SANDIA NATIONAL LABORATORIES
WASTE ISOLATION PILOT PLANT

ANALYSIS REPORT FOR SALADO FLOW IN THE 2026 COMPLIANCE RECERTIFICATION APPLICATION PERFORMANCE ASSESSMENT: INTERIM STATE REPOSITORY

REVISION 0

Brad Day

Digitally signed by Brad Day
Date: 2025.09.08 11:02:03 -06'00'

Authentication

Author:	Brad Day	Org.	08881
Author:	Seth King	Org.	08881
Technical Reviewer:	Todd Zeitler	Org.	08912
QA Reviewer:	Shelly Nielsen	Org.	08883
Management Reviewer:	Steve Wagner	Org.	08881

SEPTEMBER 2025

Information Only

Executive Summary

The Waste Isolation Pilot Plant (WIPP) was initially certified as a repository consisting of 10 panels, which were excavated for the long-term storage and placement of transuranic waste (U.S. EPA 1998). However, due to operational constraints, the entire volume of the 10 panels is no longer available for waste disposal. In March 2024, the U.S. Department of Energy (DOE) submitted the Replacement Panels Planned Change Request (RPPCR) to the U.S. Environmental Protection Agency (EPA) for approval of waste emplacement in two new panels. These panels, referred to as replacement panels, are located to the west of the existing operations area. The RPPCR received EPA approval in July of 2025.

The addition of the two replacement panels is not expected to provide adequate space for the disposal of the allowable waste volume designated for WIPP under the Land Withdrawal Act (LWA); thus, the 12-panel configuration is regarded as an interim state of the repository. The DOE may pursue approval for waste disposal in seven additional panels to accommodate the full allowable volume of waste. This hypothetical 19-panel configuration is considered the anticipated final state of the repository.

The DOE demonstrates compliance with containment requirements as outlined in the Certification Criteria of Title 40 CFR Part 191.13 through performance assessment (PA). PA calculations estimate the probability and consequences of potential radionuclide releases from the repository to the accessible environment over a regulatory period of 10,000 years following facility closure. WIPP PA models are utilized to support the periodic recertification of WIPP.

The 2026 Compliance Recertification Application (CRA-2026) represents the fifth recertification application submitted to the EPA. A PA has been carried out by Sandia National Laboratories to support the DOE's submission of the CRA-2026. The results presented in the CRA-2026 PA are compared to those from the RPPCR PA, the most recent regulatory submission.

This analysis report documents the Salado flow component of the CRA-2026 PA for the interim state repository. This report details the effects of the changes introduced and incorporated in the CRA-2026 PA that impact the Salado flow model. In comparison to the RPPCR PA, the primary effects of these changes are a decrease in brine pressure within all waste areas for undisturbed and intruded scenarios without a Castile intersection, a slight increase in brine pressure for all but the westernmost waste areas for intruded scenarios with a Castile intersection, and a substantial decrease in brine saturation in all waste areas over all scenarios.

Information Only

TABLE OF CONTENTS

EXECUTIVE SUMMARY II

1.0 INTRODUCTION 1

2.0 CHANGES SINCE THE RPPCR 2

2.1 Repository Design 2
2.2 Parameters Related to Repository Dimensions 4
2.3 Updates to the Salado Flow and Transport Computational Grid 4
2.4 Waste Inventory 4
2.5 Baseline Actinide Solubilities 5
2.6 Solubility Uncertainty Distributions 5
2.7 Colloidal Enhancement Parameters 6
2.8 MgO Hydration Parameters 6
2.9 Lower Bound on Capillary Pressure in the Anhydrite Marker Beds 6
2.10 Porosity-Permeability Parameter Distribution 6
2.11 Parameters Not Updated as Anticipated in Analysis Plan AP-214 7

3.0 CONCEPTUAL APPROACH FOR THE CRA-2026 8

3.1 Repository Representation in BRAGFLO 8
3.2 Initial Conditions 12
3.3 Boundary Conditions 13

4.0 SALADO FLOW MODELING METHODOLOGY 14

4.1 Modeling Scenarios 15
4.2 Material Maps 15
4.2.1 Scenario S1-BF (Undisturbed Conditions) 16
4.2.2 Scenario S2-BF (E1 intrusion at 350 years) 16
4.2.3 Scenario S3-BF (E1 intrusion at 1000 years) 17
4.2.4 Scenario S4-BF (E2 intrusion at 350 years) 17
4.2.5 Scenario S5-BF (E2 intrusion at 1000 years) 18
4.2.6 Scenario S6-BF (E2 intrusion at 1000 years, E1 intrusion at 2000 years) 18
4.3 Code Execution and Run Control 31
4.3.1 Sensitivity Analysis 31

Information Only

5.0 RESULTS 33
5.1 Pressure 34
5.1.1 Undisturbed Scenario 37
5.1.2 Disturbed Scenarios 37
5.1.3 Sensitivity Analysis 38
5.2 Brine Saturation 55
5.2.1 Undisturbed Scenario 58
5.2.2 Disturbed Scenarios 58
5.2.3 Sensitivity Analysis 58
5.3 Porosity 76
5.4 Gas Generation 82
5.4.1 Iron Corrosion 84
5.4.2 CPR Biodegradation 84
5.4.3 Brine Radiolysis 84
5.4.4 Sensitivity Analysis 84
5.5 Brine and Gas Flow 92
5.5.1 Brine Flow into the Repository 95
5.5.2 Net Brine Flow into and Gas Flow out of the Repository 95
5.5.3 Brine and Gas Flow across Panel Closure Systems 95
5.5.4 Brine Flow up the Shaft 95
5.5.5 Brine Flow up the Borehole 96
5.5.6 Brine Flow in Anhydrite Layers 96
5.5.7 Brine Inflow and Consumption by Waste Area 96
5.5.8 Sensitivity Analysis 96

6.0 DISCUSSION 115

7.0 SUMMARY 117

8.0 REFERENCES 118

9.0 APPENDIX A – SENSITIVITY ANALYSIS TABLES 120
9.1 Waste Panel Pressure 120
9.2 Waste Panel Brine Saturation 132
9.3 Total Cumulative Gas Generation 144
9.4 Brine Flow into the Repository 156

Information Only

10.0 APPENDIX B – ADDITIONAL PLOTS 168
10.1 Pressure 168
10.1.1 Scenario S1-BF 168
10.1.2 Scenario S2-BF 172
10.1.3 Scenario S3-BF 176
10.1.4 Scenario S4-BF 177
10.1.5 Scenario S5-BF 180
10.1.6 Scenario S6-BF 181
10.2 Brine Saturation 184
10.2.1 Scenario S1-BF 184
10.2.2 Scenario S2-BF 188
10.2.3 Scenario S3-BF 192
10.2.4 Scenario S4-BF 193
10.2.5 Scenario S5-BF 196
10.2.6 Scenario S6-BF 197
11.0 APPENDIX C – REPLICATE COMPARISON 200
11.1 Waste Panel Pressure 201
11.2 Waste Panel Brine Saturation 203
12.0 APPENDIX D – CONFIDENCE INTERVALS 205
12.1 Waste Panel Pressure 206
12.2 Waste Panel Brine Saturation 208

Information Only

LIST OF FIGURES

Figure 1. Interim State Repository Layout 3
Figure 2. CRA26_IS Grid Flaring 9
Figure 3. Generic RPPCR BRAGFLO Grid with Modeled Area Descriptions.....10
Figure 4. Generic CRA26_IS BRAGFLO Grid with Modeled Area Descriptions 11
Figure 5. CRA26_IS PA BRAGFLO Grid and Material Map; Years –5 to 0 [Scenarios S1-BF through S6-BF] 21
Figure 6. CRA26_IS PA BRAGFLO Grid and Material Map; Years 0 to 100 [Scenarios S1-BF through S6-BF] 22
Figure 7. CRA26_IS PA BRAGFLO Grid and Material Map; Years 100 to 200 [Scenarios S1-BF through S6-BF] 23
Figure 8. CRA26_IS PA BRAGFLO Grid and Material Map; Years 200 to 10000 [Scenario S1-BF], Years 200 to Time of E1 or E2 Intrusion [Scenarios S2-BF through S6-BF].....24
Figure 9. CRA26_IS PA BRAGFLO Grid and Material Map; Time of E2 Intrusion to Time of E2 Intrusion Plus 200 Years [Scenarios S4-BF through S6-BF] 25
Figure 10. CRA26_IS PA BRAGFLO Grid and Material Map; Time of E2 Intrusion Plus 200 Years to 10000 Years [Scenarios S4-BF and S5-BF], Time of E2 Intrusion Plus 200 Years to Time of E1 Intrusion [Scenario S6-BF].....26
Figure 11. CRA26_IS PA BRAGFLO Grid and Material Map; Time of E1 Intrusion to Time of E1 Intrusion Plus 200 Years [Scenarios S2-BF and S3-BF].....27
Figure 12. CRA26_IS PA BRAGFLO Grid and Material Map; Time of E1 Intrusion to Time of E1 Intrusion Plus 200 Years [Scenario S6-BF] 28
Figure 13. CRA26_IS PA BRAGFLO Grid and Material Map; Time of E1 Intrusion Plus 200 Years to Time of E1 Intrusion Plus 1200 Years [Scenarios S2-BF, S3-BF, and S6-BF].....29
Figure 14. CRA26_IS PA BRAGFLO Grid and Material Map; Time of E1 Intrusion Plus 1200 Years to 10000 Years [Scenarios S2-BF, S3-BF, and S6-BF.....30
Figure 15. Salado Flow Run Control Diagram 32
Figure 16. Pressure means with percentiles for the Waste Panel, Replicate 1, Scenario S1-BF ...39
Figure 17. Pressure distributions for the Waste Panel, Replicate 1, Scenario S1-BF.....39
Figure 18. Pressure realizations with means for the Waste Panel, Replicate 1, Scenario S1-BF..40
Figure 19. Pressure means with percentiles for the South Rest-of-Repository Area, Replicate 1, Scenario S1-BF 41
Figure 20. Pressure means with percentiles for the North Rest-of-Repository Area, Replicate 1, Scenario S1-BF 41

Information Only

Figure 21. Pressure means with percentiles for the West Rest-of-Repository Area, Replicate 1, Scenario S1-BF 42
Figure 22. Pressure means with percentiles for the South Operations Area, Replicate 1, Scenario S1-BF 42
Figure 23. Pressure means with percentiles for the West Operations Area, Replicate 1, Scenario S1-BF 43
Figure 24. Pressure means with percentiles for the Experimental Area, Replicate 1, Scenario S1-BF 43
Figure 25. Pressure means with percentiles for the Waste Panel, Replicate 1, Scenario S2-BF 44
Figure 26. Pressure distributions for the Waste Panel, Replicate 1, Scenario S2-BF 44
Figure 27. Pressure realizations with means for the Waste Panel, Replicate 1, Scenario S2-BF 45
Figure 28. Pressure means with percentiles for the South Rest-of-Repository Area, Replicate 1, Scenario S2-BF 46
Figure 29. Pressure means with percentiles for the North Rest-of-Repository Area, Replicate 1, Scenario S2-BF 46
Figure 30. Pressure means with percentiles for the West Rest-of-Repository Area, Replicate 1, Scenario S2-BF 47
Figure 31. Pressure means with percentiles for the Waste Panel, Replicate 1, Scenario S4-BF 48
Figure 32. Pressure means with percentiles for the South Rest-of-Repository, Replicate 1, Scenario S4-BF 48
Figure 33. Pressure means with percentiles for the North Rest-of-Repository, Replicate 1, Scenario S4-BF 49
Figure 34. Pressures means with percentiles for the West Rest-of-Repository, Replicate 1, Scenario S4-BF 49
Figure 35. Pressure means with percentiles for the Waste Panel, Replicate 1, Scenario S6-BF 50
Figure 36. Pressure means with percentiles for the South Rest-of-Repository, Replicate 1, Scenario S6-BF 50
Figure 37. Pressure means with percentiles for the North Rest-of-Repository, Replicate 1, Scenario S6-BF 51
Figure 38. Pressures means with percentiles for the West Rest-of-Repository, Replicate 1, Scenario S6-BF 51
Figure 39. Intact Halite porosity versus brine pressure in the Waste Panel at 10,000 years, Replicate 1, Scenario S1-BF 53
Figure 40. Partial Rank Correlation Coefficients over time for brine pressure in the Waste Panel, Replicate 1, Scenario S1-BF 53

Information Only

Figure 41. Intact Halite porosity versus brine pressure in the Waste Panel at 10,000 years, Replicate 1, Scenario S2-BF 54

Figure 42. Partial Rank Correlation Coefficients over time for brine pressure in the Waste Panel, Replicate 1, Scenario S2-BF 54

Figure 43. Brine saturation means with percentiles for the Waste Panel, Replicate 1, Scenario S1-BF 60

Figure 44. Brine saturation distributions for the Waste Panel, Replicate 1, Scenario S1-BF 60

Figure 45. Brine saturation realizations with means for the Waste Panel, Replicate 1, Scenario S1-BF 61

Figure 46. Brine saturation means with percentiles for the South Rest-of-Repository Area, Replicate 1, Scenario S1-BF 62

Figure 47. Brine saturation means with percentiles for the North Rest-of-Repository Area, Replicate 1, Scenario S1-BF 62

Figure 48. Brine saturation means with percentiles for the West Rest-of-Repository Area, Replicate 1, Scenario S1-BF 63

Figure 49. Brine saturation means with percentiles for the South Operations Area, Replicate 1, Scenario S1-BF 63

Figure 50. Brine saturation means with percentiles for the West Operations Area, Replicate 1, Scenario S1-BF 64

Figure 51. Brine saturation means with percentiles for the Experimental Area, Replicate 1, Scenario S1-BF 64

Figure 52. Brine saturation means with percentiles for the Waste Panel, Replicate 1, Scenario S2-BF 65

Figure 53. Brine saturation distributions for the Waste Panel, Replicate 1, Scenario S2-BF 65

Figure 54. Brine saturation realizations with means for the Waste Panel, Replicate 1, Scenario S2-BF 66

Figure 55. Brine saturation means with percentiles for the South Rest-of-Repository Area, Replicate 1, Scenario S2-BF 67

Figure 56. Brine saturation means with percentiles for the North Rest-of-Repository Area, Replicate 1, Scenario S2-BF 67

Figure 57. Brine saturation means with percentiles for the West Rest-of-Repository Area, Replicate 1, Scenario S2-BF 68

Figure 58. Brine saturation means with percentiles for the Waste Panel, Replicate 1, Scenario S4-BF 69

Figure 59. Brine saturation means with percentiles for the South Rest-of-Repository, Replicate 1, Scenario S4-BF 69

Information Only

Figure 60. Brine saturation means with percentiles for the North Rest-of-Repository, Replicate 1, Scenario S4-BF 70
Figure 61. Brine saturation means with percentiles for the West Rest-of-Repository, Replicate 1, Scenario S4-BF 70
Figure 62. Brine saturation means with percentiles for the Waste Panel, Replicate 1, Scenario S6-BF....71
Figure 63. Brine saturation means with percentiles for the South Rest-of-Repository, Replicate 1, Scenario S6-BF 71
Figure 64. Brine saturation means with percentiles for the North Rest-of-Repository, Replicate 1, Scenario S6-BF 72
Figure 65. Brine saturation means with percentiles for the West Rest-of-Repository, Replicate 1, Scenario S6-BF 72
Figure 66. Healed DRZ permeability versus brine saturation in the Waste Panel at 10,000 years, Replicate 1, Scenario S1-BF 74
Figure 67. Partial Rank Correlation Coefficients over time for brine saturation in the Waste Panel, Replicate 1, Scenario S1-BF 74
Figure 68. Intact Halite porosity versus brine saturation in the Waste Panel at 10,000 years, Replicate 1, Scenario S2-BF 75
Figure 69. Partial Rank Correlation Coefficients over time for brine saturation in the Waste Panel, Replicate 1, Scenario S2-BF 75
Figure 70. Porosity realizations with means in the Waste Panel, Replicate 1, Scenario S1-BF....78
Figure 71. Porosity realizations with means in the Waste Panel, Replicate 1, Scenario S2-BF....79
Figure 72. Porosity realizations with means in the Waste Panel, Replicate 1, Scenario S4-BF....80
Figure 73. Porosity realizations with means in the Waste Panel, Replicate 1, Scenario S6-BF....81
Figure 74. Gas generation means with percentiles from all sources in Total Waste Areas, Replicate 1, Scenario S1-BF 85
Figure 75. Gas generation means with percentiles from all sources in Total Waste Areas, Replicate 1, Scenario S2-BF 85
Figure 76. Gas generation means with percentiles from all sources in Total Waste Areas, Replicate 1, Scenario S4-BF 86
Figure 77. Gas generation means with percentiles from all sources in Total Waste Areas, Replicate 1, Scenario S6-BF 86
Figure 78. Gas generation means by source in Total Waste Areas, Replicate 1, Scenario S1-BF 87
Figure 79. Gas generation means by source in Total Waste Areas, Replicate 1, Scenario S2-BF 87
Figure 80. Gas generation means by source in Total Waste Areas, Replicate 1, Scenario S4-BF 88

