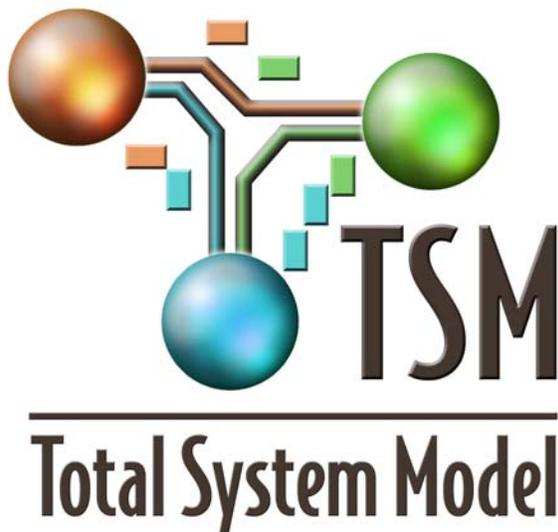




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Validation Report: Total System Model Version 6.0 Report Generators



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Validation Report: Total System Model Version 6.0 Report Generators

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October 2007

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CHANGE HISTORY

Revision No.	Date	Description
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ACRONYMS AND ABBREVIATIONS

Note: All of these acronyms are not included in the text of this report but may appear in attached files and are listed here for those interested in reviewing the attached file.

BWR	Boiling Water Reactor
BSC	Bechtel SAIC Company, LLC
CIRG	Cask Information Report Generator
CRD	Civilian Radioactive Waste Management System Requirements Document
CRG	Cost Report Generator
CRWMS	Civilian Radioactive Waste Management System
CSNF	Commercial Spent Nuclear Fuel
DLRG	Drift Length Report Generator
DPC	Dual-Purpose Canister
DOE	U.S. Department of Energy
DOE SNF	U.S. Department of Energy Spent Nuclear Fuel
DRG	Dose Report Generator
DVCG	DOE Valley Curve Generator
GRG	GROA Report Generator
GROA	Geologic Repository Operations Area
HLW	High-Level Radioactive Waste
IS	Initial State
MTU	Metric Tons of Uranium
PWR	Pressurized Water Reactor
RG	Report Generator
RRG	Results Report Generator (also called TSMRRG)
SSC	Site-Specific Canister (MPC)
TAD	Transportation, Aging, and Disposal
TCRG	Transportation Cost Report Generator
TSC	Transportable Storage Cask
TSLCC	Total System Life Cycle Cost
TSM	Total System Model
TSMRRG	TSM Results Report Generator
TSMPP	Total System Model Preprocessor

TSRG	Transportation Shipment Report Generator
TTRG	TAD Throughput Report Generator
UM	User Manual
VB	Visual Basic
VCG	Valley Curve Generator
WP	Waste Package

1. OBJECTIVE AND BACKGROUND

1.1 INTRODUCTION

This validation report supports the issuance of Version 6.0 of the Total System Model (TSM, BSC 2007a) that is described in the TSM User Manual (UM, BSC 2007b) and the TSM Preprocessor (TSMPP) User Manual (BSC 2007c). This report assumes the reader has detailed, working knowledge of the TSM functions and the Civilian Radioactive Waste Management System (CRWMS) operations. This report is based on an earlier document, *Validation Report: Total System Model Version 5.0 Report Generators* (BSC 2007d) that supported TSM Version 5.0. The format of this document is identical to that of the Version 5.0 validation document. The content of this document has been updated to reflect changes made to report generators (RGs) for TSM Version 6.0. See the TSM UM for more information on the changes for TSM Version 6.0.

This validation was performed in accordance with AP-ENG-006, *Total System Model (TSM)-Changes to Configuration Items and Base Case*.

The TSM RGs are post-processing tools created to facilitate the study and verification of results from TSM model runs. See the UM, Section 5.3.2 and Appendix A for more information. The RGs that underwent the validation process described in this document (except the Transportation Shipment Report Generator [TSRG]) are in Table 1. The TSRG was validated as documented in the *Total System Model Version 6.0 Transportation Validation Report* (BSC 2007e).

Table 1. Report Generators Validated in this Report

Report Generator	Abbreviation	Version ¹
Cask Information Report Generator	CIRG	2.0
Cost Report Generator	CRG	3.0
DOE (Department of Energy) Valley Curve Generator	DVCG	2.0
Dose Report Generator	DRG	2.0
Drift Length Report Generator	DLRG	3.0
GROA (Geologic Repository Operations Area) Report Generator	GRG	2.0
Results Report Generator	RRG	2.0
TAD (Transportation, Aging, and Disposal) Throughput Report Generator ²	TTRG	3.0
Transportation Cost Report Generator	TCRG	2.0
Transportation Shipment Report Generator	TSRG	1.5
Valley Curve Generator	VCG	3.0

Note 1: Version numbers are as validated. When TSM Version 6.0 is issued the configured versions of the RG will be issued as V6.0.

1.2 MAJOR RG CHANGES FROM TSM VERSION 6.0

The main changes in the RG are the addition of the DVCG, TCRG, and the TSRG.

Other modifications to the RG are in the RG revision log that is in Appendix A. These changes were primarily made to revise the RG to the revision and changes for TSM Version 6.0 as described in the TSM UM (BSC 2007b). However, there were other changes to improve the RG deemed necessary by the TSM Developers Group.

