CHPRC ADMINISTRATIVE DOCUMENT PROCESSING AND APPROVAL

DOCUMENT TITLE:	**OWNING ORGANIZATION/FACILITY:**
MODFLOW and Related Codes Requirements Traceability Matrix: CHPRC Build 8	CHPRC Environmental Programs & Strategic Planning / Risk Assessment & Model Integration Group

Document Number: CHPRC-00260 **Revision/Change Number:** 8

DOCUMENT TYPE *(Check Applicable)* [ ] Plan [X] Report [ ] Study [ ] Description Document [ ] Other

DOCUMENT ACTION *(Check One)* [ ] New [X] Revision [ ] Cancellation

RESPONSIBLE CONTACTS

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Manager	AH Aly	509-376-0330

DOCUMENT CONTROL

Is the document intended to be controlled within the Document Management Control System (DMCS)? [X] Yes [ ] No

Does document contain scientific and technical information intended for public use? [X] Yes [ ] No

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DOCUMENT REVISION SUMMARY

NOTE: Provide a brief description or summary of the changes for the document listed.

Updates requirements status based on acceptance testing results to add new capabilities to MT3DMS for strontium-90 incorporation to Build 8 of MODFLOW and Related Codes

REVIEWERS **Others**

Name *(print)*	Organization
S Mehta (Independent Technical Review)	EP&SP/Risk Assessment & Modeling Integration
CW Connell (Software Subject Matter Expert)	EP&SP/Environmental Data Integration
JA Archuleta (Quality Assurance Reviewer)	EP&SP/Environmental Compliance & Quality Assurance

APPROVAL SIGNATURES

Author:	1 DEC 2015	RELEASE / ISSUE
Name: (Print) WE Nichols	Date	
Responsible Manager:	12/7/15	DATE: Dec 08, 2015 HANFORD RELEASE
Name: (print) AH Aly	Date	
Other:		
Name: (print)	Date	

Date Received for Clearance Process (MM/DD/YYYY)
12/03/2015

INFORMATION CLEARANCE FORM

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- [ ] Abstract
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- [ ] Visual Aid
- [ ] Full Paper
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- [ ] Journal Article
- [ ] Internet
- [ ] Software
- [x] Report

B. Document Number: CHPRC-00260 Revision 8

C. Title: MODFLOW and Related Codes Requirements Traceability Matrix

D. Proposed Internet Address

E. Required Information (MANDATORY)

1. Is document potentially Classified? (•) No ( ) Yes

Aly, Alaa H Approved via attached IDMS Data File
Manager Required (Print and Sign)

If Yes _____
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H. Information Owner/Author/Requestor

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(Print and Sign)

Responsible Manager

Aly, Alaa H Approved via attached IDMS Data File
(Print and Sign)

Approval by Direct Report to President (Speech/Articles Only) _____
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I. Reviewers

Reviewers	Yes	Print	Signature	Public Y/N (If N, complete J)
General Counsel	[ ]			Y / N
Office of External Affairs	[ ]			Y / N
DOE	[ ]			Y / N
Other	[x]	Nelson, Ronald L	Y - Approved via attached IDMS Data File	Y / N
Other	[ ]			Y / N
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J. Comments

Information Clearance Approval

Approved for Public Release; Further Dissemination Unlimited

APPROVED
By Ashley R Jenkins at 1:08 pm, Dec 08, 2015

If Additional Comments, Please Attach Separate Sheet

A-6001-401 (REV 5)

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  - <task name="**Clearance Process**" id="**0**" date-initiated="**20151208T0834**" performer="**Ashley R Jenkins**" performer-id="**144719257**" username="**h2281903**">
    <comments>**Due Date: 12/10/2015 COB Please review CHPRC-00260 Rev. 8, MODFLOW and Related Codes Requirements Traceability Matrix for public release and provide comments or approval. POC: Will E. Nichols 376-4553 Thanks, Ashley Jenkins, Information Clearance 376-6146**</comments>
  </task>
  <task name="**Add XML**" id="**1**" date-done="**20151208T0835**" />
  <task name="**Manager Approval**" id="**41**" date-due="**20151211T0834**" date-done="**20151208T0839**" performer="**Alaa H Aly**" performer-id="**141440097**" username="**h9198318**" disposition="**Approve**" authentication="**true**" />
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CHPRC-00260
Revision 8

MODFLOW and Related Codes Requirements Traceability Matrix

CHPRC Build 8

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

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CHPRC-00260
Revision 8

MODFLOW and Related Codes Requirements Traceability Matrix

CHPRC Build 8

Document Type: RPT Program/Project: EP&SP

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CH2M HILL Plateau Remediation Company

Date Published
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Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
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APPROVED
By Ashley R Jenkins at 1:09 pm, Dec 08, 2015

Release Approval Date

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MODFLOW and Related Codes

CHPRC Build 8

REQUIREMENTS TRACEABILITY MATRIX

Signature Page

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Prepared by: In

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CHPRC

December 1, 2015

1. OVERVIEW AND SCOPE

Acronym:	MODFLOW	HISI ID:	2517	Software Grade:	C
Acronym:	MT3DMS	HISI ID:	2518		

This requirements traceability matrix (RTM) document identifies and traces CHPRC requirements for MODFLOW and related software that CHPRC intends to use for simulation of groundwater flow and contaminant transport in the unconfined aquifer at the Hanford Site at various spatial and temporal scales.