Information Only

Figure 81. Gas generation means by source in Total Waste Areas, Replicate 1, Scenario S6-BF 88

Figure 82. Gas generation from iron corrosion means in Total Waste Areas, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF 89

Figure 83. Normalized gas generation from iron corrosion means in Total Waste Areas, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF 89

Figure 84. Gas generation from cellulose biodegradation means in Total Waste Areas, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF 90

Figure 85. Normalized gas generation from cellulose biodegradation means in Total Waste Areas, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF 90

Figure 86. Gas generation from radiolysis means in Total Waste Areas, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF.....91

Figure 87. Normalized gas generation from radiolysis means in Total Waste Areas, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF 91

Figure 88. Brine flow into repository means with percentiles, Replicate 1, Scenario S1-BF 97

Figure 89. Brine flow into repository means with percentiles, Replicate 1, Scenario S2-BF 97

Figure 90. Brine flow into repository means with percentiles, Replicate 1, Scenario S4-BF 98

Figure 91. Brine flow into repository means with percentiles, Replicate 1, Scenario S6-BF 98

Figure 92. Net brine flow means into the repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF 99

Figure 93. Net gas flow means out of the repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF 99

Figure 94. Brine flow means across the South Rest-of-Repository PCS, Replicate 1, Scenario S1-BF.....100

Figure 95. Gas flow means across the South Rest-of-Repository PCS, Replicate 1, Scenario S1-BF.....101

Figure 96. Brine flow means across the North Rest-of-Repository PCS, Replicate 1, Scenario S1-BF.....102

Figure 97. Gas flow means across the North Rest-of-Repository PCS, Replicate 1, Scenario S1-BF.....103

Figure 98. Brine flow means across the West Rest-of-Repository PCS, Replicate 1, Scenario S1-BF.....104

Figure 99. Gas flow means across the West Rest-of-Repository PCS, Replicate 1, Scenario S1-BF 105

Figure 100. Brine flow means with percentiles up the Shaft, Replicate 1, Scenario S1-BF 106

Figure 101. Brine flow means with percentiles up the Shaft, Replicate 1, Scenario S2-BF 106

Information Only

Figure 102. Brine flow means with percentiles up the Shaft, Replicate 1, Scenario S4-BF 107
Figure 103. Brine flow means with percentiles up the Shaft, Replicate 1, Scenario S6-BF 107
Figure 104. Brine flow means with percentiles up the Borehole, Replicate 1, Scenario S2-BF .108
Figure 105. Brine flow means with percentiles up the Borehole, Replicate 1, Scenario S4-BF .108
Figure 106. Brine flow means with percentiles up the Borehole, Replicate 1, Scenario S6-BF .109
Figure 107. Brine flow means away from the Repository in all anhydrite layers, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF 110
Figure 108. Brine flow means in all anhydrite layers across the land withdrawal boundary, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF 110
Figure 109. Net brine flow means into the representative waste panel, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF.....111
Figure 110. Brine consumption means in the representative waste panel, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF 111
Figure 111. Net brine flow means into the South Rest-of-Repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF.....112
Figure 112. Brine consumption means in the South Rest-of-Repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF.....112
Figure 113. Net brine flow means into the North Rest-of-Repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF.....113
Figure 114. Brine consumption means in the North Rest-of-Repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF.....113
Figure 115. Net brine flow means into the West Rest-of-Repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF.....114
Figure 116. Brine consumption means in the West Rest-of-Repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF.....114
Figure 117. Pressure means for repository areas, Replicate 1, Scenario S1-BF.....168
Figure 118. Pressure distributions for the South Rest-of-Repository, Replicate 1, Scenario S1-BF 169
Figure 119. Pressure distributions for the North Rest-of-Repository, Replicate 1, Scenario S1-BF 169
Figure 120. Pressure distributions for the South Operations Area, Replicate 1, Scenario S1-BF 170
Figure 121. Pressure distributions for the Experimental Area, Replicate 1, Scenario S1-BF 170
Figure 122. Pressure distributions for the West Operations Area, Replicate 1, Scenario S1-BF 171

Information Only

Figure 123. Pressure distributions for the West Rest-of-Repository, Replicate 1, Scenario S1-BF 171
Figure 124. Pressure means for repository areas, Replicate 1, Scenario S2-BF.....172
Figure 125. Pressure distributions for the South Rest-of-Repository, Replicate 1, Scenario S2-BF 173
Figure 126. Pressure distributions for the North Rest-of-Repository, Replicate 1, Scenario S2-BF 173
Figure 127. Pressure distributions for the South Operations Area, Replicate 1, Scenario S2-BF 174
Figure 128. Pressure distributions for the Experimental Area, Replicate 1, Scenario S2-BF 174
Figure 129. Pressure distributions for the West Operations Area, Replicate 1, Scenario S2-BF 175
Figure 130. Pressure distributions for the West Rest-of-Repository, Replicate 1, Scenario S2-BF 175
Figure 131. Pressure means for repository areas, Replicate 1, Scenario S3-BF.....176
Figure 132. Pressure means for repository areas, Replicate 1, Scenario S4-BF.....177
Figure 133. Pressure distributions for the Waste Panel, Replicate 1, Scenario S4-BF.....177
Figure 134. Pressure distributions for the South Rest-of-Repository, Replicate 1, Scenario S4-BF 178
Figure 135. Pressure distributions for the North Rest-of-Repository, Replicate 1, Scenario S4-BF 178
Figure 136. Pressure distributions for the West Rest-of-Repository, Replicate 1, Scenario S4-BF 179
Figure 137. Pressure means for repository areas, Replicate 1, Scenario S5-BF.....180
Figure 138. Pressure means for repository areas, Replicate 1, Scenario S6-BF.....181
Figure 139. Pressure distributions for the Waste Panel, Replicate 1, Scenario S6-BF.....181
Figure 140. Pressure distributions for the South Rest-of-Repository, Replicate 1, Scenario S6-BF 182
Figure 141. Pressure distributions for the North Rest-of-Repository, Replicate 1, Scenario S6-BF 182
Figure 142. Pressure distributions for the West Rest-of-Repository, Replicate 1, Scenario S6-BF 183
Figure 143. Brine saturation means for repository areas, Replicate 1, Scenario S1-BF.....184
Figure 144. Brine saturation distributions for the South Rest-of-Repository, Replicate 1, Scenario S1-BF 185

Information Only

Figure 145. Brine saturation distributions for the North Rest-of-Repository, Replicate 1, Scenario S1-BF 185
Figure 146. Brine saturation distributions for the South Operations Area, Replicate 1, Scenario S1-BF.....186
Figure 147. Brine saturation distributions for the Experimental Area, Replicate 1, Scenario S1-BF 186
Figure 148. Brine saturation distributions for the West Operations Area, Replicate 1, Scenario S1-BF.....187
Figure 149. Brine saturation distributions for the West Rest-of-Repository, Replicate 1, Scenario S1-BF 187
Figure 150. Brine saturation means for repository areas, Replicate 1, Scenario S2-BF.....188
Figure 151. Brine saturation distributions for the South Rest-of-Repository, Replicate 1, Scenario S2-BF 189
Figure 152. Brine saturation distributions for the North Rest-of-Repository, Replicate 1, Scenario S2-BF 189
Figure 153. Brine saturation distributions for the South Operations Area, Replicate 1, Scenario S2-BF.....190
Figure 154. Brine saturation distributions for the Experimental Area, Replicate 1, Scenario S2-BF 190
Figure 155. Brine saturation distributions for the West Operations Area, Replicate 1, Scenario S2-BF.....191
Figure 156. Brine saturation distributions for the West Rest-of-Repository, Replicate 1, Scenario S2-BF 191
Figure 157. Brine saturation means for repository areas, Replicate 1, Scenario S3-BF.....192
Figure 158. Brine saturation means for repository areas, Replicate 1, Scenario S4-BF.....193
Figure 159. Brine saturation distributions for the Waste Panel, Replicate 1, Scenario S4-BF ...193
Figure 160. Brine saturation distributions for the South Rest-of-Repository, Replicate 1, Scenario S4-BF 194
Figure 161. Brine saturation distributions for the North Rest-of-Repository, Replicate 1, Scenario S4-BF 194
Figure 162. Brine saturation distributions for the West Rest-of-Repository, Replicate 1, Scenario S4-BF 195
Figure 163. Brine saturation means for repository areas, Replicate 1, Scenario S5-BF.....196
Figure 164. Brine saturation means for repository areas, Replicate 1, Scenario S6-BF.....197
Figure 165. Brine saturation distributions for the Waste Panel, Replicate 1, Scenario S6-BF ...197

Information Only

Figure 166. Brine saturation distributions for the South Rest-of-Repository, Replicate 1, Scenario S6-BF 198
Figure 167. Brine saturation distributions for the North Rest-of-Repository, Replicate 1, Scenario S6-BF 198
Figure 168. Brine saturation distributions for the West Rest-of-Repository, Replicate 1, Scenario S6-BF 199
Figure 169. Pressure distribution comparison for the Waste Panel, Replicates 1-3, Scenario S1-BF 201
Figure 170. Pressure distribution comparison for the Waste Panel, Replicates 1-3, Scenario S2-BF 201
Figure 171. Pressure distribution comparison for the Waste Panel, Replicates 1-3, Scenario S4-BF 202
Figure 172. Pressure distribution comparison for the Waste Panel, Replicates 1-3, Scenario S6-BF 202
Figure 173. Brine saturation distribution comparison for the Waste Panel, Replicates 1-3, Scenario S1-BF 203
Figure 174. Brine saturation distribution comparison for the Waste Panel, Replicates 1-3, Scenario S2-BF 203
Figure 175. Brine saturation distribution comparison for the Waste Panel, Replicates 1-3, Scenario S4-BF 204
Figure 176. Brine saturation distribution comparison for the Waste Panel, Replicates 1-3, Scenario S6-BF 204
Figure 177. Pressure means and confidence intervals for the Waste Panel, Scenario S1-BF 206
Figure 178. Pressure means and confidence intervals for the Waste Panel, Scenario S2-BF 206
Figure 179. Pressure means and confidence intervals for the Waste Panel, Scenario S4-BF 207
Figure 180. Pressure means and confidence intervals for the Waste Panel, Scenario S6-BF 207
Figure 181. Brine saturation means and confidence intervals for the Waste Panel, Scenario S1-BF 208
Figure 182. Brine saturation means and confidence intervals for the Waste Panel, Scenario S2-BF 208
Figure 183. Brine saturation means and confidence intervals for the Waste Panel, Scenario S4-BF 209
Figure 184. Brine saturation means and confidence intervals for the Waste Panel, Scenario S6-BF 209

Information Only

LIST OF TABLES

Table 1. Changed Repository Parameters 4
Table 2. Inventory Iron, CPR, and Decay Heat Concentrations 5
Table 3. BRAGFLO Modeling Scenarios 15
Table 4. Time Period Associations Between Material Map Figures and BRAGFLO Scenarios 20
Table 5. Pressure Statistics on Vector Means, Replicate 1 35
Table 6. Pressure Statistics on Individual Vectors, Replicate 1 36
Table 7. Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure, Replicate 1, Scenario S1-BF of CRA26_IS 52
Table 8. Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure, Replicate 1, Scenario S2-BF of CRA26_IS 52
Table 9. Brine Saturation Statistics on Vector Means, Replicate 1 56
Table 10. Brine Saturation Statistics on Individual Vectors, Replicate 1 57
Table 11. Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation, Replicate 1, Scenario S1-BF of CRA26_IS 73
Table 12. Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation, Replicate 1, Scenario S2-BF of CRA26_IS 73
Table 13. Porosity Statistics, Replicate 1 77
Table 14. Cumulative Gas Generation Statistics, Replicate 1 83
Table 15. Brine and Gas Flow Statistics, Replicate 1 93
Table 16. Brine Flow and Consumption Statistics, Replicate 1 94
Table 17. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S1-BF of RPPCR 120
Table 18. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S1-BF of CRA26_IS 120
Table 19. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S1-BF of RPPCR 121
Table 20. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S1-BF of CRA26_IS 121
Table 21. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S1-BF of RPPCR 122
Table 22. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S1-BF of CRA26_IS 122

Information Only

Table 23. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S2-BF of RPPCR 123

Table 24. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S2-BF of CRA26_IS 123

Table 25. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S2-BF of RPPCR 124

Table 26. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S2-BF of CRA26_IS 124

Table 27. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S2-BF of RPPCR 125

Table 28. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S2-BF of CRA26_IS 125

Table 29. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S4-BF of RPPCR 126

Table 30. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S4-BF of CRA26_IS 126

Table 31. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S4-BF of RPPCR 127

Table 32. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S4-BF of CRA26_IS 127

Table 33. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S4-BF of RPPCR 128

Table 34. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S4-BF of CRA26_IS 128

Table 35. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S6-BF of RPPCR 129

Table 36. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S6-BF of CRA26_IS 129

Table 37. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S6-BF of RPPCR 130

Table 38. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S6-BF of CRA26_IS 130

Table 39. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S6-BF of RPPCR 131

Table 40. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S6-BF of CRA26_IS 131

Information Only

Table 41. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S1-BF of RPPCR 132

Table 42. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S1-BF of CRA26_IS 132

Table 43. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S1-BF of RPPCR 133

Table 44. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S1-BF of CRA26_IS 133

Table 45. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S1-BF of RPPCR 134

Table 46. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S1-BF of CRA26_IS 134

Table 47. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S2-BF of RPPCR 135

Table 48. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S2-BF of CRA26_IS 135

Table 49. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S2-BF of RPPCR 136

Table 50. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S2-BF of CRA26_IS 136

Table 51. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S2-BF of RPPCR 137

Table 52. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S2-BF of CRA26_IS 137

Table 53. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S4-BF of RPPCR 138

Table 54. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S4-BF of CRA26_IS 138

Table 55. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S4-BF of RPPCR 139

Table 56. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S4-BF of CRA26_IS 139

Table 57. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S4-BF of RPPCR 140

Table 58. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S4-BF of CRA26_IS 140

Information Only

Table 59. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S6-BF of RPPCR 141

Table 60. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S6-BF of CRA26_IS 141

Table 61. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S6-BF of RPPCR 142

Table 62. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S6-BF of CRA26_IS 142

Table 63. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S6-BF of RPPCR 143

Table 64. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S6-BF of CRA26_IS 143

Table 65. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S1-BF of RPPCR 144

Table 66. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S1-BF of CRA26_IS 144

Table 67. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S1-BF of RPPCR 145

Table 68. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S1-BF of CRA26_IS 145

Table 69. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S1-BF of RPPCR 146

Table 70. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S1-BF of CRA26_IS 146

Table 71. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S2-BF of RPPCR 147

Table 72. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S2-BF of CRA26_IS 147

Table 73. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S2-BF of RPPCR 148

Table 74. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S2-BF of CRA26_IS 148

Table 75. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S2-BF of RPPCR 149

Table 76. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S2-BF of CRA26_IS 149

Information Only

Table 77. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S4-BF of RPPCR 150

Table 78. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S4-BF of CRA26_IS 150

Table 79. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S4-BF of RPPCR 151

Table 80. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S4-BF of CRA26_IS 151

Table 81. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S4-BF of RPPCR 152

Table 82. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S4-BF of CRA26_IS 152

Table 83. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S6-BF of RPPCR 153

Table 84. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S6-BF of CRA26_IS 153

Table 85. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S6-BF of RPPCR 154

Table 86. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S6-BF of CRA26_IS 154

Table 87. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S6-BF of RPPCR 155

Table 88. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S6-BF of CRA26_IS 155

Table 89. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S1-BF of RPPCR 156

Table 90. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S1-BF of CRA26_IS 156

Table 91. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S1-BF of RPPCR 157

Table 92. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S1-BF of CRA26_IS 157

Table 93. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S1-BF of RPPCR 158

Table 94. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S1-BF of CRA26_IS 158

Information Only

Table 95. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S2-BF of RPPCR 159

Table 96. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S2-BF of CRA26_IS 159

Table 97. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S2-BF of RPPCR 160

Table 98. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S2-BF of CRA26_IS 160

Table 99. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S2-BF of RPPCR 161

Table 100. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S2-BF of CRA26_IS 161

Table 101. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S4-BF of RPPCR 162

Table 102. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S4-BF of CRA26_IS 162

Table 103. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S4-BF of RPPCR 163

Table 104. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S4-BF of CRA26_IS 163

Table 105. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S4-BF of RPPCR 164

Table 106. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S4-BF of CRA26_IS 164

Table 107. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S6-BF of RPPCR 165