The revisions in Appendix A are listed by two-digit version numbers and the version numbers are changed at the discretion of the developers as the changes are made. Typically, a change in the initial digit indicates a major change in the RG content and a change in the second digit indicates a minor change such as formatting changes, minor changes for query names, etc. The RG version that was validated is indicated in Table 1. As noted on Table 1, when the TSM Version 6.0 is issued, the RG version number used by the developers is retained and the revision log notes which version number was issued as a configured version with a configured version of the TSM.

2. VALIDATION

2.1 METHOD

The TSM RGs were designed to automate the analysis of model data and computations through the use of Visual Basic™ (VB) macros in Microsoft Excel workbooks. To verify the accuracy of the implementation, the validation process manually applied functions and formulas at the Excel worksheet cell level to compare to the VB results. In some cases, alternate queries were devised and run manually to check the results. The workbooks with the manual checks are attached to this report.

The same general validation process was performed on each of the generators. Data from runs in various interim versions of TSM Version 6.0 were used for the input data files. The TSM Developers Group supervised the runs that were used to ensure that revisions to TSM programming did not impact the results. If there were changes that could impact the results, a new validation was done for the RG worksheets that could be impacted and the updated validation is documented in this report. As a final check, all RGs were run during the end-to-end tests in the integrated TSM validation and the results were checked as part of that validation (BSC 2007f).

The input data is from .simdata files, .mdb files, and Initial State (IS) files found in the zipped “run files” (attached). The run file and data file are noted either at the top of the validated worksheets or in a new sheet that has comments about the validation. Because the .simdata and .mdb files are in a Microsoft Access database format, traditional SQL queries can be used to extract data from the files. The SimCAD™ Data analyzer can also be used to extract data manually.

To verify results, a validation column was typically added next to each column of the worksheet generated by the VB. In some cases, queries were written that provided several columns of results and these were usually inserted to the right of the RG results. A visual check was then made to compare results between the inserted columns and the columns of RG results. This validates that the data was properly extracted from the results database and that the VB is performing the desired analysis.

In some cases, the RGs use the same programming to generate multiple worksheets but query different variables or TSM process data. For these cases, alternate query programming was used to check the programming for one sheet; then sheets with the same programming were validated by ensuring the proper variable names, process names or records were used in the other sheets with the same programming. For worksheets checked with this method the analyst doing the validation confirmed that the proper names were used for the query.

Color-coding is used to highlight the validation results. Original columns of the generator have a white background. Validation columns have a colored background. In each worksheet, comment boxes and a text box provide clarification for complicated calculations. An explanation of colors is in Table 2.

Table 2. Color Coding on Validated RG Workbooks

Blue	Indicates values extracted from the selected input file.
Green	Represents calculations using extracted values.
Pink	Indicates intermediate calculation, reference values, or the assignment of a value to use for making final calculations.
Yellow	Identifies data retrieved or calculated that are removed from the final report.
Purple	Values copied from other worksheets usually for summary purposes.

A description of each step of the validation procedure is described in Figure 1. The RG workbooks were validated in parallel with the final refinements of the TSM during the integrated TSM validation and testing. So, there were many opportunities to identify discrepancies and make changes to the RG or in some cases to the TSM. The process to iteratively validate the RG in parallel with the TSM is discussed in the TSM Validation Report (BSC 2007f).

As described in the TSM Validation Report (BSC2007f), the final test for the TSM is an end-to-end test and all of the RG were rerun as part of the test in the final version issued as TSM Version 6.0. Those RG results were manually reviewed for correctness and to ensure the RG is compatible with the issued TSM Version 6.0. The detailed checks described in this validation report and Figure 1 were not repeated.