Controlled software use documents related to this RTM are:

- CHPRC-00257, *MODFLOW and Related Codes Functional Requirement Document*
- CHPRC-00258, *MODFLOW and Related Codes Software Management Plan*
- CHPRC-00259, *MODFLOW and Related Codes Software Test Plan*

Staff providing input to the RTM are listed in the table below.

Name	Organization	Project Management Role/Responsibilities
William E. Nichols	EP&SP	Software Owner
Sunil Mehta	EP&SP	Technical Authority
Alaa H. Aly	EP&SP	Responsible Manager

2. DESCRIPTION OF MATRIX FIELDS

The RTM is shown below. The columns in the RTM are:

- **Unique Number.** A unique identification number containing the general category of the requirement assigned in ascending order.
- **Requirement.** The requirement statement.
- **Source of Requirement.** The requirement source (Identified Modeling Need, Conference; Configuration Control Board; Task Assignment, etc.).
- **Functional Requirements Document (FRD)**. The section in the FRD document referencing the requirement.
- **Program Module.** The software module satisfying the requirement.
- **Test Case Number.** The test case number referencing where the requirement is tested.
- **Successful Test Verification.** Indicate **Y** (yes), **N** (no), or **ND** (not determined) to indicate successful verification testing of satisfying the requirement.
- **Modification of Requirement.** If requirement was changed, eliminated, or replaced, indicate disposition and authority for modification.
- **Remarks.** Provide any pertinent remarks or notes.

3. REQUIREMENTS TRACEABILITY MATRIX

Unique Number	Requirement	Source of Requirement	Functional Requirements Document	Program Module	Test Case	Successful Test Verification Yes / No / or Not Determined	Modification of Requirement	Remarks
Objective 1: Simulate groundwater drawdown for Theis problem (infinite-extent uniform horizontal aquifer subject to constant single-well pumping rate)								
RTM-1.1	Calculate drawdown to within one percent of analytic solution for all nodes lying between the pumping well and a radius of 1000 m for pumping durations of 5 and 10 days	Technical Authority	3.3	MODFLOW-2000	MF-ATC-1	**Yes** 4-Mar-2015 on Windows® 3-Mar-2015 on Linux®	No	Both single and double precision versions tested Acceptance tested on both Windows® and Linux® Platforms
				MODFLOW-2000-MST		**Yes** 4-Mar-2015 on Windows® 3-Mar-2015 on Linux®		
				MODFLOW-USG		**Yes** 8-May-2015 on Windows® 1-May-2015 on Linux®		

Unique Number	Requirement	Source of Requirement	Functional Requirements Document	Program Module	Test Case	Successful Test Verification Yes / No / or Not Determined	Modification of Requirement	Remarks
Objective 1: Simulate groundwater drawdown for Theis problem (infinite-extent uniform horizontal aquifer subject to constant single-well pumping rate)								
RTM-1.2	Calculate drawdown to within five percent of analytic solution for all nodes lying between the pumping well and a radius of 5000 m for pumping durations of 5 and 10 days	Technical Authority	3.3	MODFLOW-2000	MF-ATC-1	**Yes** 4-Mar-2015 on Windows® 3-Mar-2015 on Linux®	No	Both single and double precision versions tested Acceptance tested on both Windows® and Linux® Platforms
				MODFLOW-2000-MST		**Yes** 4-Mar-2015 on Windows® 3-Mar-2015 on Linux®		
				MODFLOW-USG		**Yes** 8-May-2015 on Windows® 1-May-2015 on Linux®		

Unique Number	Requirement	Source of Requirement	Functional Requirements Document	Program Module	Test Case	Successful Test Verification Yes / No / or Not Determined	Modification of Requirement	Remarks
Objective 2: Simulate concentration for van Genuchten & Alves (transport of initial square pulse due to advection and diffusion in constant water velocity environment)								
RTM-2.1	Match analytic solution peak concentration location (distance) to within one percent for transport times of 2400 and 9600 days	Technical Authority	3.3	MT3DMS	MT-ATC-2	**Yes** 4-Mar-2015 on Windows® 3-Mar-2015 on Linux®	No	Both single and double precision versions tested Acceptance tested on both Windows® and Linux® Platforms
				MT3DMS-MST		**Yes** 24-Nov-2015 on Windows® 23-Nov-2015 on Linux®		Both single and double precision versions tested Acceptance tested on both Windows® and Linux® Platforms
RTM-2.2	Match analytic solution peak concentration value to within one percent for transport times of 2400 and 9600 days	Technical Authority	3.3	MT3DMS	MT-ATC-2	**Yes** 4-Mar-2015 on Windows® 3-Mar-2015 on Linux®	No	Both single and double precision versions tested Acceptance tested on both Windows® and Linux® Platforms
				MT3DMS-MST		**Yes** 24-Nov-2015 on Windows® 23-Nov-2015 on Linux®		Both single and double precision versions tested Acceptance tested on both Windows® and Linux® Platforms

4. REFERENCES

CHPRC-00257, 2010, *MODFLOW and Related Codes Functional Requirement Document*, Rev. 1, CH2M HILL Plateau Remediation Company, Richland, Washington.

CHPRC-00258, 2014 *MODFLOW and Related Codes Software Management Plan*, Rev. 4, CH2M HILL Plateau Remediation Company, Richland, Washington.

CHPRC-00259, 2014, *MODFLOW and Related Codes Software Test Plan*, Rev. 3, CH2M HILL Plateau Remediation Company, Richland, Washington.

5. ATTACHMENTS

None.