Table 108. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S6-BF of CRA26_IS 165

Table 109. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S6-BF of RPPCR 166

Table 110. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S6-BF of CRA26_IS 166

Table 111. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S6-BF of RPPCR 167

Table 112. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S6-BF of CRA26_IS 167

Information Only

Table 113. Time-averaged Confidence Interval Limits for RPPCR.....205
Table 114. Time-averaged Confidence Interval Limits for CRA26_IS 205

Information Only

LIST OF VARIABLES

Quantity	Units	Description
WAS_PRES	MPa	Brine Pressure in Waste Panel
WAS_PRES	MPa	Brine Pressure in Waste Panel
SRR_PRES	MPa	Brine Pressure in South Rest-of-Repository
NRR_PRES	MPa	Brine Pressure in North Rest-of-Repository
SOP_PRES	MPa	Brine Pressure in South Operations Area
EXP_PRES	MPa	Brine Pressure in Experimental Area
WOP_PRES	MPa	Brine Pressure in West Operations Area
WRR_PRES	MPa	Brine Pressure in West Rest-of-Repository
WAS_SATB	-	Brine Saturation in Waste Panel
SRR_SATB	-	Brine Saturation in South Rest-of-Repository
NRR_SATB	-	Brine Saturation in North Rest-of-Repository
SOP_SATB	-	Brine Saturation in South Operations Area
EXP_SATB	-	Brine Saturation in Experimental Area
WOP_SATB	-	Brine Saturation in West Operations Area
WRR_SATB	-	Brine Saturation in West Rest-of-Repository
WAS_POR	-	Porosity in Waste Panel
SRR_POR	-	Porosity in South Rest-of-Repository
NRR_POR	-	Porosity in North Rest-of-Repository
WRR_POR	-	Porosity in West Rest-of-Repository
FEMOL_T	mol	Gas Generation from Iron Corrosion in Total Waste Areas
CELMOL_T	mol	Gas Generation from Cellulose Biodegradation in Total Waste Areas
ALL_HRDC	mol	Gas Generation from Radiolysis in Total Waste Areas
ALL_HTTC	mol	Gas Generation from All Sources in Total Waste Areas
FEMOL_TV	mol/m^3	Normalized Gas Generation from Iron Corrosion in Total Waste Areas
CELMOL_TV	mol/m^3	Normalized Gas Generation from Cellulose Biodegradation in Total Waste Areas
ALL_HRDCV	mol/m^3	Normalized Gas Generation from Radiolysis in Total Waste Areas
BRNREPIC	m^3	Brine Flow into Repository
BRNREP	m^3	Net Brine Flow into Repository
GASREP	m^3	Net Gas Flow out of Repository
BSNPCSUD	m^3	Brine Flow out of South Rest-of-Repository (South to North) Across the Panel Closure UDRZ
BSSPCSUD	m^3	Brine Flow into South Rest-of-Repository (North to South) Across the Panel Closure UDRZ
BSNPCS	m^3	Brine Flow out of South Rest-of-Repository (South to North) Across the Panel Closure

Information Only

Quantity	Units	Description
BSSPCS	m^3	Brine Flow into South Rest-of-Repository (North to South) Across the Panel Closure
BSNPCSLD	m^3	Brine Flow out of South Rest-of-Repository (South to North) Across the Panel Closure LDRZ
BSSPCSLD	m^3	Brine Flow into South Rest-of-Repository (North to South) Across the Panel Closure LDRZ
GSNPCSUD	m^3	Gas Flow out of South Rest-of-Repository (South to North) Across the Panel Closure UDRZ
GSSPCSUD	m^3	Gas Flow into South Rest-of-Repository (North to South) Across the Panel Closure UDRZ
GSNPCS	m^3	Gas Flow out of South Rest-of-Repository (South to North) Across the Panel Closure
GSSPCS	m^3	Gas Flow into South Rest-of-Repository (North to South) Across the Panel Closure
GSNPCSLD	m^3	Gas Flow out of South Rest-of-Repository (South to North) Across the Panel Closure LDRZ
GSSPCSLD	m^3	Gas Flow into South Rest-of-Repository (North to South) Across the Panel Closure LDRZ
BNNPCSUD	m^3	Brine Flow out of North Rest-of-Repository (South to North) Across the Panel Closure UDRZ
BNSPCSUD	m^3	Brine Flow into North Rest-of-Repository (North to South) Across the Panel Closure UDRZ
BNNPCS	m^3	Brine Flow out of North Rest-of-Repository (South to North) Across the Panel Closure
BNSPCS	m^3	Brine Flow into North Rest-of-Repository (North to South) Across the Panel Closure
BNNPCSLD	m^3	Brine Flow out of North Rest-of-Repository (South to North) Across the Panel Closure LDRZ
BNSPCSLD	m^3	Brine Flow into North Rest-of-Repository (North to South) Across the Panel Closure LDRZ
GNNPCSUD	m^3	Gas Flow out of North Rest-of-Repository (South to North) Across the Panel Closure UDRZ
GNSPCSUD	m^3	Gas Flow into North Rest-of-Repository (North to South) Across the Panel Closure UDRZ
GNNPCS	m^3	Gas Flow out of North Rest-of-Repository (South to North) Across the Panel Closure
GNSPCS	m^3	Gas Flow into North Rest-of-Repository (North to South) Across the Panel Closure
GNNPCSLD	m^3	Gas Flow out of North Rest-of-Repository (South to North) Across the Panel Closure LDRZ
GNSPCSLD	m^3	Gas Flow into North Rest-of-Repository (North to South) Across the Panel Closure LDRZ

Information Only

Quantity	Units	Description
BONPCSUD	m^3	Brine Flow into West Rest-of-Repository (South to North) Across the Panel Closure UDRZ
BOSPCSUD	m^3	Brine Flow out of West Rest-of-Repository (North to South) Across the Panel Closure UDRZ
BONPCS	m^3	Brine Flow into West Rest-of-Repository (South to North) Across the Panel Closure
BOSPCS	m^3	Brine Flow out of West Rest-of-Repository (North to South) Across the Panel Closure
BONPCSLD	m^3	Brine Flow into West Rest-of-Repository (South to North) Across the Panel Closure LDRZ
BOSPCSLD	m^3	Brine Flow out of West Rest-of-Repository (North to South) Across the Panel Closure LDRZ
GONPCSUD	m^3	Gas Flow into West Rest-of-Repository (South to North) Across the Panel Closure UDRZ
GOSPCSUD	m^3	Gas Flow out of West Rest-of-Repository (North to South) Across the Panel Closure UDRZ
GONPCS	m^3	Gas Flow into West Rest-of-Repository (South to North) Across the Panel Closure
GOSPCS	m^3	Gas Flow out of West Rest-of-Repository (North to South) Across the Panel Closure
GONPCSLD	m^3	Gas Flow into West Rest-of-Repository (South to North) Across the Panel Closure LDRZ
GOSPCSLD	m^3	Gas Flow out of West Rest-of-Repository (North to South) Across the Panel Closure LDRZ
BNSHUDRZ	m^3	Brine Flow up Shaft
BNBHUDRZ	m^3	Brine Flow up Borehole
BRTOMBOC	m^3	Brine Flow into all Anhydrite Layers Away from Repository
BRTOLWBC	m^3	Brine Flow in all Anhydrite Layers Across Land Withdrawal Boundary
WAS_BBALN	m^3	Net Brine Flow into Waste Panel
WAS_BBALC	m^3	Brine Consumption in Waste Panel
SRR_BBALN	m^3	Net Brine Flow into South Rest-of-Repository
SRR_BBALC	m^3	Brine Consumption in South Rest-of-Repository
NRR_BBALN	m^3	Net Brine Flow into North Rest-of-Repository
NRR_BBALC	m^3	Brine Consumption in North Rest-of-Repository
WRR_BBALN	m^3	Net Brine Flow into West Rest-of-Repository
WRR_BBALC	m^3	Brine Consumption in West Rest-of-Repository

Information Only

1.0 INTRODUCTION

The Waste Isolation Pilot Plant (WIPP), located in southeastern New Mexico, has been developed by the U.S. Department of Energy (DOE) for the geologic disposal of transuranic (TRU) waste. The containment of TRU waste at WIPP is regulated by the U.S. Environmental Protection Agency (EPA) under Title 40 of the Code of Federal Regulations (CFR), Part 191.

The DOE demonstrates compliance with the containment requirements of 40 CFR 191.13 by means of performance assessment (PA) as described in the Certification Criteria of Title 40 CFR Part 194. Sandia National Laboratories (SNL) conducts PAs at the request of the DOE. The PA calculations estimate the probability and consequences of potential radionuclide releases from the repository to the accessible environment over a regulatory period of 10,000 years following facility closure. The PA models are continuously maintained and updated with new information, which typically leads to refinements and modifications in both the models and their parameters. Additionally, planned changes to the repository and its components necessitate updates to the WIPP PA models.

All previous WIPP certifications have been based on a repository consisting of 10 panels. In March 2024, the DOE submitted the Replacement Panels Planned Change Request (RPPCR) to seek EPA approval for waste emplacement in two new panels, referred to as replacement panels, located to the west of the existing operations area (Bollinger 2024). The RPPCR received EPA approval in July of 2025 (U.S. EPA 2025).

The addition of the two replacement panels is not expected to provide sufficient space for the disposal of the allowable waste volume designated for WIPP under the Land Withdrawal Act (LWA). The 12-panel configuration is thus regarded as an interim state of the repository. The DOE may seek approval for waste disposal in up to seven additional panels to accommodate the full allowable volume of waste. This 19-panel configuration is considered the anticipated final state of the repository.

The CRA-2026 is the fifth recertification application for the WIPP submitted by the DOE for EPA approval. The PA executed by SNL in support of the CRA-2026 PA is described in AP-214 (Hansen et al. 2025). This analysis report documents the Salado flow component of the CRA-2026 PA for the interim state repository.

Information Only

2.0 CHANGES SINCE THE RPPCR

Several changes are incorporated in the CRA-2026 PA relative to the RPPCR that may impact the Salado flow results. These changes include:

- The repository design.
- Parameters related to repository dimensions.
- The waste inventory.
- Baseline actinide solubilities.
- Solubility uncertainty distributions.
- Colloid concentration parameters for humic and microbial colloids.
- MgO hydration parameters.
- The Salado flow and transport computational grid.
- A new lower bound on capillary pressure in the anhydrite marker beds.
- Revisions to the porosity-permeability parameter distribution.

Changes listed above are discussed in more detail in the sections that follow.

2.1 Repository Design

This analysis represents the 12-panel interim state repository consisting of ten original and two replacement panels. Figure 1 depicts the interim state repository. The RPPCR considered the anticipated final repository state, which included a total of 19 waste panels and the entire allowable inventory volume.

Information Only

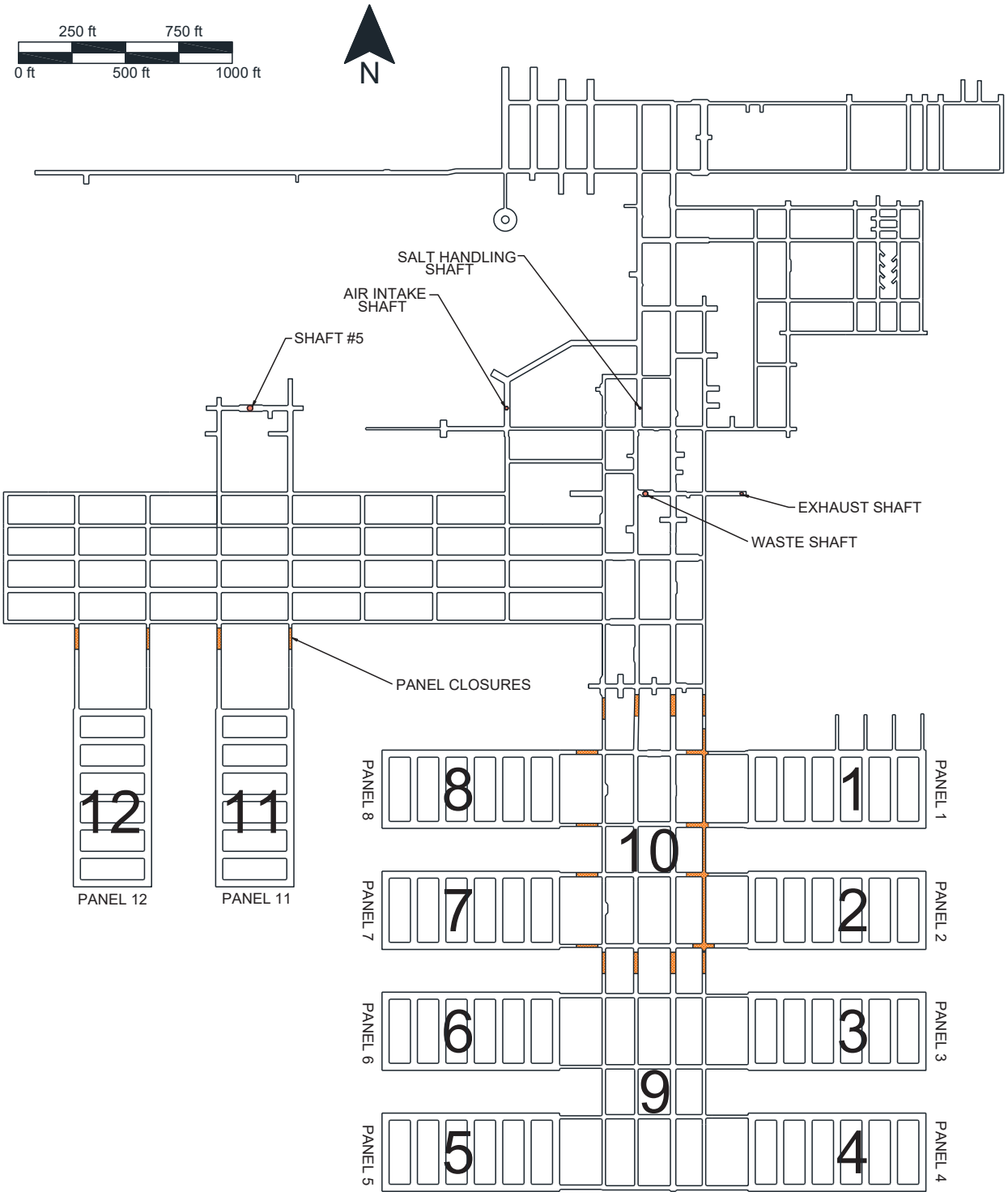

Figure 1. Interim State Repository Layout

Information Only

2.2 Parameters Related to Repository Dimensions

The repository design (Section 2.1) requires changes to several parameters describing repository dimensions. Brunell (2025) revises four parameters to align with the dimensions used in the development of the Salado flow and transport grid (Section 2.3). The parameters include:

- the waste storage volume (REFCON:VREPOS).
- the area of the berm placed over the waste panels (REFCON:ABERM).
- the area allocated for contact-handled (CH) waste disposal (REFCON:AREA_CH).
- the fraction of the repository volume occupied by CH waste (REFCON:FVW).

Although not listed in AP-214 as an anticipated change (Hansen et al. 2025), the area for emplaced remote-handled (RH) waste (REFCON:AREA_RH) is revised by King (2025b) due to the reduced inventory volume used in the CRA26_IS PA calculation (see Section 2.2). The updated values are provided in Table 1, with REFCON:VREPOS being the only parameter in this list that may impact the Salado flow results.

Table 1. Changed Repository Parameters

Material	Property	RPPCR Value	CRA26_IS Value	Units
REFCON	VREPOS	853,284.89	560,722.29	m^3
REFCON	ABERM	1,268,303	750,000	m^2
REFCON	AREA_CH	216,952	141,511	m^2
REFCON	FVW	0.197	0.279	-
REFCON	AREA_RH	15,760	3,528	m^2

2.3 Updates to the Salado Flow and Transport Computational Grid

Dimensions in the computational grid for the Salado flow (BRAGFLO) and transport (NUTS) calculation are changed to be consistent with the interim state repository dimensions (Section 2.1). Day (2025a) modifies the computational grid based on as-built excavation footprint dimensions within the existing repository, plans for future excavations, and the planned change for alternative panel closure locations for Panels 1 and 2 (Knerr 2020).

2.4 Waste Inventory

The LWA establishes a statutory limit on the volume of waste that can be disposed of in the WIPP repository, set at 175,564 m^3 (6,200,000 ft^3). Current assessments indicate that the interim state repository will accommodate less waste than the LWA volume. Ward (2025) provided an assessment of the projected waste storage capacity at 157,831.92 m^3, which includes 156,247.12 m^3 of Contact-Handled (CH) waste and 1,584.80 m^3 of Remote-Handled (RH) waste.