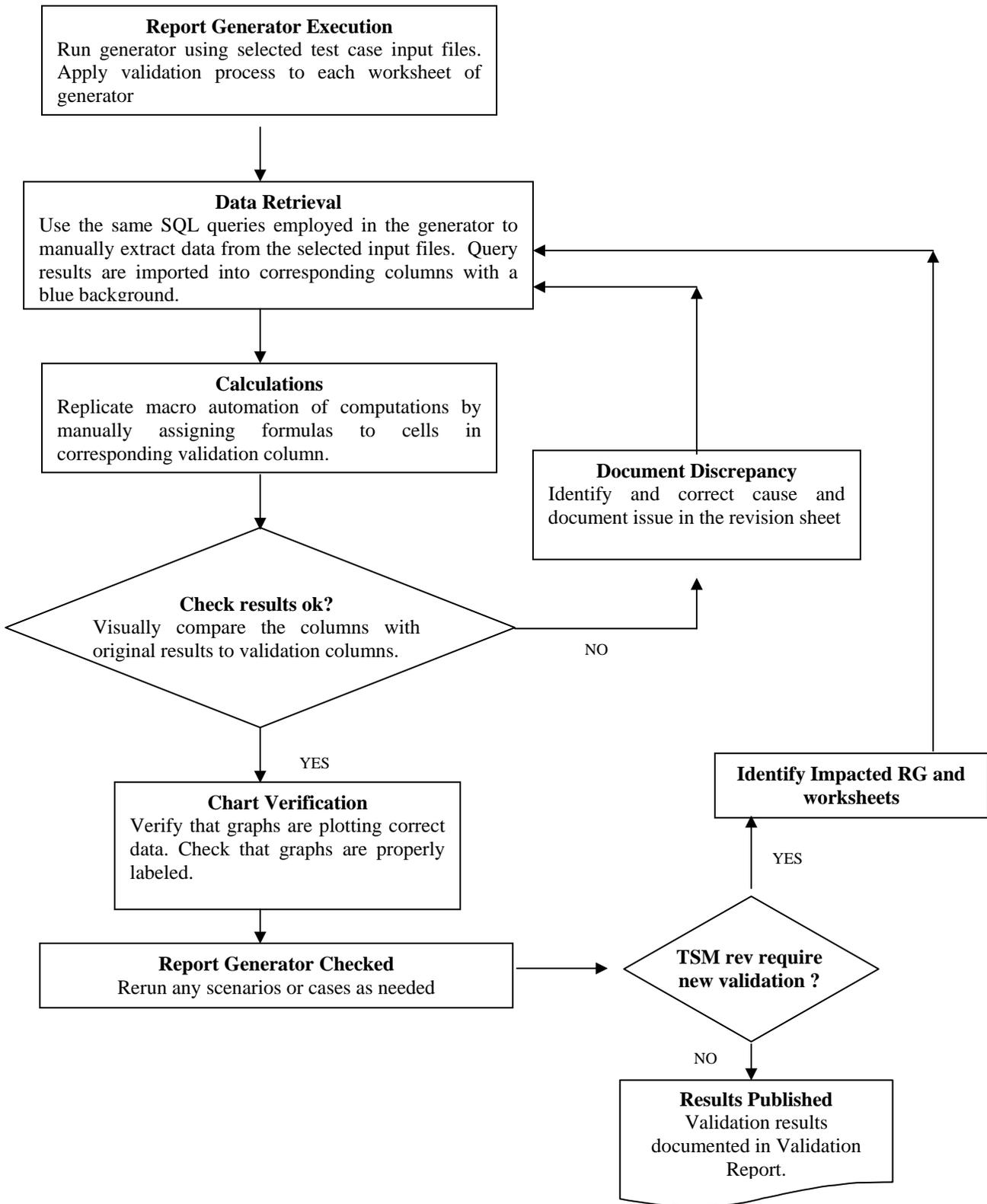


Figure 1. Report Generator Validation Process Flowchart

2.2 VALIDATION RESULTS

An RG worksheet was considered successfully validated when the values in the validation columns matched the original values in the corresponding columns. Discrepancies found during the validation process were identified as well as the reason for the discrepancy and corrections were made if needed. Minor discrepancies for round off or other minor differences of a few percent were documented with a note. Table 3 lists each of the worksheets in the RGs and its validation status. The Validation Workbook/Test Case Run File column lists the RG validation file and the run file that was used. Notice that the run file names include the interim TSM version. As mentioned in Section 2, if there were subsequent changes to a worksheet, that worksheet was re-validated using a later version. So, some RG workbooks may show more than one interim version that was used for different worksheets.

The validated RG workbooks and run files are attached to this report; see Section 5.

The RG results for the end-to-end test are documented in the TSM Validation Report (BSC 2007f) and the RGs for the end-to-end tests are attached to the TSM Validation Report.

Table 3. Validation Results

Report Generator	Worksheet	Passed Validation	Validation Workbook/ Test Case Run File
CIRG	1. Cask Data	√	TSM Cask Information Report Generator_A2B_090407_dlm_slx.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
CIRG	1A. Cask Allocation	√	TSM Cask Information Report Generator_A2B.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
CIRG	2. Cask Residence Time	√	TSM Cask Information Report Generator_A2B_090407_dlm_slx.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
CIRG	3. Cask 1 Residence Time	√	(Same function as Sheet 4)
CIRG	4. Cask 6 Residence Time	√	TSM Cask Information Report Generator_A2B.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
CIRG	5. Cask 26 Residence Time	√	(Same function as Sheet 4)
CIRG	6. Cask 44 Residence Time	√	(Same function as Sheet 4)
CIRG	6A. Cask 2XX Residence Time	√	(Same function as Sheet 4)
CIRG	7. Cask 202 Residence Time	√	(Same function as Sheet 4)
CIRG	8. Cask 208 Residence Time	√	(Same function as Sheet 4)
CIRG	9. Cask 253 Residence Time	√	(Same function as Sheet 4)
CIRG	10. Site Batching Times	√	TSM Cask Information Report Generator_A2B_090407_dlm_slx.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
CIRG	Cask Reference	N/A	

Report Generator	Worksheet	Passed Validation	Validation Workbook/ Test Case Run File
CRG	Reference & End User Inputs	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	1. WAST Operations Cost	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	2. CSNF (Commercial Spent Nuclear Fuel) Trans Cask Costs- No TAD	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	2A. TSC (Transportable Storage Cask) Use	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	2B. DOE Cask Costs	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	2C. DOE OV (Overpack) Cask Costs	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	3. TAD Trans Overpack Costs	√	TSM Cost Report Generator_091307_dlm.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	4. Cask Rail Car Costs	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	5. TAD Costs	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	5A. TAD Arrivals	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	6. CSNF Waste Package Costs	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	6A. DOE Waste Package Costs	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	7.WHF TAD Canisters	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	8. TAD Age Overpacks	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	9. DPC (Dual-Purpose Canister) Age Overpacks	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	10. All Age Overpacks	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	10A. No. in Aging	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	11. Rolling Stock	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	12. Reserved	N/A	
CRG	13. DPC Disposal	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip

