 6 Multigroup Libraries Update

May 11, 2009

Description

The SCALE modules assume that the multigroup cross-section data contain no upscatter data above the first thermal energy group. The ENDF/B-VI and -VII multigroup libraries distributed in SCALE 6 contained upscatter data for nuclides Am242m, Au197, W, W182, W184, W186, Gd155 and Bi209 in the ENDF/B-VI multigroup libraries, and Ag101m, Am242m, Am244m, Cd115m, Co58m, Eu156, Hg199, Hf201, Ho166m, Pm148m, Sb124, Te127m, Te129m, W182, W184, and W186 in the ENDF/B-VII multigroup libraries. The presence of the upscatter data caused a MALOCS library collapse within a TRITON case to fail.

New multigroup libraries without upscatter data above the first thermal group have been created for the 238 neutron group libraries for ENDF/B-VI and -VII as well as the coupled shielding libraries.

SCALE Manual Updates

Updated listings of the libraries in Sect. M4.A are provided in SectM4_updates.pdf.

Testing and Verification

To test the new libraries at ORNL, a suite of 272 benchmark cases representing a wide variety of applications were used to test the 238-group libraries. The cases were also run with the 238-group libraries in the RSICC release of SCALE 6. In addition, test cases for the shielding libraries were run and compared with results using the SCALE 6 RSICC release. There were virtually no differences in results with the new libraries.

Based on the benchmark testing, results are consistent with results obtained in SCALE 6.0. Moreover, the testing demonstrates acceptable results for the benchmark problems. The new libraries are recommended for all SCALE 6 users.

Installation and Test Instructions - Windows

The following updated multigroup libraries are provided in *xsec-lib-update.exe* for Windows. These should be installed in the `\scale6\data` directory.

Filename	Date
xn200g47v6	4/7/2009
xn200g47v7	4/7/2009
xn27g19v7	4/7/2009
xn238v6	4/8/2009
xn238v7	4/8/2009

A set of 17 test case input files is provided in *test-cases-windows.exe*. These should be installed in the `\scale6\test\mg-libraries` directory.

To run the test cases, open the Run SCALE6 shortcut and change directories to `\scale6\test\mg-libraries`. Enter the following command to run all test cases.

```
run_all_dir
```

It will take approximately 6 hours for all cases to complete. Once they are finished, enter the following command to collect results.

```
checkall
```

This will compile a summary of results in the file *results.txt*. Compare this file with *ornl-results.txt* and confirm that your results agree within two or three standard deviations with the ORNL results.

Installation and Test Instructions – Linux, Unix, Mac

The new multigroup libraries are provided in *xsec-lib-update.tar.gz* for Linux, Unix, Mac. Place the *xsec-lib-update.tar.gz* in the head SCALE directory. While sitting in that directory, enter the commands

```
gunzip xsec-lib-update.tar.gz
tar -xvf xsec-lib-update.tar
```

The following files should now be in the SCALE **data** directory.

```
scale.rev10.xn238v6
scale.rev06.xn200g47v6
scale.rev06.xn27g19v7
scale.rev06.xn200g47v7
scale.rev05.xn238v7
```

A set of 17 test case input files is provided in *test-cases-unix.tar.gz*. These should be uncompressed and installed in an empty directory.

Run all 17 cases. It will take approximately 6 CPU hours for all cases to complete. Once they are finished, enter the following command to collect results.

```
checkall
```

This will compile a summary of results in the file *results.txt*. Compare this file with *ornl-results.txt* and confirm that your results agree within two or three standard deviations with the ORNL results.