Information Only

Based on information collected up to December 31, 2023, the Interim State Performance Assessment Inventory Report – 2024 (ISPAIR-2024; Van Soest 2025) offers an inventory estimate scaled to the waste volume specified by Ward. Kicker (2025) conducted a screening analysis of the inventory estimates for the ISPAIR-2024 to define the inventory-related input parameters for the PA calculations.

A comparison of the CRA26_IS inventory parameters to RPPCR, as normalized by the waste storage volume of the repository (REFCON:VREPOS), is provided in Table 2.

Table 2. Inventory Iron, CPR, and Decay Heat Concentrations

Input	Unit	RPPCR Value	CRA26_IS Value	CRA26_IS to RPPCR Ratio
Iron	kg/m^3	87.51	126.83	1.45
CPR	kg/m^3	25.02	40.48	1.62
Decay Heat	$watt/m^3$	0.22	0.43	1.95

2.5 Baseline Actinide Solubilities

Thermodynamic calculations are used to compute the baseline solubilities for actinides in the +III, +IV, and +V oxidation states in GWB and ERDA-6 brines for five multiples of the minimum brine volume for a DBR event. These baseline solubility calculations account for inventory components and thus are updated to be consistent with inventory estimates. Domski (2025b) reports the baseline solubility values based on the CRA26_IS inventory.

Currently there is no thermodynamic model for WIPP actinides in the +VI oxidation state. The Los Alamos National Laboratory Actinide Chemistry and Repository Science Program (LANL-ACRSP) has performed experimental investigations on U(VI) solubility under WIPP-relevant conditions. Based on this experimental work, Kaplan et al. (2025) recommends a solubility of 3×10^{-6} M for actinides in the +VI oxidation state in both Salado and Castile brines.

2.6 Solubility Uncertainty Distributions

Actinide solubility uncertainty distributions, which are independent of the repository inventory, are updated for CRA-2026, as documented in Domski (2025a). A literature review was conducted to identify relevant studies published prior to the CRA-2026 cutoff date. Based on this review, the uncertainty distribution for +III actinide solubilities (SOLMOD3:SOLVAR) is updated. No new literature was found for +IV actinide solubilities; therefore, no update to the +IV solubility uncertainty distribution is made.

Information Only

2.7 Colloidal Enhancement Parameters

Based on updates to the thermodynamic model and baseline solubility values, Mariner (2025) reevaluated the proportionality constant for humic colloids. Mariner recommends updated values for radionuclides in the +III oxidation state for both Castile and Salado brines (PHUMOX3:PHUMCIM and PHUMOX3:PHUMSIM). Mariner recommends no change to values for radionuclides in the +IV oxidation state.

In previous WIPP PA calculations, microbial colloid enhancement parameters (PROPMIC and CAPMIC) have been specified for each element (parameter materials AM, NP, PU, TH, and U). For the CRA-2026 PA, the microbial enhancement parameters have been specified for each element-oxidation state (materials AM+3, NP+4, NP+5, PU+3, PU+4, U+4, and U+6), in order to more closely align to the experimental data used to derive the parameter values. Kaplan et al. (2025) recommends the microbial colloid parameter values for the CRA-2026 PA.

2.8 MgO Hydration Parameters

The rate of hydration of MgO to form brucite, $Mg(OH)_2$, in the Salado flow model is specified for humid (WAS_AREA:BRUCITEH), Castile brine inundated (WAS_AREA:BRUCITEC), and Salado brine inundated (WAS_AREA:BRUCITES) conditions. Although changes to the MgO hydration rate parameters were not anticipated in AP-214 (Hansen et al. 2025), Nemer (2025) recommends new parameter distributions for the Castile and Salado brine inundated conditions. King (2025a) redefines the recommended distributions to be compatible with the WIPP PA code LHS.

2.9 Lower Bound on Capillary Pressure in the Anhydrite Marker Beds

To improve numerical stability of the Salado flow model when using the modified van Genuchten-Parker capillary pressure function in the anhydrite marker beds, the PA code BRAGFLO was updated to Version 8.00 (WIPP PA 2025) to implement a new capillary pressure model which incorporates a lower bound on the capillary pressure. This lower bound is applied when brine saturations exceed one minus the residual gas saturation. Day (2025b) sets the lower bound on capillary pressure to 1 atm (101325 Pa), with the PO_MIN property of the S_MB139, S_ANH_AB, and S_MB138 materials, and applied the new capillary pressure model by setting the CAP_MOD property to 6 for the same materials.

2.10 Porosity-Permeability Parameter Distribution

King (2025a) redefines the distribution for the parameter representing the relationship between porosity and permeability in a run-of-mine salt panel closure system during the secondary time duration (PCS_T2:POR2PERM). Initially defined as a truncated normal distribution, this parameter is revised, along with the MgO hydration parameters (Section 2.8), to a cumulative

Information Only

distribution characterized by discrete data points. This change constitutes a deviation from AP-214 (Hansen et al. 2025).

2.11 Parameters Not Updated as Anticipated in Analysis Plan AP-214

AP-214 (Hansen et al. 2025) indicates that several parameters were expected to be updated for CRA-2026. Specifically, the parameter specifying the likelihood of low or high oxidation state for an actinide (property OXCUTOFF for materials NP, PU, and U) and the parameters related to mineral and intrinsic colloids (properties CONCMIN and CONCINT for materials AM, NP, PU, TH, and U) were anticipated to undergo revisions. Kaplan et al. (2025) re-examines the basis for these parameter values and recommends the continued use of the RPPCR values. As a result, no changes were made to these parameters for CRA-2026.

Information Only

3.0 APPROACH FOR THE CRA-2026

The CRA26_IS is based on the Repository Fluid Flow conceptual model previously used in the RPPCR PA. The reduced footprint of the interim state WIPP repository necessitates a change to the Disposal System Geometry to account for a total of 12 panels rather than the 19 panels considered in the RPPCR. The fourth waste area conceptualized for use in the RPPCR to represent 2 replacement and up to 7 additional panels is modified to represent only the 2 replacement panels for CRA26_IS.

3.1 Repository Representation in BRAGFLO

The computational grid used by BRAGFLO for CRA26_IS includes changes from the RPPCR BRAGFLO grid to accommodate as-built excavation footprint dimensions within the existing repository, plans for future excavations, and the planned change for alternative panel closure locations for Panels 1 and 2.

The flaring of the far-field Salado has been re-calculated based on the altered dimensions of the WIPP repository (Day 2025a). The flaring is centered around the mid-point of the experimental area. To reduce grid-dependent effects on the simulations, the column of intact Salado cells directly connected to the excavated regions is not flared for the CRA26_IS grid with both Δx and Δz dimensions of the adjoining excavation and intact Salado cells set equal. The flaring to all other columns outside of the excavated area plus the adjoining intact Salado cells is applied by calculating the z-dimension of the grid cell as if the cell were to wrap from the center of flow outside all of the cells between the cell in question and the center of flow and back (Figure 2).

The Land Withdrawal Boundary (LWB) is placed between the 4th and 5th columns of grid cells on the South end of the grid, and between the 67th and 68th columns of grid cells on the North end of the grid. The distance to the North LWB was calculated as the minimum distance from the westernmost edge of the excavated repository to the nearest land withdrawal boundary (to the west). The distance to the South LWB was calculated as the minimum distance from the southernmost edge of the excavated repository to the nearest land withdrawal boundary (to the south). The grid is extended 10,000 meters beyond the LWB on both ends.

A 1-degree dip from north to south continues to be applied to the Salado layers of the computational grid. The dip serves two purposes. First, the regional dip in the area of the WIPP is approximately 1-degree (Powers et al. 1978) and modeling this 1-degree dip allows the far-field Salado to drain to and from the repository through the marker beds. Second, the dip forces a low point in the repository representation to allow an intrusion to be modeled in a worst-case event of being down-dip from the rest of the repository.

The generic BRAGFLO computational grids with modeled area descriptions and cell dimensions for the RPPCR and CRA26_IS PA are shown in Figure 3 and Figure 4. Detailed material maps associated with the six modeling scenarios for the CRA26_IS are described in Section 4.2.