Report Generator	Worksheet	Passed Validation	Validation Workbook/ Test Case Run File
CRG	14. Reserved	N/A	
CRG	15. All Costs	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	16. TADs Pool	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	17. TADs Dry	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	18. Results Summary	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	19. Annual Costs	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
CRG	20. Annual Items	√	TSM Cost Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
DLRG	Introduction	√	TSM Drift Length Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
DLRG	1. WP Lengths	√	TSM Drift Length Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
DRG	1. Dose Summary	√	TSM DRG_BasisDate20070813_A2B20070815.xls TSM_V6.0E5_71_TSLCC_XPC_8-08-07.
DRG	2. Process Lines	√	TSM DRG_BasisDate20070813_A2B20070815.xls TSM_V6.0E5_71_TSLCC_XPC_8-08-07.zip
DVCG	1. DSNF ¹ IS Cask Load	√	TSM DOE Valley Curve Generator_a2b.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
DVCG	2. DSNF ¹ Cask Load Delays	√	TSM DOE Valley Curve Generator_a2b.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
DVCG	DSNF ¹ Reference	N/A	
DVCG	3. HLW (High-Level Radioactive Waste) IS Cask Load Delays	√	(Same function as Sheet 1)
DVCG	4. HLW Cask Load Delays	√	(Same function as Sheet 2)
DVCG	HLW Reference	N/A	
DVCG	5. MCO (Multi-Canister Overpack) IS Cask Load	√	(Same function as Sheet 1)
DVCG	6. MCO Cask Load Delays	√	(Same function as Sheet 2)
DVCG	MCO Reference	N/A	
DVCG	7. NAVY IS Cask Load	√	(Same function as Sheet 1)
DVCG	8. NAVY Cask Load Delays	√	(Same function as Sheet 2)

Report Generator	Worksheet	Passed Validation	Validation Workbook/ Test Case Run File
DVCG	Navy Reference	N/A	
DVCG	9. Cask Load Delays SRS-HLW		TSM DOE Valley Curve Generator_F7_CD1 validation.xls TSM_V6.0F7_71_CD1_Lisa_10-05-07.zip
DVCG	10. Cask Load Delays SRS-DSNF		TSM DOE Valley Curve Generator_F7_CD1 validation.xls TSM_V6.0F7_71_CD1_Lisa_10-05-07.zip
DVCG	11. Cask Load Delays HAN-HLW		TSM DOE Valley Curve Generator_F7_CD1 validation.xls TSM_V6.0F7_71_CD1_Lisa_10-05-07.zip
DVCG	12. Cask Load Delays HAN-DSNF		TSM DOE Valley Curve Generator_F7_CD1 validation.xls TSM_V6.0F7_71_CD1_Lisa_10-05-07.zip
DVCG	13. Cask Load Delays INL-HLW		TSM DOE Valley Curve Generator_F7_CD1 validation.xls TSM_V6.0F7_71_CD1_Lisa_10-05-07.zip
DVCG	14. Cask Load Delays INL-DSNF		TSM DOE Valley Curve Generator_F7_CD1 validation.xls TSM_V6.0F7_71_CD1_Lisa_10-05-07.zip
DVCG	15. Cask Load Delays INL-NAVY		TSM DOE Valley Curve Generator_F7_CD1 validation.xls TSM_V6.0F7_71_CD1_Lisa_10-05-07.zip
GRG	1. Load-Unload by Bldg	√	TSM GROA Report Generator_a2b.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
GRG	2. Load-Unload System Balance	√	TSM GROA Report Generator_a2b.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
GRG	3. WP (Waste Package) and TAD Created	√	TSM GROA Report Generator_a2b.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
GRG	4. BWR (Boiling Water Reactor) Heat by Time	√	TSM GRG_CD1_Russ_9-19-07_RG_9-20-07.xls TSM_V6.0F4_CD1_russ_091907.zip
GRG	5. PWR (Pressurized Water Reactor) Heat by Time	√	TSM GRG_CD1_Russ_9-19-07_RG_9-20-07.xls TSM_V6.0F4_CD1_russ_091907.zip
RRG	1. Object Data	√	TSM RRG 9-12-07 Validation 25A E9 .xls TSM_V6.0E9_71_Lisa_25A.zip
RRG	2. Cost and Throughput	√	TSM RRG 9-12-07 Validation 25A E9 .xls TSM_V6.0E9_71_Lisa_25A.zip
RRG	3. GROA Parameters	√	TSM RRG 9-12-07 Validation 25A E9 .xls TSM_V6.0E9_71_Lisa_25A.zip
RRG	4. Summary Results	√	TSM RRG 9-12-07 Validation 25A E9 .xls TSM_V6.0E9_71_Lisa_25A.zip

Report Generator	Worksheet	Passed Validation	Validation Workbook/ Test Case Run File
TCRG	Reference & End User Inputs	N/A	
TCRG	1. Rail Costs	√	TSM Transportation Cost Report Generator_A2B_20070831_slr.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
TCRG	2. Truck Costs	√	TSM Transportation Cost Report Generator_A2B_20070831_slr.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
TCRG	3. All Cask Costs	√	TSM Transportation Cost Report Generator 0F7 CD1.xls TSM_V6.0F7_71_CD1_Lisa_10-05-07.zip
TCRG	4. TSC (Transportable Storage Cask) Costs	√	TSM Transportation Cost Report Generator_A2B_20070831_slr.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
TCRG	5. Truck Cask Costs	√	TSM Transportation Cost Report Generator_A2B_20070831_slr.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
TCRG	6. Large Rail Costs	√	TSM Transportation Cost Report Generator_A2B_20070831_slr.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
TCRG	7. Large Rail Overpacks	√	TSM Transportation Cost Report Generator_A2B_20070831_slr.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
TCRG	8. Medium Rail Cask	√	TSM Transportation Cost Report Generator_A2B_20070831_slr.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
TCRG	9. Small Rail Cask	√	TSM Transportation Cost Report Generator_A2B_20070831_slr.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
TCRG	10. DOE Cask Costs	√	TSM Transportation Cost Report Generator_A2B_20070831_slr.xls TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip
TTRG	1. CSNF Processed	√	TSM TAD Throughput Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
TTRG	2. TAD Processed	√	TSM TAD Throughput Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
TTRG	3. DOE Processed	√	TSM TAD Throughput Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
TTRG	4. WHF (Wet Handling Facility) Unload	√	TSM TAD Throughput Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
TTRG	5. CRCF1 (Canister Receipt and Closure Facility1) Unload	√	TSM TAD Throughput Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip

