EPA Comment (Received during EPA Run Control Inspection for the Week of August 9, 2004):

Investigate how CCDFGF and SUMMARIZE are checked/verified/tested for capturing the correct code CDB data streams.

Original DOE Response

Dunagan (2004) describes the procedure used to verify that SUMMARIZE and CCDFGF have captured the correct code Computational Database (CDB) data streams. The actual processing of CDB data streams is verified in advance because the codes which manipulate CDB data streams have been validated and verified for this purpose in accordance with Sandia National Laboratories (SNL) software quality assurance procedure NP 19-1. The selection of CDB data streams to process is controlled by scripts that are part of the Performance Assessment Run Control System (PA RCS). Verifying that these scripts choose the appropriate data streams is accomplished by comparing the script input files with PA RCS log files.

Addendum to DOE Response

The purpose of this addendum is to report on additional work (Kanney and Kirchner 2005) to verify that data from process model CDB files is being transferred across the SUMMARIZE interface with sufficient accuracy.

During their review of the 2004 Compliance Recertification Application (CRA-2004), EPA requested information regarding how data transfer between process model codes and CCDFGF was verified. DOE responded to this request by describing a procedure for inspecting WIPP PA Run Control log files to verify that the correct files were fetched from CMS libraries and used by SUMMARIZE (Dunagan 2004, Piper 2004). Subsequent to the response, several problems with data transfer across the SUMMARIZE interface were discovered, corrected and reported. The problems encountered fell into two categories:

- Certain releases were miscalculated because information in certain SUMMARIZE output tables was not in the column that PRECCDFGF expected.
- Releases to the Culebra were under-estimated in several cases because SUMMARIZE wrote zeros to the output table when it could not locate an input CDB file.

The impact of the first class of errors on the results and conclusions of the CRA-2004 were determined to be minimal (Vugrin 2004). An informal review of the second type of error indicates that the impact is minimal (a formal review is in progress). Regardless, it was recognized that the SUMMARIZE interface needed to be improved in future PAs.

Both classes of problems outlined can be traced back to errors in the SUMMARIZE input files, not with the SUMMARIZE code itself. Nearly 600 SUMMARIZE input files were

used in the CRA-2004. Since each one was prepared manually, the probability of errors was considerable. However, it was determined that improving the SUMMARIZE code was an important part of improving the interface between process model codes and CCDF construction codes. The following steps were followed to improve the SUMMARIZE interface:

- A PRECCDFGF driver was added to the set of output drivers in SUMMARIZE. This driver writes header information at the top of the output table. The header information identifies the data that appears in the rest of the table.
  The PRECCDFGF code was modified to read the header information produced by SUMMARIZE to verify that the data in the input file is in the order required by PRECCDFGF.
- The SUMMARIZE code was modified to incorporate strict checking of the vector list, removing the possibility that vectors are inadvertently skipped due to errors in CDB file specification.
  The WIPP PA Run Control scripts were re-written to automate the generation of the SUMMARIZE input files and eliminate errors introduced during manual editing of the files.

The steps outlined above were implemented (following all applicable software quality assurance procedures) and used in the 2004 Compliance Recertification Performance Assessment Baseline Calculation (CRA-2004 PABC, Kanney and Leigh (2005)).

In order to demonstrate that the improvements made to the SUMMARIZE interface have eliminated the errors discussed above, a verification study has been performed. The procedures and results of the verification of the SUMMARIZE interface in the CRA-2004 PABC are documented in Kanney and Kirchner (2005). This report verifies that data from process model CDB files is now being transferred across the SUMMARIZE interface with sufficient accuracy.

References

Dunagan, S. 2004. Explanation of how SUMMARIZE and CCDFGF are checked/verified/tested for capturing the correct CDB data streams in the WIPP CRA-2004 Performance Assessment. Technical Memorandum ERMS 536767, Sandia National Laboratories, Carlsbad, NM.

Kanney, J. F., and T. B. Kirchner. 2005. Verification of the SUMMARIZE Interface in the CRA-2004 Performance Assessment Baseline Calculation. ERMS 540977, Sandia National Laboratories, Carlsbad, NM.

Kanney, J. F., and C. Leigh. 2005. Analysis Plan for Post CRA PA Baseline Calculation (AP-122). ERMS 539624, Sandia National Laboratories, Carlsbad, NM.

Piper, L. 2004. 4th Response Submittal to EPA. U.S. Department of Energy, Carlsbad, NM.

Vugrin, E. D. 2004. Corrected CRA Figures. Technical Memorandum ERMS 538260, Sandia National Laboratories, Carlsbad, NM.