Information Only

Information Only

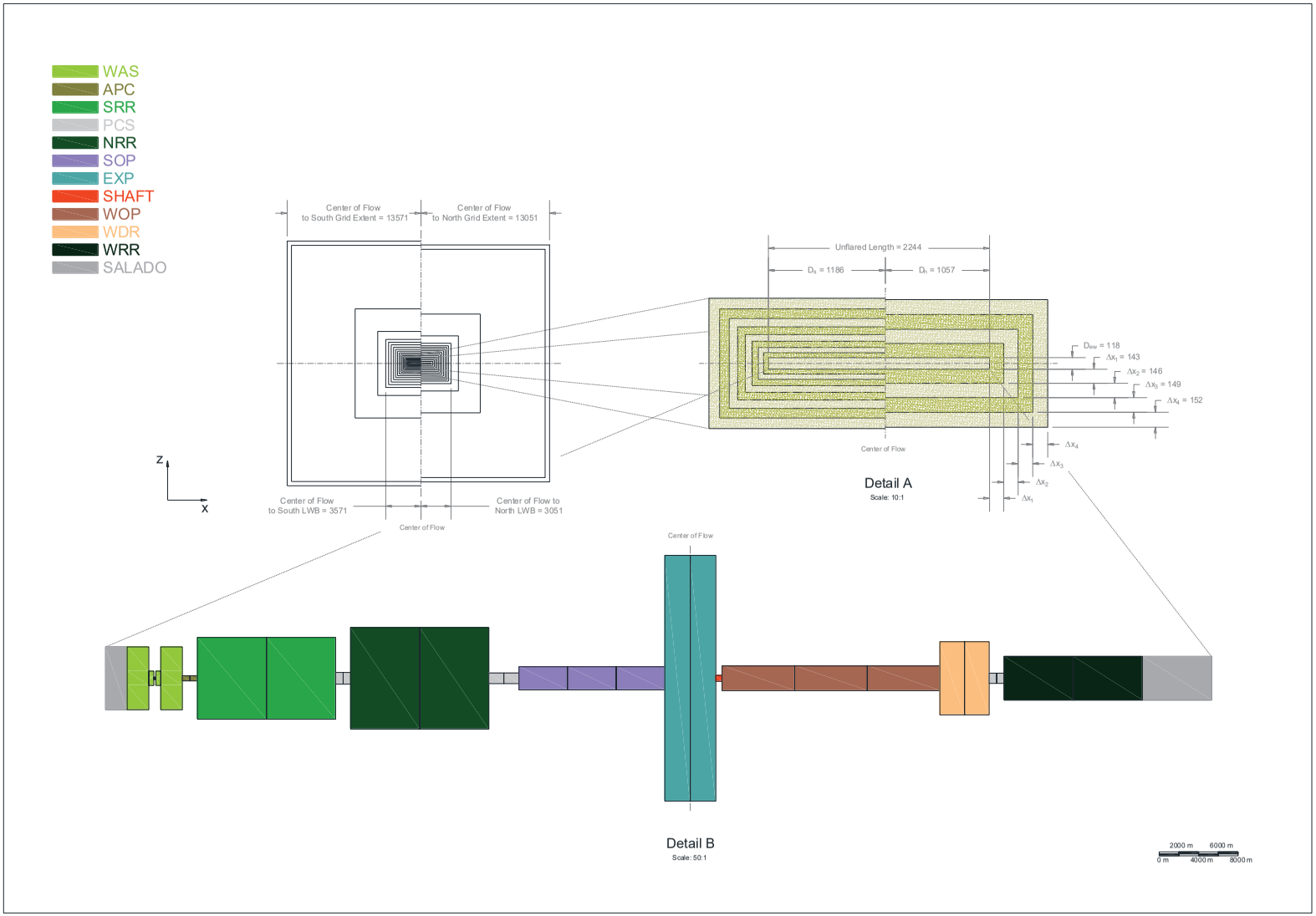

Figure 2. CRA26_IS Grid Flaring

Information Only

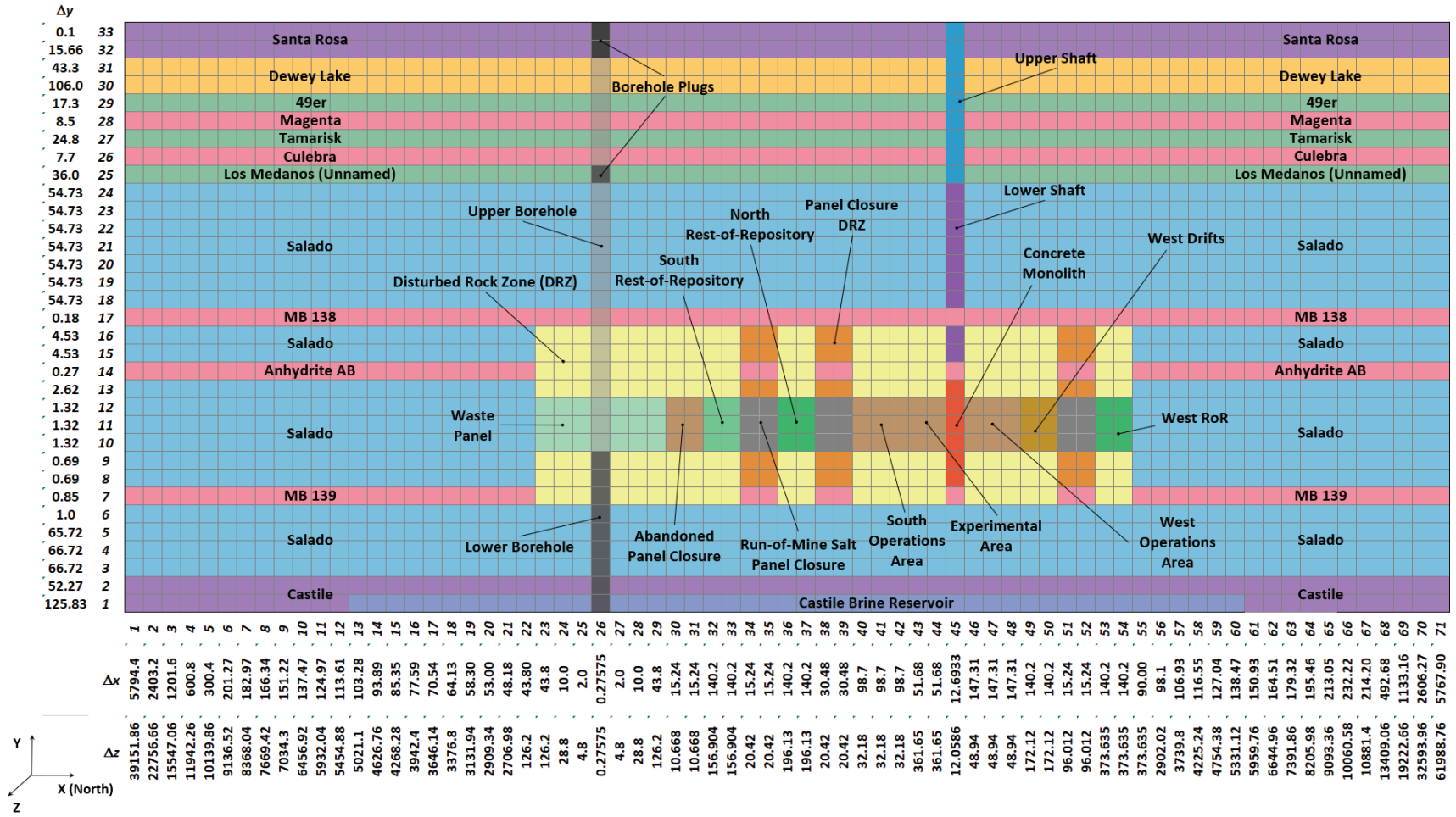

Figure 3. Generic RPPCR BRAGFLO Grid with Modeled Area Descriptions

Information Only

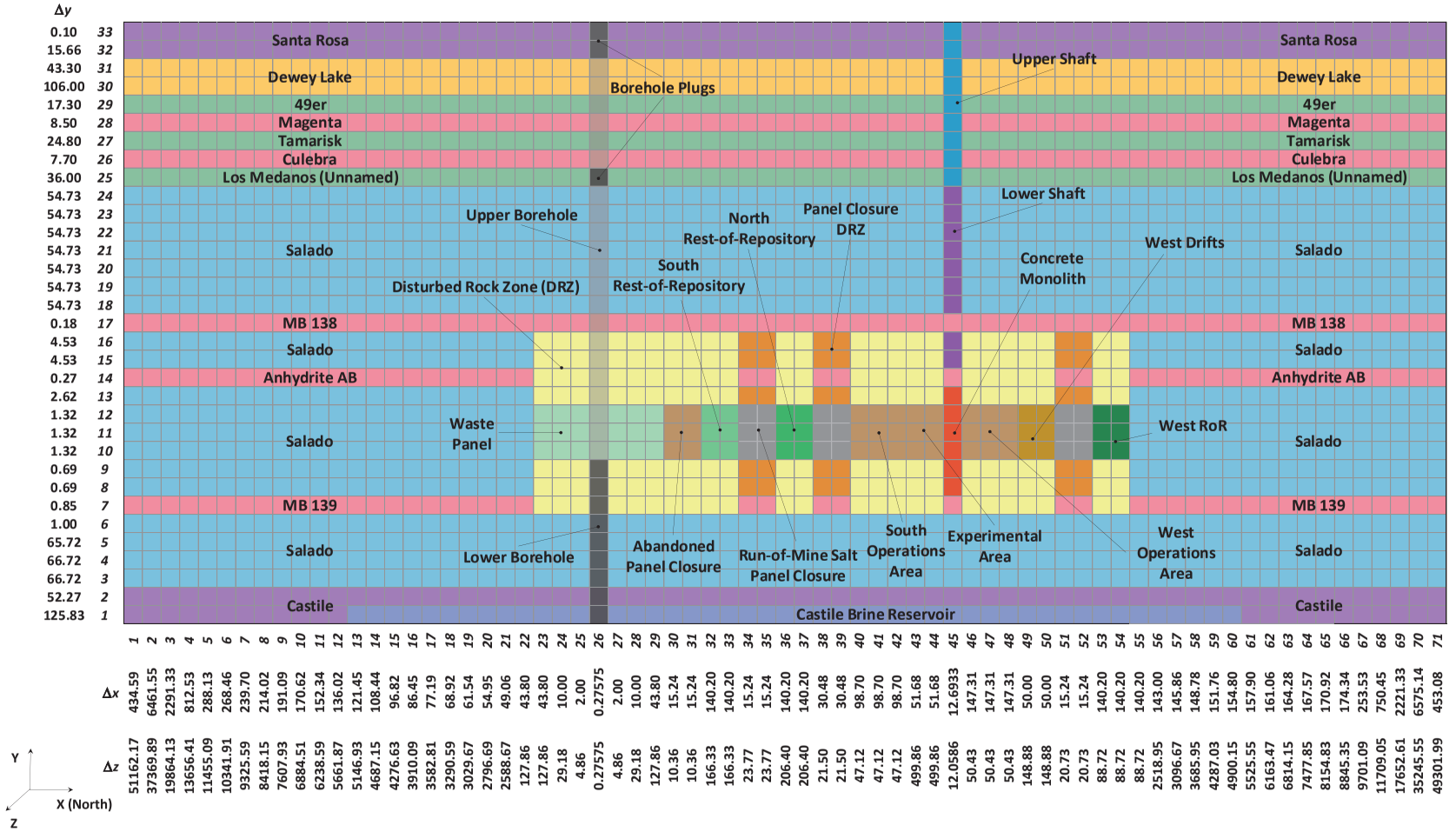

Figure 4. Generic CRA26_IS BRAGFLO Grid with Modeled Area Descriptions

3.2 Initial Conditions

BRAGFLO simulations require the assignment of initial conditions including brine pressure, brine saturation, quantities for all radionuclides participating in radiolysis, and concentrations of iron, magnesium oxide, and biodegradable material in the waste areas. These initial conditions are provided to BRAGFLO through various pre-processing steps in which values are either retrieved from the WIPP PA Performance Assessment Parameter Database or sampled, as appropriate.

At the beginning of each BRAGFLO run, the model simulates a short period of time representing disposal operations. This portion of the run is called the initialization period and lasts for 5 years (from t = –5 to 0 years), corresponding to the time a typical waste panel is expected to be open during disposal operations. All grid blocks require initial pressure and saturation at the beginning of the run (t = –5 years). At time=0 years, BRAGFLO resets initial conditions within the excavated regions including the shaft.

The initial conditions specified for BRAGFLO modeling are listed below:

- Brine pressure in all non-excavated regions is equal to lithostatic pressure. This pressure is sampled at a single location and is assumed to be hydrostatic at all other locations. Note that brine pressure in all non-excavated regions is alternatively set equal to one atmosphere (1.01325×10^5 Pa) for any location above the water table.
- Pressure within all excavated regions is set to one atmosphere (1.01325×10^5 Pa) at t = -5 years.
- Pressure within the excavated waste regions at t = 0 years is increased to 1.24×10^5 Pa in order to account for the pressure increase (2.24×10^4 Pa) calculated for early time rapid microbial gas produced.
- Brine saturation within the non-excavated regions is set to 1.0 at t = –5 years.
- Brine saturation within the excavated regions is set to a value of 0 at t = –5 years.
- Brine saturation in the excavated regions at t = 0 years is prescribed the following values:
  - 0.015 for the excavated waste regions.
  - 0.0 for the operations and experimental areas.
  - 0.9999999 for the shaft (upper, lower, and concrete monolith).
  - Sampled value for the emplaced panel closures from a cumulative distribution with a minimum of 0.0, a mean of 0.25, and a maximum of 0.6.
  - 0.0 for the abandoned panel closure.
  - Brine saturation in the Santa Rosa and the upper Dewey Lake is set to 0.08363 at t = –5 years.

During the initialization period, brine tends to flow into the excavated areas and the shaft, resulting in decreased pressure and saturation in the rock immediately adjacent to the excavations. At time t = 0 years, the pressure and saturation in all the excavations and the shaft is reset to initial

Information Only

conditions for the materials used to represent these regions for the regulatory period. This practice is intended to capture the effect of evaporation of brine inflow during the operational period and the transport of this brine up the shaft ventilation system, as well as the depressurization of the surrounding rock formations due to excavation.

The initial concentrations for radionuclide quantities are applied by equally distributing the sum of radiolysis-contributing contact-handled (CH) and remote-handled (RH) radionuclide inventory on a volumetric basis over all waste areas of the repository. As discussed in Section 2.4, the Land Withdrawal Act (LWA) legislated waste capacity of WIPP is 175,564 m^3 (U.S. Congress 1992 and 1996). The CRA26_IS inventory was scaled for consistency with the projected waste storage capacity of 157,831.92 m^3, less than the full legislated volume of WIPP (Van Soest 2025).

3.3 Boundary Conditions

The boundary conditions assigned for the BRAGFLO calculations in the CRA26_IS are the same as those for the RPPCR PA as follows:

- Constant pressure at the north and south ends of the Culebra and Magenta dolomites.
- Constant pressure (1.01325×10^5 Pa) and saturation (0.08363) conditions at the land surface boundary of the grid, except for saturation at the shaft cell on the land surface boundary (Vaughn 1996).
- No-flow conditions at all other grid boundaries.

Information Only

4.0 SALADO FLOW MODELING METHODOLOGY

The BRAGFLO (WIPP PA 2025) numerical code calculates the flow of brine and gas in the vicinity of the WIPP repository over a 10,000-year regulatory compliance period. The results of these calculations are used by other codes to calculate potential radionuclide releases to the accessible environment. Some of the specific processes included in the BRAGFLO calculations include:

- Two-phase, immiscible, brine and gas flow.
- Pressure-induced fracture of the host rock.
- Creep closure of the waste filled regions within the repository.
- Pressure-dependent increase in permeability (i.e., Klinkenberg effect).
- Brine and gas consumption and/or generation due to chemical processes (e.g., iron corrosion, cellulose biodegradation, MgO hydration and carbonation, brine radiolysis) within the waste.

There is significant uncertainty associated with characterizing the physical properties of geologic materials that influence these processes. WIPP PA addresses these uncertainties in two ways. Properties such as permeability and porosity are usually measured indirectly and vary significantly depending upon location. The uncertainty in particular physical property values is called subjective (epistemic) uncertainty. Subjective uncertainty can, in theory, be reduced by further study of the system. Subjective uncertainty is addressed within Salado flow modeling using probability distributions for subjectively uncertain parameters. Multiple flow realizations are performed in which the values of uncertain parameters are sampled from their respective distributions. For subjectively uncertain, spatially distributed quantities, e.g., the permeability of the DRZ, one sampled value is used to specify a particular parameter value over its entire spatial extent in a single realization. To reduce the number of realizations required and to ensure that low probability (and possibly high consequence) combinations are represented, Latin Hypercube Sampling (LHS) is used to create the realizations. For the WIPP PA, the LHS software (WIPP PA 2021) is used to create a "replicate" of 100 distinct parameter sets ("vectors") that are sampled from the full range of parameter uncertainty. To ensure that the Latin Hypercube replicates are representative, a total of three replicates are run for a total of 300 separate vectors.

Another type of uncertainty encountered in WIPP PA is that of stochastic (aleatory) uncertainty associated with incomplete knowledge of future events. Unlike subjective uncertainty, stochastic uncertainty cannot be reduced by further study. During BRAGFLO calculations, stochastic uncertainty is addressed by defining a set of six scenarios for which brine and gas flow is calculated for each of the vectors generated by the LHS software. Other WIPP PA codes addresses stochastic uncertainty by employing a Monte Carlo sampling technique on random futures, building random future responses based on the six defined BRAGFLO scenarios. In this context, a future is defined as one possible sequence of events. The total number of BRAGFLO simulations that must be run for a WIPP PA calculation is 3 replicates times 100 vectors times 6 scenarios equaling 1,800 BRAGFLO simulations.

Information Only

4.1 Modeling Scenarios

The six scenarios used in the CRA26_IS are unchanged from those used for the RPPCR PA. Results obtained in the six scenarios from BRAGFLO are used to initialize flow and material properties in subsequent codes in the PA computational suite, e.g., in the calculation of direct brine release volumes. The scenarios in BRAGFLO are denoted as S1-BF to S6-BF. The scenarios include one undisturbed scenario (S1-BF), four scenarios with a single inadvertent future drilling intrusion into the repository during the 10,000-year regulatory period (S2-BF to S5-BF), and one scenario with two intrusions into a single waste panel (S6-BF). Two types of intrusions, denoted as E1 and E2, are considered in PA calculations. An E1 intrusion assumes the borehole passes through a waste-filled panel and into a region of pressurized brine that may exist under the repository in the Castile formation. An E2 intrusion assumes that the borehole passes through the repository but does not encounter pressurized brine. Scenarios S2-BF and S3-BF model the effect of an E1 intrusion occurring at 350 years and 1000 years, respectively, after the repository is closed. Scenarios S4-BF and S5-BF model the effect of an E2 intrusion at 350 and 1000 years. Scenario S6-BF models an E2 intrusion occurring at 1000 years, followed by an E1 intrusion into the same panel at 2000 years. BRAGFLO results obtained in Scenario S6-BF are used to calculate transport releases to the Culebra. Table 3 summarizes the six scenarios used in WIPP PA Salado flow analyses.

Table 3. BRAGFLO Modeling Scenarios

Scenario	Description
S1-BF	Undisturbed Repository
S2-BF	E1 intrusion at 350 years
S3-BF	E1 intrusion at 1,000 years
S4-BF	E2 intrusion at 350 years
S5-BF	E2 intrusion at 1,000 years
S6-BF	E2 intrusion at 1,000 years; E1 intrusion at 2,000 years.

The primary event mechanics of each scenario and the associated material property maps are given in Section 4.2.

4.2 Material Maps

Implementation of the BRAGFLO scenarios necessitates the modification of the grid material maps at different times. Figure 5 through Figure 14 show material maps associated with the BRAGFLO grid for all BRAGFLO scenarios across all time periods (–5 to 10,000 years). Associations between the material maps and BRAGFLO scenarios are summarized in Table 4.

Information Only

4.2.1 Scenario S1-BF (Undisturbed Conditions)

- **-5 years**: Initialization phase with open waste areas, panel closures, and shaft. (Figure 5)
- **0 years**: Waste, panel closures, and shaft are emplaced. ROMPCS represented by material PCS_T1 with no healing of the DRZ above and below the panel closure and abandoned panel closure represented by material PCS_NO. (Figure 6)
- **100 years**: ROMPCS material transitions from PCS_T1 to PCS_T2 with no healing of the DRZ above and below the panel closure. (Figure 7)
- **200 years**: ROMPCS material transitions from PCS_T2 to PCS_T3 with healed regions of DRZ above and below the panel closure represented by material DRZ_PCS. Lower shaft material transitions from SHFTL_T1 to SHFTL_T2. (Figure 8)

4.2.2 Scenario S2-BF (E1 intrusion at 350 years)

- **–5 years**: Initialization phase with open waste areas, panel closures, and shaft. (Figure 5)
- **0 years**: Waste, panel closures, and shaft are emplaced. ROMPCS represented by material PCS_T1 with no healing of the DRZ above and below the panel closure and abandoned panel closure represented by material PCS_NO. (Figure 6)
- **100 years**: ROMPCS material transitions from PCS_T1 to PCS_T2 with no healing of the DRZ above and below the panel closure. (Figure 7)
- **200 years**: ROMPCS material transitions from PCS_T2 to PCS_T3 with healed regions of DRZ above and below the panel closure represented by material DRZ_PCS. Lower shaft material transitions from SHFTL_T1 to SHFTL_T2. (Figure 8)
- **350 years**: Borehole intrusion through the Waste Panel and into a hypothetical pressurized brine region in the underlying Castile Formation, with the borehole represented by material BH_OPEN. Concrete borehole plugs, represented by material CONC_PLG, immediately emplaced in the borehole below the Culebra and at the surface. (Figure 11)
- **550 years**: Borehole plugs fail, the borehole material degrades, and the entire borehole is modeled as having properties equivalent to silty sand. The borehole, bottom to top, is represented by material BH_SAND. (Figure 13)
- **1550 years**: The permeability of the borehole between the repository and the Castile brine region decreases due to creep closure of the salt. The lower borehole is represented by material BH_CREEP. (Figure 14)

Information Only

4.2.3 Scenario S3-BF (E1 intrusion at 1000 years)

- **–5 years**: Initialization phase with open waste areas, panel closures, and shaft. (Figure 5)
- **0 years**: Waste, panel closures, and shaft are emplaced. ROMPCS represented by material PCS_T1 with no healing of the DRZ above and below the panel closure and abandoned panel closure represented by material PCS_NO. (Figure 6)
- **100 years**: ROMPCS material transitions from PCS_T1 to PCS_T2 with no healing of the DRZ above and below the panel closure. (Figure 7)
- **200 years**: ROMPCS material transitions from PCS_T2 to PCS_T3 with healed regions of DRZ above and below the panel closure represented by material DRZ_PCS. Lower shaft material transitions from SHFTL_T1 to SHFTL_T2. (Figure 8)
- **1000 years**: Borehole intrusion through the Waste Panel and into a hypothetical pressurized brine region in the underlying Castile Formation, with the borehole represented by material BH_OPEN. Concrete borehole plugs, represented by material CONC_PLG, immediately emplaced in the borehole below the Culebra and at the surface. (Figure 11)
- **1200 years**: Borehole plugs fail, the borehole material degrades, and the entire borehole is modeled as having properties equivalent to silty sand. The borehole, bottom to top, is represented by material BH_SAND. (Figure 13)
- **2200 years**: The permeability of the borehole between the repository and the Castile brine region decreases due to creep closure of the salt. The lower borehole is represented by material BH_CREEP. (Figure 14)

4.2.4 Scenario S4-BF (E2 intrusion at 350 years)

- **–5 years**: Initialization phase with open waste areas, panel closures, and shaft. (Figure 5)
- **0 years**: Waste, panel closures, and shaft are emplaced. ROMPCS represented by material PCS_T1 with no healing of the DRZ above and below the panel closure and abandoned panel closure represented by material PCS_NO. (Figure 6)
- **100 years**: ROMPCS material transitions from PCS_T1 to PCS_T2 with no healing of the DRZ above and below the panel closure. (Figure 7)
- **200 years**: ROMPCS material transitions from PCS_T2 to PCS_T3 with healed regions of DRZ above and below the panel closure represented by material DRZ_PCS. Lower shaft material transitions from SHFTL_T1 to SHFTL_T2. (Figure 8)
- **350 years**: Borehole intrusion terminating at the floor of the Waste Panel, with the borehole represented by material BH_OPEN. Concrete borehole plugs, represented

Information Only

by material CONC_PLG, immediately emplaced in the borehole below the Culebra and at the surface. (Figure 9)

- **550 years**: Borehole plugs fail, the borehole material degrades, and the entire borehole is modeled as having properties equivalent to silty sand. The borehole, bottom to top, is represented by material BH_SAND. (Figure 10)

4.2.5 Scenario S5-BF (E2 intrusion at 1000 years)

- **–5 years**: Initialization phase with open waste areas, panel closures, and shaft. (Figure 5)
- **0 years**: Waste, panel closures, and shaft are emplaced. ROMPCS represented by material PCS_T1 with no healing of the DRZ above and below the panel closure and abandoned panel closure represented by material PCS_NO. (Figure 6)
- **100 years**: ROMPCS material transitions from PCS_T1 to PCS_T2 with no healing of the DRZ above and below the panel closure. (Figure 7)
- **200 years**: ROMPCS material transitions from PCS_T2 to PCS_T3 with healed regions of DRZ above and below the panel closure represented by material DRZ_PCS. Lower shaft material transitions from SHFTL_T1 to SHFTL_T2. (Figure 8)
- **1000 years**: Borehole intrusion terminating at the floor of the Waste Panel, with the borehole represented by material BH_OPEN. Concrete borehole plugs, represented by material CONC_PLG, immediately emplaced in the borehole below the Culebra and at the surface. (Figure 9)
- **1200 years**: Borehole plugs fail, the borehole material degrades, and the entire borehole is modeled as having properties equivalent to silty sand. The borehole, bottom to top, is represented by material BH_SAND. (Figure 10)