Report Generator	Worksheet	Passed Validation	Validation Workbook/ Test Case Run File
TTRG	6. CRCF2 Unload	√	TSM TAD Throughput Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
TTRG	7. CRCF3 Unload	√	TSM TAD Throughput Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
TTRG	8. To Aging	√	TSM TAD Throughput Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
TTRG	9. IHF (Initial Handling Facility) WP	√	TSM TAD Throughput Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
TTRG	10. WHF TAD	√	TSM TAD Throughput Report Generator_F7_71_CD1.xls TSM_V6.0F7_71_CD1_Lisa_10-05-07.zip
TTRG	11. CRCF WP	√	TSM TAD Throughput Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
TTRG	12. WP Emplaced	√	TSM TAD Throughput Report Generator_A2B.xls TSM_V6.0E9_71_XPC_LCC_BS.zip
VCG	1. IS Shipments	√	TSM VCG 7-10-07_25A E9 validate.xls TSM_V6.0E9_71_25A_Lisa_9-10-07.zip
VCG	2. MTU (Metric Tons of Uranium) Delays	√	TSM VCG 7-10-07_25A E9 validate.xls TSM_V6.0E9_71_25A_Lisa_9-10-07.zip
VCG	3. Pad Staging	√	TSM VCG 7-10-07_25A E9 validate.xls TSM_V6.0E9_71_25A_Lisa_9-10-07.zip
VCG	4. Pad Staging-MTU	√	TSM VCG 7-10-07_25A E9 validate.xls TSM_V6.0E9_71_25A_Lisa_9-10-07.zip
VCG	Reference	N/A	

Note 1: DSNF = DOE SNF = U.S. Department of Energy Spent Nuclear Fuel

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3. USE OF COMPUTER SOFTWARE AND MODELS

The following computer software and models are used in this calculation:

- TSM Interim Version 6.0
- SimCADPro™ 7.1
- SimCAD™ Data Analyzer Version 2.0
- MS EXCEL 2003
- MS Access 2003

TSM RGs and the versions that were validated are listed in Table 1 and Table 3. See Section 5.0 for a listing the attached RG workbook files.

The TSM model interim versions that were used are included in the run files that are listed in Section 5.

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4. REFERENCES

4.1 DOCUMENTS CITED

Bechtel SAIC Company, LLC (BSC) 2007a. *Total System Model Version 6.0*. Washington DC: BSC. Software ID: 50040.

BSC 2007b. *User Manual for the Total System Model Version 6.0*. 50040-UM-01-6.0-00 REV 00. Washington, DC: BSC. ACC: Submit to RPC.

BSC 2007c. *User Manual for the Total System Model Version 6.0 Preprocessor*. 50040-UM-02-6.0-00 REV 00. Washington, DC: BSC. ACC: Submit to RPC.

BSC 2007d. *Validation Report: Total System Model Version 5.0 Report Generators*. 50040-VAL-03-5.0-00. Washington, DC: BSC. ACC: Submit to RPC.

BSC 2007e. *Total System Model Version 6.0 Transportation Validation Report*, 50040-VAL-06-6.0-00, Bechtel SAIC Company, LLC, Washington, D.C. ACC: Submit to RPC.

BSC 2007f. *Total System Model Version 6.0 Validation Report*, 50040-VAL-01-6.0-00, Bechtel SAIC Company, LLC, Washington, D.C. ACC: Submit to RPC.

4.2 CODES, STANDARDS, REGULATIONS, AND PROCEDURES

AP-ENG-006 REV 0 ICN 0, *Total System Model(TSM) – Changes to Configuration Items and Base Case*. Washington, DC: BSC. ACC: DOC.20050131.0001.

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5. ATTACHMENTS

The files in Table 4 are included electronically. The “Report Generator” files are the RG issued with TSM V6.0. Versions of the RG that were used for validations are listed in the “Validated RG Workbook Files” and these files also contain the detailed checks and notes. The “Run files” lists the run files that were used for validation. Table 3 also lists the RG validation file and run file for each worksheet in the RGs.

Table 4. Electronic Attachments

File Names	Description/Zip File Contents	Size (kB)	Date
Report Generator Files			
TSM CIRG_2-0_090507.zip	TSM Cask Information Report Generator.xls	308	09/05/2007
TSM CRG_3-0_092107.zip	TSM Cost Report Generator.xls	1,034	09/21/2007
TSM DLRG_3-0_092107.zip	TSM Drift Length Report Generator.xls	1,637	09/21/2007
TSM DRG_2-0_092007.zip	TSM Dose Report Generator.xls	155	09/20/2007
TSM DVCG_2-0_092507.zip	TSM DOE Valley Curve Generator.xls	304	09/25/2007
TSM GRG_2-0_092007.zip	TSM GROA Report Generator.xls	1,085	09/20/2007
TSM RRG_2-0_092707.zip	TSM Results Report Generator.xls	165	09/20/2007
TSM TCRG_2-0_091107.zip	TSM Transportation Cost Report Generator.xls	278	09/11/2007
TSM TSRG_1-5_050807_configured_091107.zip	TSM Transportation Shipment Report Generator_9_11_07.xls	180	9/11/2007
TSM TTRG_3-0_091407.zip	TSM TAD Throughput Report Generator.xls	250	09/14/2007
TSM VCG_3-0_092107.zip	TSM Valley Curve Generator.xls	1,711	9/21/2007
Validated RG Workbook Files			
TSM Cask Information Report Generator_A2B.xls	Version 2.0 from 8/20/07 using TSM_V6.0E1_71	1,174	9/04/2007
TSM Cask Information Report Generator_A2B_090407_dlm_slt.xls	Version 2.0 from 8/20/07 using TSM_V6.0E1_71	1,071	10/09/2007
TSM Cost Report Generator_091307_dlm.xls	Version 3.0 from 9/13/07 using TSM_V6.0E9_71, Sheet 19	4,270	9/13/2007
TSM Cost Report Generator_A2B.xls	Version 3.0 from 9/10/07 using TSM_V6.0E9_71	7,311	9/12/2007
TSM DOE Valley Curve Generator_a2b.xls	Version 2.0 from 9/5/07 using TSM_V6.0E9_71 for sheets 1-8	2,547	9/11/2007
TSM DOE Valley Curve Generator_F7_CD1 validation.xls	Version 2.0 from 9/25/07 using TSM_V6.0F7_71 for sheets 9-15	1,928	10/11/2007
TSM DRG_BasisDate20070813_A2B20070815.xls	Version 2.0 from 8/12/07 using TSM_V6.0E5_71 for sheets 9-15	774	8/16/07
TSM Drift Length Report Generator_A2B.xls	Version 2.6 from 3/29/07 using TSM_V6.0E9_71	4,709	9/7/2007

File Names	Description/Zip File Contents	Size (kB)	Date
TSM GRG_CD1_Russ_9-19-07_RG_9-20-07.xls	Version 2.0 from 9/20/07 using TSM_V6.0F4_71, sheet 4,5	2,582	10/09/2007
TSM GROA Report Generator_a2b.xls	Version 2.0 from 8/28/07 using TSM_V6.0E9_71, sheets 1-3	5,989	9/05/2007
TSM RRG 9-12-07 Validation 25A E9 .xls	Version 2.0 from 9/12/07 using TSM_V6.0E9_71	982	9/14/2007
TSM TAD Throughput Report Generator_A2B.xls	Version 3.0 from 8/02/07 using TSM_V6.0E9_71	950	9/14/2007
TSM TAD Throughput Report Generator_F7_71_CD1.xls	Version 3.0 from 9/14/07 using TSM_V6.0F7_71 (for Sheet 10 only)	831	10/10/2007
TSM Transportation Cost Report Generator 0F7 CD1.xls	Version 3.0 from 8/02/07 using TSM_V6.0F7_71 (for Sheet 3 only)	611	10/10/2007
TSM Transportation Cost Report Generator_A2B_20070831_slt.xls	Version 1.2 from 4/06/06 using TSM_V6.0E7_71	1,901	9/05/2007
TSM VCG 7-10-07_25A E9 validate.xls	Version 3.0 from 7/07/07 using TSM_V6.0E9_71	21,809	9/11/2007
Run Files			
TSM_V6.0E5_71_TSLCC_XPC_8-08-07.zip	Run file for DRG validation TSM_V6.0E5_71.SIM, TSM.mdb, tsm_v6.xml, TSM_V6.0E5_71.simdata, IS_07LCC_newNavyIAS_WO_030507.xls	48,533	8/08/2007
TSM_V6.0E7_71_TSLCC_XPC_8-19-07.zip	Run file for CIRG, TCRG validations TSM_V6.0E7_71.SIM, TSM.mdb, tsm_v6.xml, TSM_V6.0E7_71.simdata, IS_07LCC_newNavyIAS_WO_030507.xls	50,685	8/19/2007
TSM_V6.0E9_71_25A_Lisa_9-10-07.zip	Run file for VCG validation TSM_V6.0E9_71.SIM, TSM.mdb, tsm_v6.xml, TSM_V6.0E9_71.simdata, IS_WO_V3.0G_TAD_Scn25A_DOE_TSC_6-13.xls	59,761	9/10/2007
TSM_V6.0E9_71_Lisa_25A.zip	Run file for RRG validation TSM_V6.0E9_71.SIM, TSM.mdb, tsm_v6.xml, TSM_V6.0E9_71.simdata, IS_WO_V3.0G_TAD_Scn25A_DOE_TSC_6-13.xls	60,899	9/04/2007
TSM_V6.0E9_71_XPC_LCC_BS.zip	Run file for CRG, DLRG, DVCG-Sheets 1-8, GRG-Sheets 1-3, TTRG-Except Sheet 10 validations TSM_V6.0E9_71.SIM, TSM.mdb, tsm_v6.xml, TSM_V6.0E9_71.simdata, IS_07LCC_newNavyIAS_WO_030507.xls	50,386	9/04/2007
TSM_V6.0F4_CD1_russ_091907.zip	Run file for GRG-Sheets 4,5 validation TSM_V6.0F4_71.SIM, TSM.mdb, tsm_v6.xml, TSM_V6.0F4_71.simdata, IS_CD-1_70kWS_NoTeleport_WO_083007.xls	25,851	9/19/2007

File Names	Description/Zip File Contents	Size (kB)	Date
TSM_V6.0F7_71_CD1_Lisa_10-05-07.zip	Run file for TTRG-Sheet 10, TCRG-Sheet 3, DVCG-sheets 9 through 14 validations TSM_V6.0F7_71.SIM, TSM.mdb, tsm_v6.xml, TSM_V6.0F7_71.simdata, IS_CD-1_70kWS_NoTeleport_WO_083007.xls	23,871	10/05/2007

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APPENDIX A
REPORT GENERATOR REVISION LOG

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APPENDIX A. REPORT GENERATOR REVISION LOG

This appendix contains portions of the change log for the RGs maintained by the TSM Developers Group. The list shows all of the changes to the RGs for TSM Version 6.0 after issuance with TSM Version 5.0. The DVCG, TCRG, and TSRG were not previously issued with a TSM version release so the changes from the initial version are included.