4.2.6 Scenario S6-BF (E2 intrusion at 1000 years, E1 intrusion at 2000 years)

- **–5 years**: Initialization phase with open waste areas, panel closures, and shaft. (Figure 5)
- **0 years**: Waste, panel closures, and shaft are emplaced. ROMPCS represented by material PCS_T1 with no healing of the DRZ above and below the panel closure and abandoned panel closure represented by material PCS_NO. (Figure 6)
- **100 years**: ROMPCS material transitions from PCS_T1 to PCS_T2 with no healing of the DRZ above and below the panel closure. (Figure 7)
- **200 years**: ROMPCS material transitions from PCS_T2 to PCS_T3 with healed regions of DRZ above and below the panel closure represented by material

Information Only

DRZ_PCS. Lower shaft material transitions from SHFTL_T1 to SHFTL_T2. (Figure 8)

- **1000 years**: Borehole intrusion terminating at the floor of the Waste Panel, with the borehole represented by material BH_OPEN. Concrete borehole plugs, represented by material CONC_PLG, immediately emplaced in the borehole below the Culebra and at the surface. (Figure 9)
- **1200 years**: Borehole plugs fail, the borehole material degrades, and the entire borehole is modeled as having properties equivalent to silty sand. The borehole, bottom to top, is represented by material BH_SAND. (Figure 10)
- **2000 years**: A second borehole intrusion connects the waste panel to a hypothetical pressurized brine region in the underlying Castile Formation. The lower borehole is represented by material BH_OPEN. (Figure 12)
- **2200 years**: The lower borehole is modeled as having properties equivalent to silty sand and is represented by material BH_SAND. (Figure 13)
- **3200 years**: The permeability of the borehole between the repository and the Castile brine region decreases due to creep closure of the salt. The lower borehole is represented by material BH_CREEP. (Figure 14)

Information Only

Information Only

Table 4. Time Period Associations Between Material Map Figures and BRAGFLO Scenarios

Material Map Figure No.	Figure 5	Figure 6	Figure 7	Figure 8	Figure 9	Figure 10	Figure 11	Figure 12	Figure 13	Figure 14
Scenario	Time Period (year)	Time Period (year)	Time Period (year)	Time Period (year)	Time Period (year)	Time Period (year)	Time Period (year)	Time Period (year)	Time Period (year)	Time Period (year)
S1-BF	-5 - 0	0 - 100	100 - 200	200 -10000	-	-	-	-	-	-
S2-BF	-5 - 0	0 - 100	100 - 200	200 - 350	-	-	350-550	-	550 - 1550	1550 - 10000
S3-BF	-5 - 0	0 - 100	100 - 200	200 - 1000	-	-	1000 - 1200	-	1200 - 2200	2200 - 10000
S4-BF	-5 - 0	0 - 100	100 - 200	200 - 350	350 - 550	550 - 10000	-	-	-	-
S5-BF	-5 - 0	0 - 100	100 - 200	200 - 1000	1000 - 1200	1200 - 10000	-	-	-	-
S6-BF	-5 - 0	0 - 100	100 - 200	200 - 1000	1000 - 1200	1200 - 2000	-	2000 - 2200	2200 - 3200	3200 - 10000

Information Only

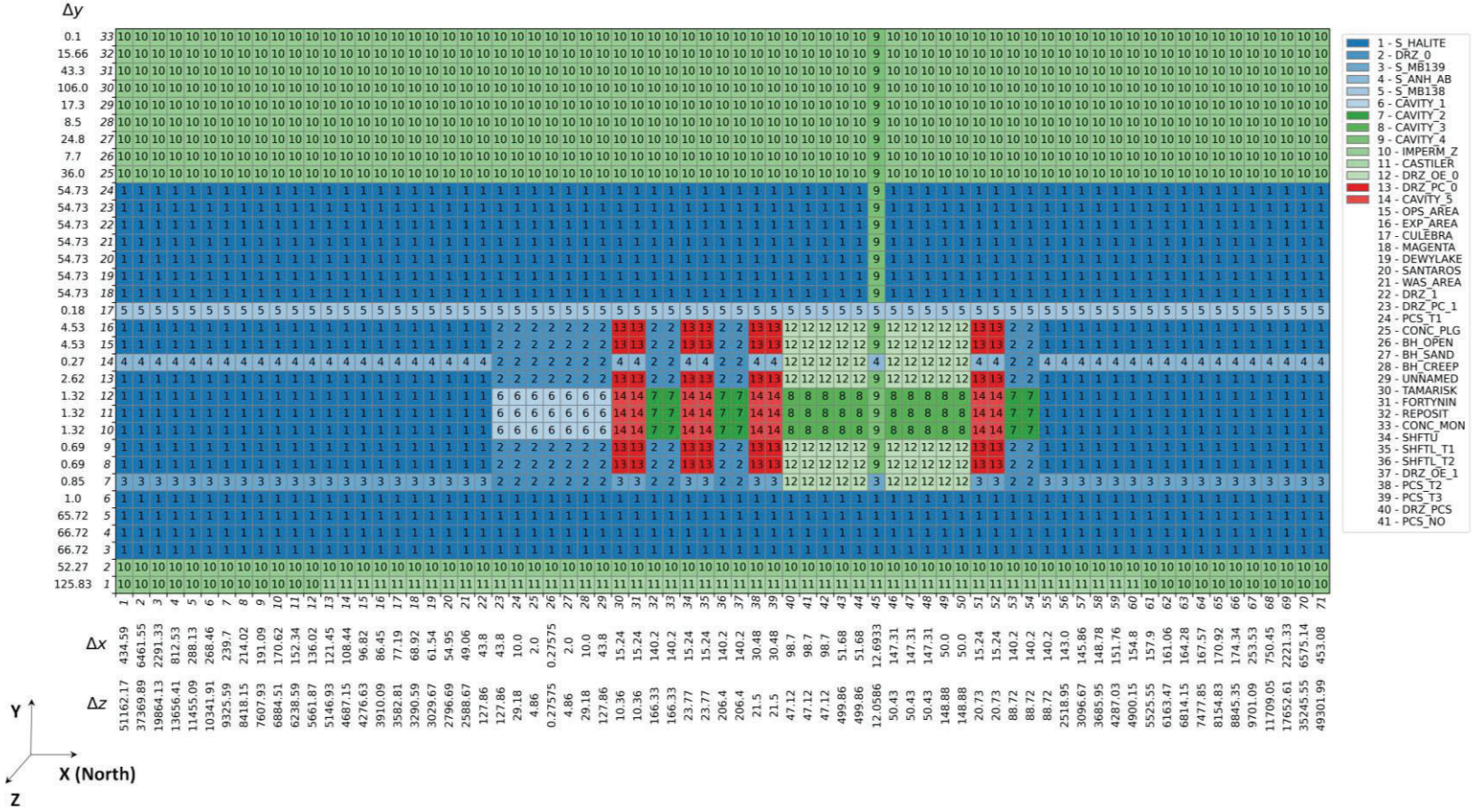

Figure 5. CRA26_IS PA BRAGFLO Grid and Material Map; Years –5 to 0 [Scenarios S1-BF through S6-BF]

Information Only

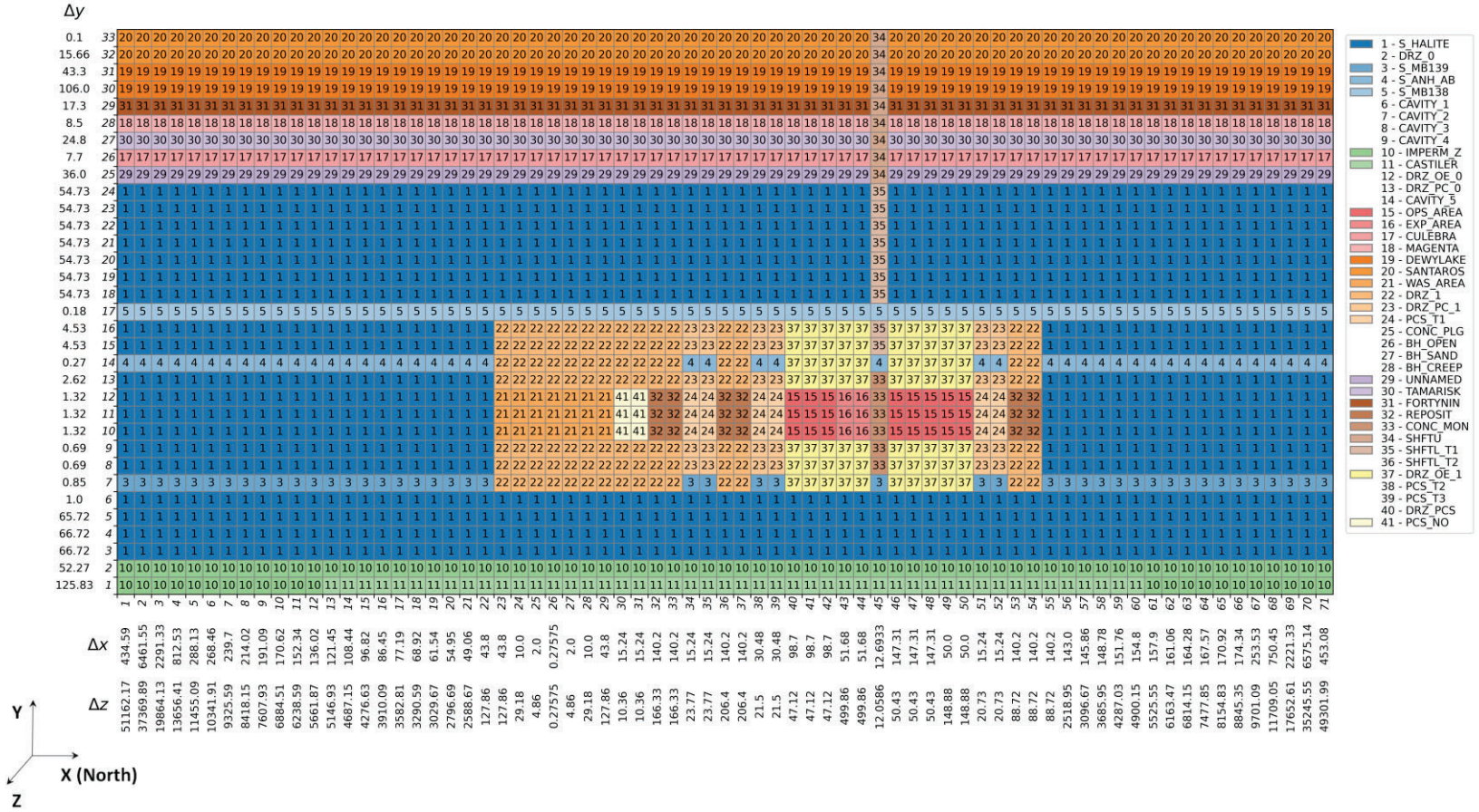

Figure 6. CRA26_IS PA BRAGFLO Grid and Material Map; Years 0 to 100 [Scenarios S1-BF through S6-BF]

Information Only

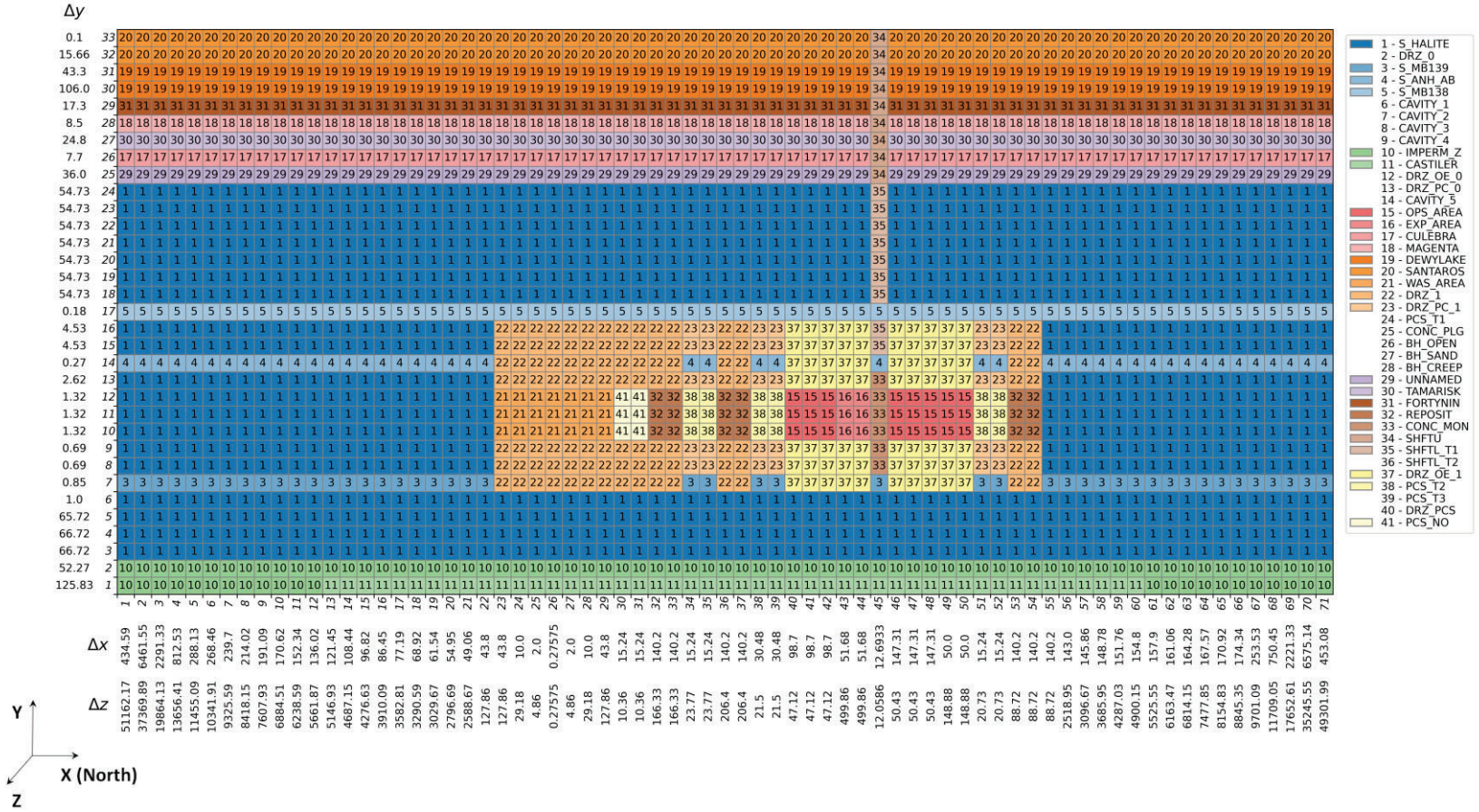

Figure 7. CRA26_IS PA BRAGFLO Grid and Material Map; Years 100 to 200 [Scenarios S1-BF through S6-BF]

Information Only

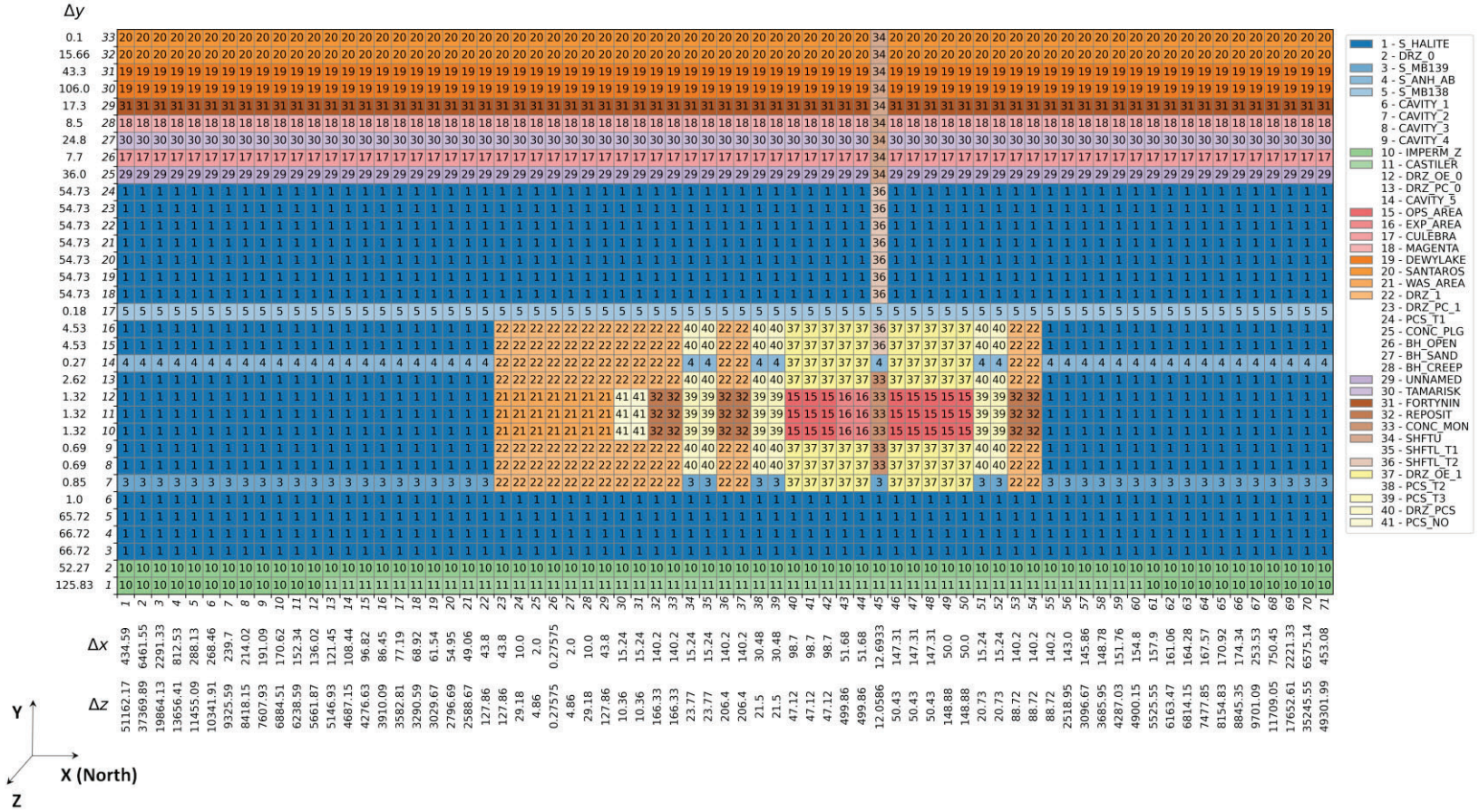

Figure 8. CRA26_IS PA BRAGFLO Grid and Material Map; Years 200 to 10000 [Scenario S1-BF], Years 200 to Time of E1 or E2 Intrusion [Scenarios S2-BF through S6-BF]

Information Only

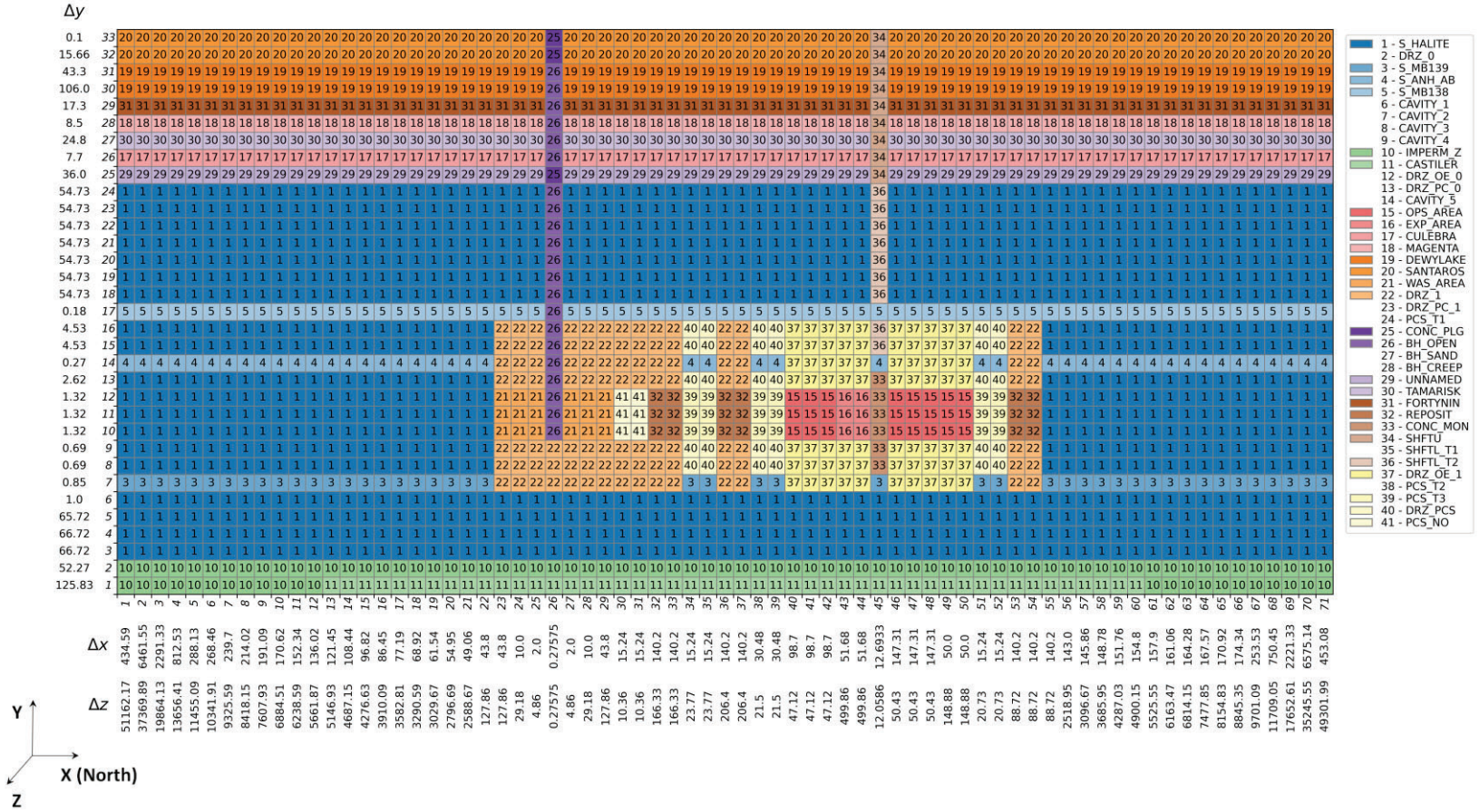

Figure 9. CRA26_IS PA BRAGFLO Grid and Material Map; Time of E2 Intrusion to Time of E2 Intrusion Plus 200 Years [Scenarios S4-BF through S6-BF]

Information Only

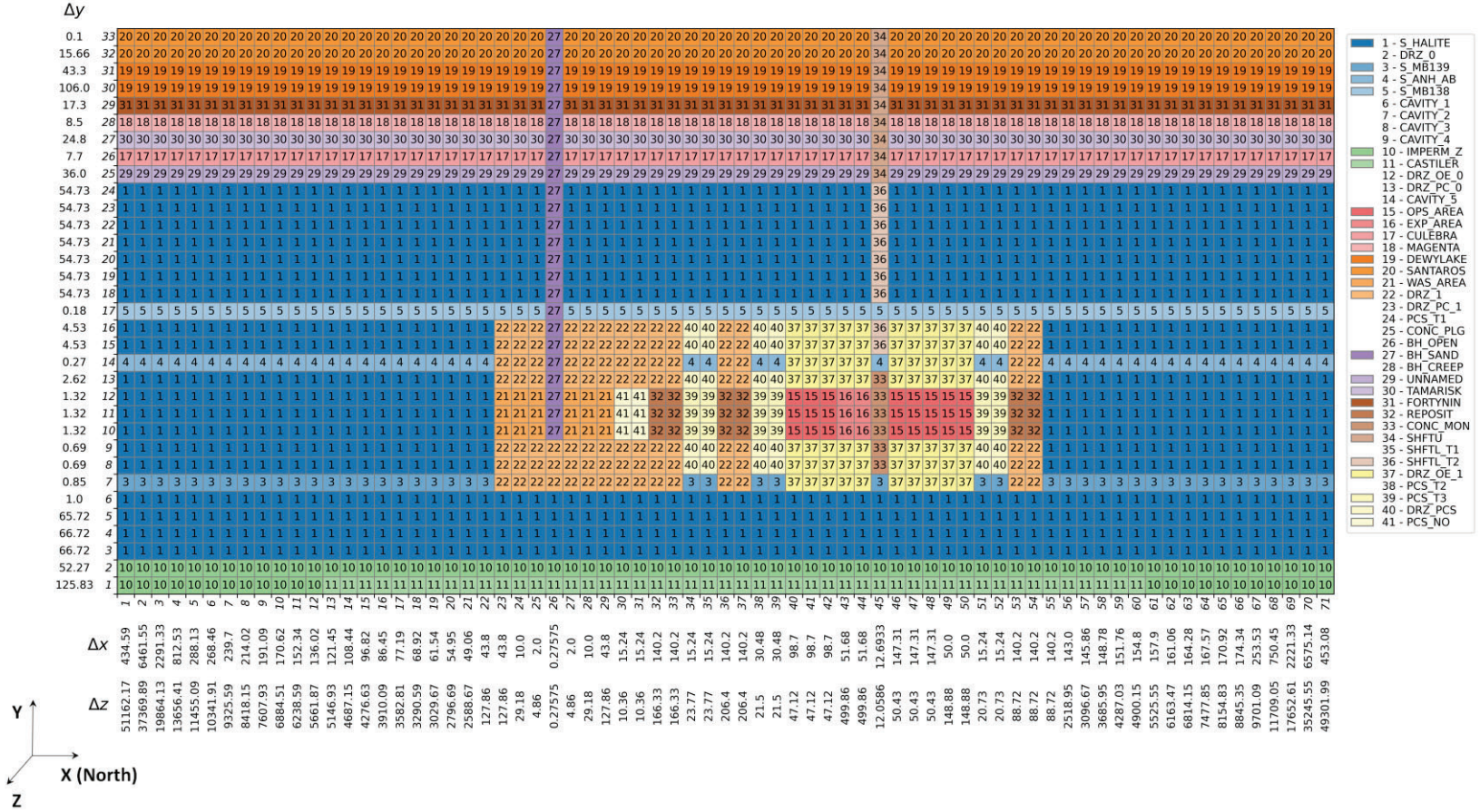

Figure 10. CRA26_IS PA BRAGFLO Grid and Material Map; Time of E2 Intrusion Plus 200 Years to 10000 Years [Scenarios S4-BF and S5-BF], Time of E2 Intrusion Plus 200 Years to Time of E1 Intrusion [Scenario S6-BF]

Information Only

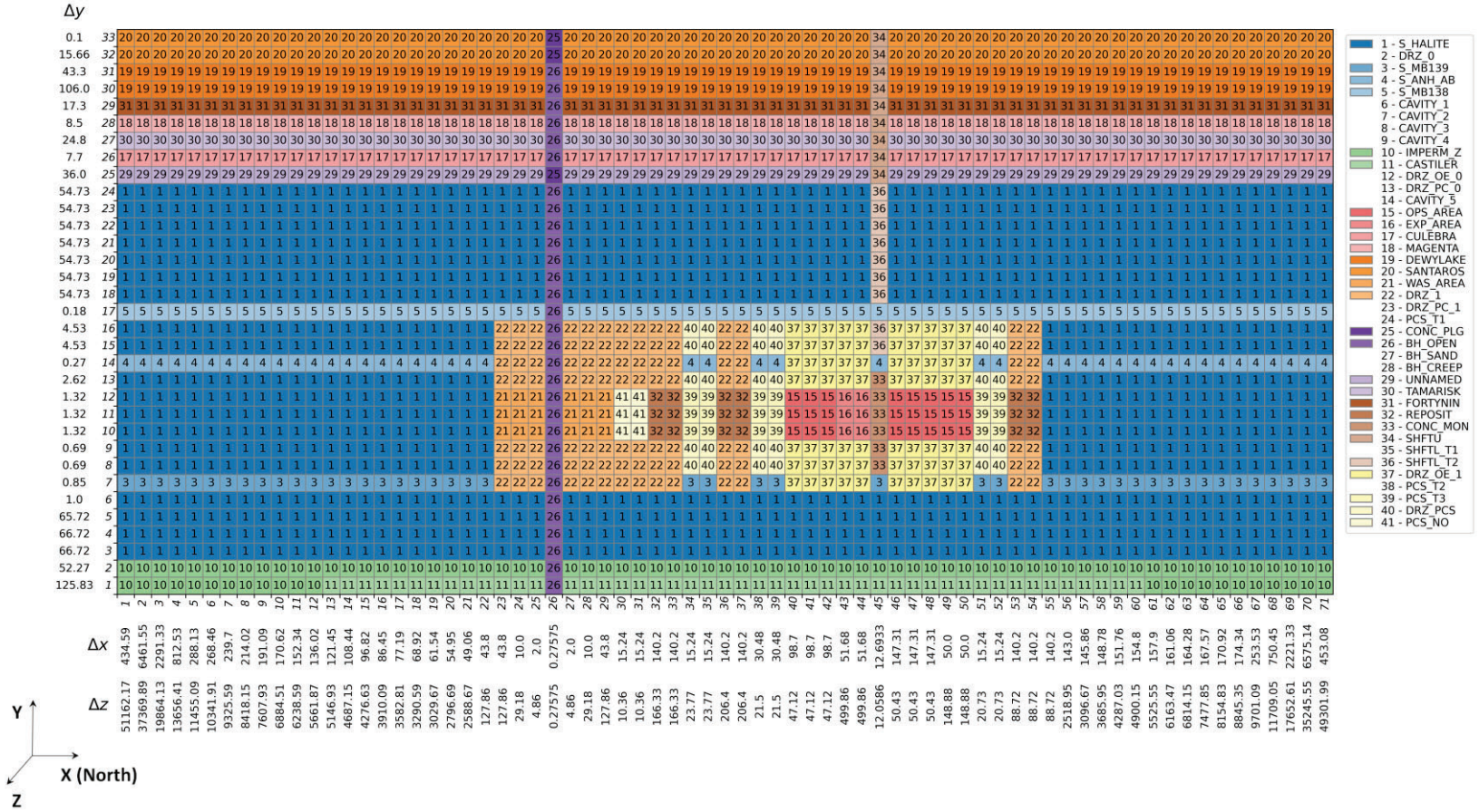

Figure 11. CRA26_IS PA BRAGFLO Grid and Material Map; Time of E1 Intrusion to Time of E1 Intrusion Plus 200 Years [Scenarios S2-BF and S3-BF]

Information Only

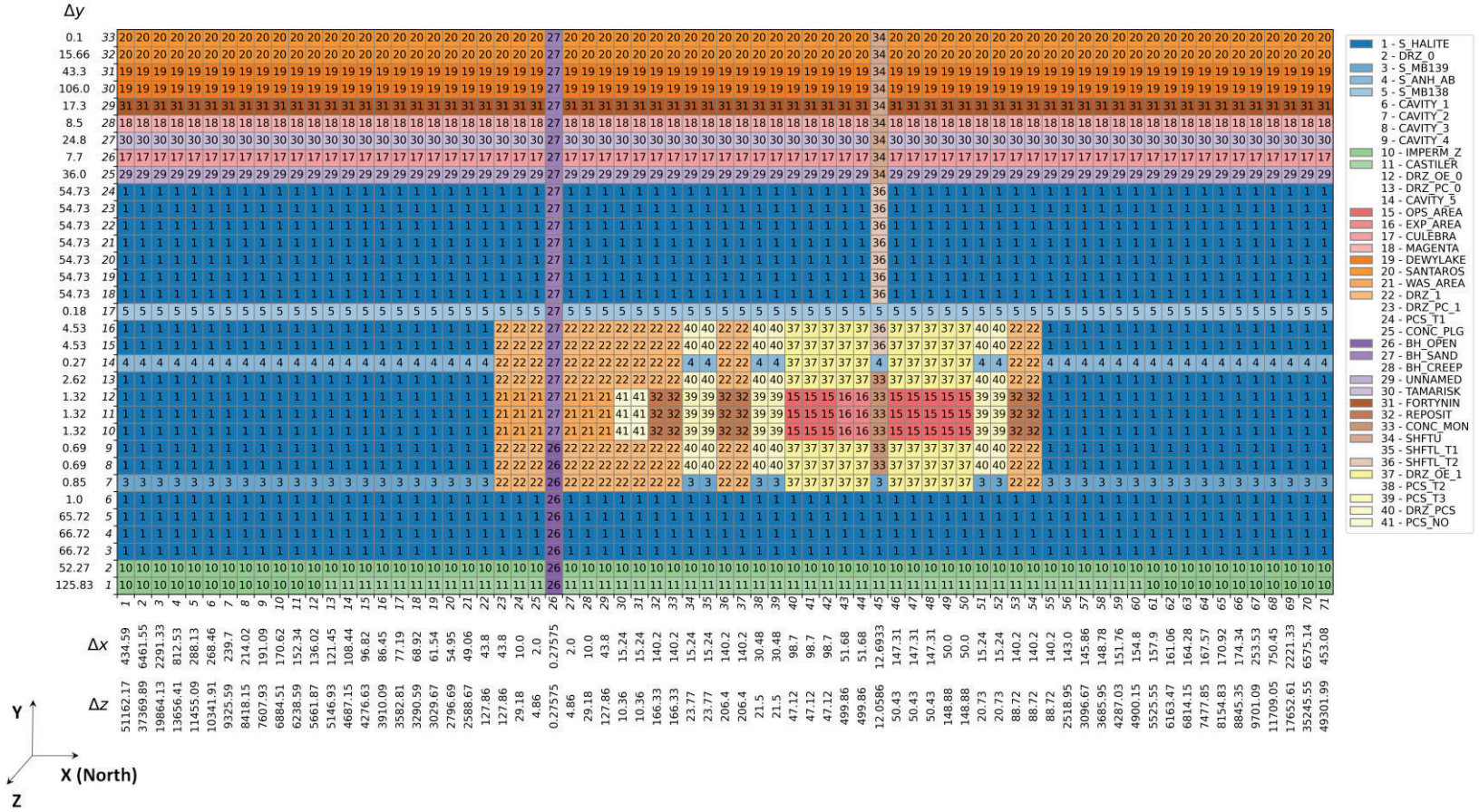

Figure 12. CRA26_IS PA BRAGFLO Grid and Material Map; Time of E1 Intrusion to Time of E1 Intrusion Plus 200 Years [Scenario S6-BF]