When a TSM version is released, the interim version of the TSM RG is revised to include the TSM version number and that RG is placed in configuration management. The Development Team continues the 2-digit version number for further development. RGs are continually revised and updated as analysis needs progress. RGs are revised in accordance with AP-ENG-006.

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Report Generator	Ver.	Date	Modifications
CIRG	1.5	06/11/2007	<p>Added report 10. Site Batching report for cycle times by site grouped by transportation mode.</p> <p>In report 1 and 1A, no longer make adjustments for open cask buys using 1B. Cask Reference worksheet. Renamed to Cask Reference worksheet.</p> <p>Removed Casks Required column.</p> <p>In report 2, Added Days column.</p> <p>For reports 3 through 9, added Lead Time, Day column. Added Cask Residence Time chart.</p>
CIRG	2.0	08/20/2007	<p>Modified queries for CaskBuynn_INS and CaskHoldForDOEOV processes.</p> <p>Added processes for DOE overpack to report 1A. Cask Allocation.</p> <p>Removed cask 102, 206, 209, 251, and 253 in report 1. Cask Data.</p> <p>Corrected query to remove DPCToStageLT in report 10. Site Batching Times.</p> <p>Checked for new GROA processes for E9 runs.</p>
CIRG	2.0	09/05/2007	<p>Removed cask 102, 206, 209, 251, and 253 in report 1. Cask Data.</p> <p>Corrected query to remove DPCToStageLT in report 10. Site Batching Times. Checked for new GROA processes.</p>
CRG	3.0	09/10/2007	<p>Overall improvements for all worksheets included adding constants for columns and improved handling for no rows retrieved.</p> <p>Modified subroutines for worksheets as follows:</p> <p>Reference – Removed settings for ISF, Large WP, and TAD Case from input form and Reference worksheet.</p> <p>Removed Bolted TAD option and TAD Overpack cost from dialog box and Reference worksheet. Removed unused values. Added instructions</p> <ol style="list-style-type: none"> 1. WAST Operations Cost – Added column constants. 2. CSNF Trans Cask Costs – No TAD, eliminated Corrections column. 2A. TSC Use – Modified query to use BuyCasknn. 2B. DOE Cask Costs – Added column constants. 2C. DOE OV Cask Costs. Added this report. 3. TAD Trans Overpack Costs – Eliminated use of TAD Case setting and removed correction columns. 4. Cask Rail Car Costs – Removed Corrections and Corrected Total columns for TAD cases. Modified query to include 244 OV for 242 Humboldt Bay. Added TSC column. 5. TAD Costs – Removed correction columns. 6. Waste Package Costs – Modified to only include data for WPTAD.

Report Generator	Ver.	Date	Modifications
			<p>8. TAD Age Overpacks – Changed name of worksheet.</p> <p>9. DPC Age Overpacks. – Modified query to include processes STStage, DPCReturn</p> <p>10. All Age Overpacks – Modified method for copying data from worksheet 8.</p> <p>10A. No. in Aging - Modified query to include processes STStage, DPCReturn, and TSCLongReturn.</p> <p>12. Reserved – Removed WA Loading Cost report.</p> <p>14. Reserved – Removed ISF Use and Costs report.</p> <p>15. All Costs – Updated for changes made to other worksheets.</p> <p>16. TADs Pool – Modified column name.</p> <p>17. TADs Dry – Modified column name</p> <p>18. Results Summary – Report and subroutine name changed. Updated for changes made to other worksheets. Corrected cost for 2C. DOE OV Cask Costs. Removed cost for 2A. TSC Use.</p> <p>19. Annual Costs – Report and subroutine name changed. Updated for changes made to other worksheets. Modified column names.</p> <p>20. Annual Items – Report and subroutine name changed. Updated for changes made to other worksheets. Modified column names.</p>
CRG	3.0	09/14/2007	<p>Corrected year 1 of Per Quarter in 3. TAD Trans Overpack Costs.</p> <p>Corrected calculation of Total Cost in 18. Results Summary.</p>
CRG	3.0	09/21/2007	<p>Modified names of charts and y-axis labels on all charts.</p> <p>Added chart to worksheet 10A. No. in Aging.</p> <p>Added cumulative cost column to 16. TADs Pool and 17. TADs Dry</p>
DVCG	1.0	06/29/2006	Initial version.
DVCG	1.1	09/11/2006	Added reference sheets and calculated delays based on the Civilian Radioactive Waste Management System Requirements Document (CRD). Added columns for CRD Cum and CRD Deficit in each Cask Load Delays worksheet.

Report Generator	Ver.	Date	Modifications
DVCG	1.2	10/24/2006	In IS Cask Load reports, modified to use ADO for retrieving data from Excel Initial State file instead of using cut and paste functions. Modified data retrieval from IS to exclude any Process Connection identified as "buffer". In Cask Load Delays report, modified SQL query to no longer sum MTU by grouping on arrival time in order to have the correct number of shipments by arrival time
DVCG	1.3	06//05/2007	Added worksheets for cask loads based on waste type for each DOE site, SRS, HAN, and INL using Simdata file. Corrected query to differentiate DOE SNF and MCO cask loads. TSMCC.ini file should be updated to call SetSimdataFile.
DVCG	2.0	07/09/2007	Minor corrections.
DVCG	2.0	09/05/2007	Updated for new GROA variables for E9 runs.
DVCG	2.0	09/18/2007	Updated Reference worksheets. Corrected reports 9-15 to remove extra quarter for some years.
DVCG	2.0	09/24/2007	Corrected reports 9-15 to calculate delta between Simdata and IS columns for maximum number of rows.
DVCG	2.0	09/25/2007	Corrected valley curves in worksheets 9-15 by setting IS Cask Load Cum column.
DRG	2.0	08/13/2007	Modified GenerateReport01(), added GenerateReport02().
DRG	2.0	09/11/2007	Removed Introduction worksheet. Renamed report from 1. Site to 1. Dose Summary. Redefined y-axis settings for charts in report 2. Process Lines. Queries checked for updating to new E9 process names.
DRG	2.0	09/20/2007	Modified name of chart on worksheet 2. Process Lines.
DLRG	3.0	09/13/2007	Updated Introductions worksheet. Changed name of report to 1. WP Lengths from 1. Drift Length.

Report Generator	Ver.	Date	Modifications
DLRG	3.0	09/21/2007	Added WPTAD to Lengths table. Modified worksheet 1. WP Lengths to ensure data is always sorted by time.
GRG	2.0	08/21/2007	Rewrote modules for reports. 1. Load-Unload by Bldg and 2. Load-Unload System Balance. Modified report 1. Load-Unload by Bldg to include BWR and PWR Crit unload records. Modified report 2. Load-Unload System Balance to include heat data for the IHF facility and BWR and PWR Crit records. Modified to use SumProduct function for calculating heat load and unload totals. The previous version using a SQL query with the Sum function and ADO was giving inconsistent results. Modified report 3. WP and TAD Created for queries for determining WP and TAD counts.
GRG	2.0	08/28/2007	Modified queries in reports 4 and 5 to retrieve BWR and PWR from CRCF1, CRCF2, and CRCF3.
GRG	2.0	09/13/2007	In report 4. BWR Heat by Time and 5. PWR Heat by Time, corrected first entry of Cum Heat.
GRG	2.0	09/20/2007	In report 3. WP and TAD Created, changed label to TAD Count from WHF.
RRG	2.0	06/25/2007	Updated worksheets 2, 3, and 4 for new variables and processes.
RRG	2.0	06/28/2007	Minor correction for WHF in 3. GROA Parameters.
RRG	2.0	07/19/2007	Removed processes and objects in SQL queries that are obsolete in TSM version 6.
RRG	2.0	08/08/2007	Added variable countCaskGROAmax to report 3.GROA Paramters and 4. Summary Results.
RRG	2.0	09/12/2007	Modified objects/processes for TSM v6.0 E9 and removed obsolete items listed in all reports.
RRG	2.0	09/17/2007	Modified report 2. Cost and Throughput to remove obsolete variables and new ones. Modified report 4. Summary Results to add new process, RF_Router.

Report Generator	Ver.	Date	Modifications
RRG	2.0	09/20/2007	Modified report 2. Cost and Throughput to remove radGROAfromAgeCum. Modified report 4. Summary Results to remove MTU_GROA and MTU_RF.
RRG	2.0	09/27/2007	Modified report 1. Object Data to handle condition when items for WP Subtotal not found. Modified functions for creating and clearing worksheets to be more consistent with other report generators.
TCRG	1.0	08/25/2005	Initial version.
TCRG	1.1	09/06/2005	Corrections to query in Report 2. Truck Costs to include variable costtruckdriver2cum.
TCRG	1.2	04/06/2006	Modified for simplification control center framework. Added ModuleMain.Auto_Open (), SetSimdataFile(), and Initialize(). Made compatible with TSMCC.
TCRG	2.0	09/11/2007	Updated Reference & End User Inputs with new cost values and notes. Changed name of reports to 6. Rail Basket Costs and 7. Rail Overpacks. Add casks 208 and 253 to report 7. Rail Overpacks. Removed Introduction worksheet.
TSRG	1.0	05/17/2006	Initial version.
TSRG	1.1	11/08/2006	Added instructions and improved error handling for missing worksheets and files.
TSRG	1.2	12/18/2006	Corrected city matching process and added location of route files to reference worksheets
TSRG	1.3	01/08/2007	Added functionality to add/delete cities for routing analysis.
TSRG	1.4	01/25/2007	Correction for omitting calculation of first shipper in report.
TSRG	1.5	03/04/2	Modified for handling WV shipper. Modified to list same shippers for each run to facilitate comparisons.

Report Generator	Ver.	Date	Modifications
		007	
TTRG	3.0	08/02/2007	Deleted all existing reports and added 12 new reports for the TSM V6.0 GROA changes. Added the model version to the header.
TTRG	3.0	09/10/2007	Modified Chart Preferences for interval settings for Y axis of all charts. Changed Y axis label to Cumulative Number on all charts. Checked for process name changes for E9 runs in all queries and updated 10. WHF TAD. Added TAD Arrivals column to report and chart in report 2. TAD Processed.
TTRG	3.0	09/14/2007	Changed column heading to WHFDispatch1 from TADDispatch1 in 10. WHF TAD.
VCG	3.0	07/10/2007	Updated for E9 processes.
VCG	3.0	09/21/2007	In Reference worksheet, set User CRD Rates to the default CRD rates using a Total System Life Cycle Cost Analysis from Spring 2007 initial state file.