Information Only

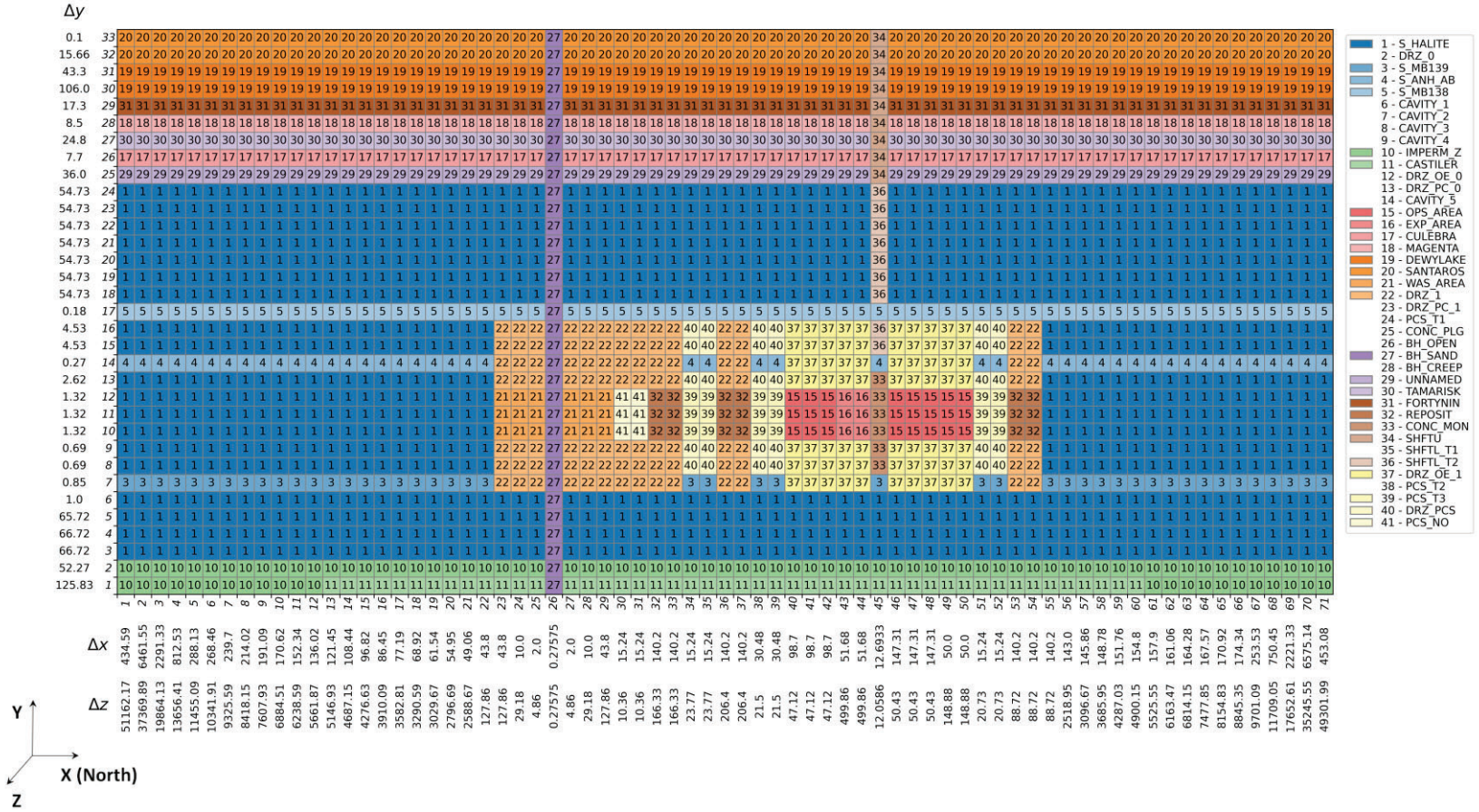

Figure 13. CRA26_IS PA BRAGFLO Grid and Material Map; Time of E1 Intrusion Plus 200 Years to Time of E1 Intrusion Plus 1200 Years [Scenarios S2-BF, S3-BF, and S6-BF]

Information Only

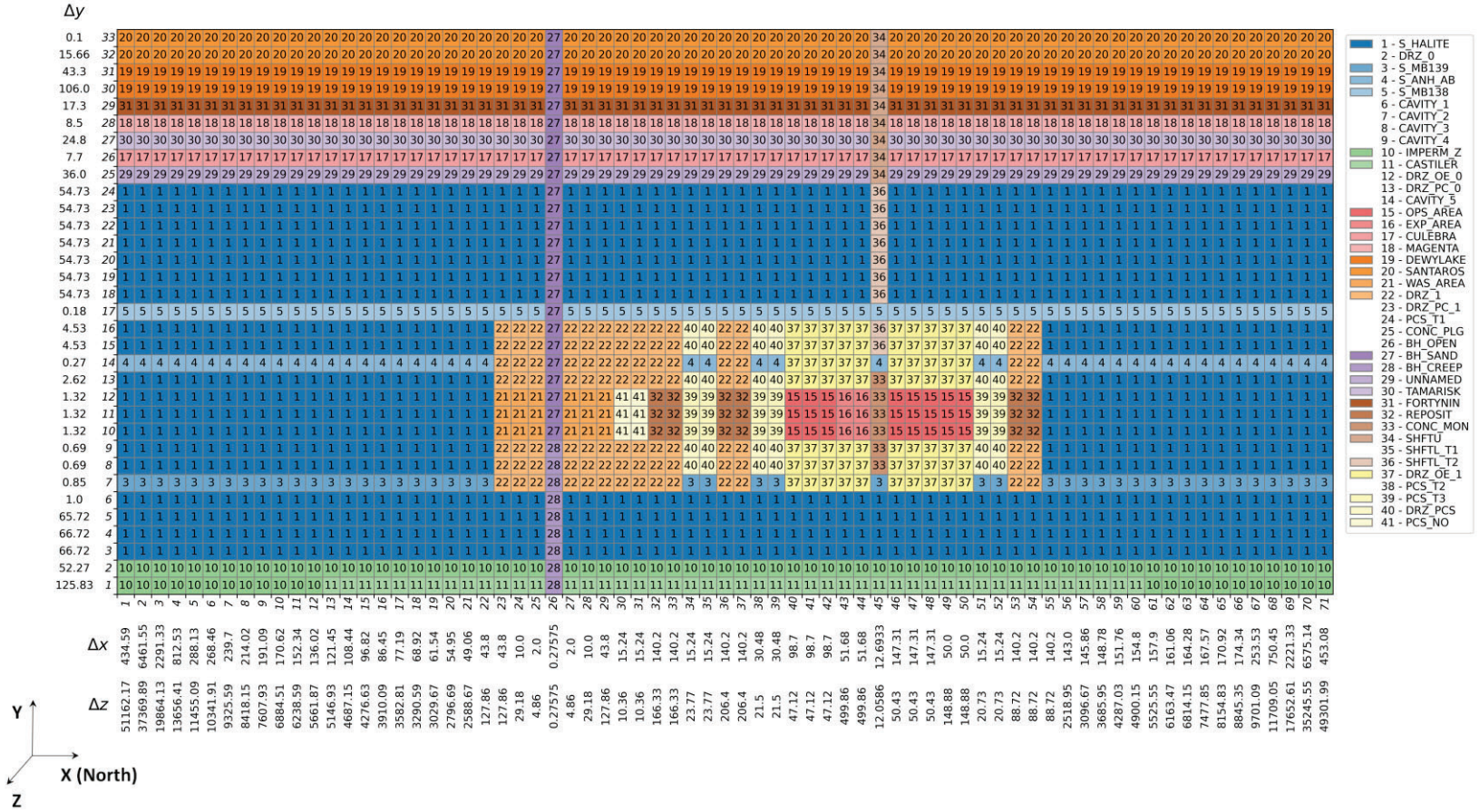

Figure 14. CRA26_IS PA BRAGFLO Grid and Material Map; Time of E1 Intrusion Plus 1200 Years to 10000 Years [Scenarios S2-BF, S3-BF, and S6-BF

4.3 Code Execution and Run Control

Execution of the 1800 separate (3 replicates, 6 scenarios, 100 vectors) Salado flow simulations requires a series of steps which are automated by the WIPP PA Run Control system. A flow diagram that illustrates the execution order for the Salado flow solution is provided in Figure 15. A full description of the run control for the CRA26_IS analysis, including names and locations of input and output files, can be found in Long (2025).

4.3.1 Sensitivity Analysis

The STEPWISE code is used in a sensitivity analysis to determine the relative importance of the sampled parameters in the Salado flow calculation for the CRA26_IS analysis. Salado flow simulation outputs at 10,000 years post-closure are input into STEPWISE along with the sampled input parameter values. The STEPWISE code relates the sampled input parameter values to the output metrics by performing a multiple regression analysis and reporting the results in tables. A sensitivity analysis of the RPPCR BRAGFLO output was performed during the RPPCR analysis (King 2023). The RPPCR results will be compared to the CRA26_IS results here.

A discussion of STEPWISE linear multiple regression, determination of significance, regression coefficients, predicted error sum of squares, limitation of the analysis, spurious correlations, and statistical significance can be found in King, Brunell, and Zeitler (2025).

For some quantities, Partial Rank Correlation Coefficients (PRCCs) are calculated at select time points. These PRCC values are calculated as a post-processing step using Python. The parameters used in the PRCC analysis are the parameters identified by the STEPWISE analysis as having the most control over variability in the output quantity.

Information Only

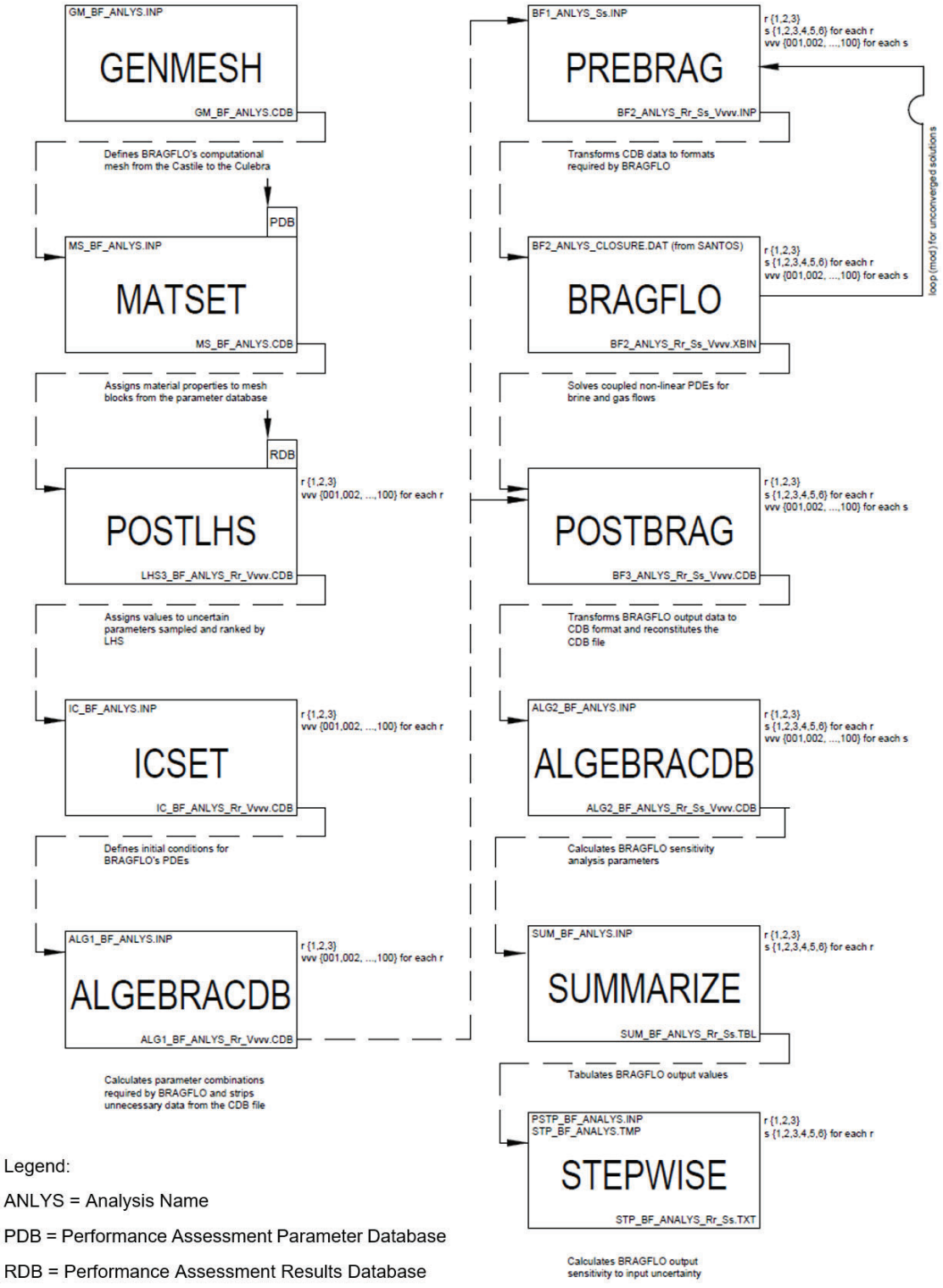

Figure 15. Salado Flow Run Control Diagram

Information Only

5.0 RESULTS

Salado flow results obtained after incorporating the changes summarized in Section 2.0 for the CRA26_IS are now reported and compared with those obtained in the RPPCR PA (King 2023). In WIPP PA, a replicate consists of 100 calculated realizations (vectors). Results for three replicates were calculated for the CRA26_IS and RPPCR analyses. Only results from Replicate 1, including means, statistics, and sensitivity analyses, will be presented in this section.

Results for pressure and saturation are presented in terms of volume-averaged quantities. For example, volume-averaged pressure is obtained by forming the product of grid block pressure and grid block volume for each grid block in the region of concern, summing this product up over all grid blocks in the region, and dividing by the bulk volume of the region. All other volume-averaged quantities are computed in the same manner. Cumulative gas generations and cumulative flow volumes are also presented. Cumulative gas generation is calculated as the gas generation rate integrated over time. Cumulative flow into a region is defined as the flow into a region integrated over time. Cumulative flow into a region is one directional flow, there is no subtraction of flow out of that region. Net cumulative flow for a region considers both inflow and outflow with net brine inflow and net gas outflow presented as positive quantities. Time-averaged values are computed by integrating over time, then dividing by the time interval of 10,000 years.

Mean values, 5th, and 95th percentiles through time will be shown, the mean or percentile is calculated at each time point and does not necessarily represent a realized vector in the PA calculation. For select quantities, vector plots will also be shown. In these vector plots, 100 vector results over time for the specific replicate, scenario, and quantity will be shown, with the mean value imposed over the top of the results. Each analysis will be plotted separately.

Box and whisker plots are also used to display the results. Boxes extend from the 25th percentile to the 75th percentile, also known as the inner quartile range. Whiskers extend the minimum of the full data range or 1.5 times the inner quartile range. Any data outside of 1.5 times the inner quartile range will be plotted as points beyond the whiskers. The black center line in the box is the median value; the mean value is denoted with a white square. Distributions are shown for a number of representative time points and as values averaged over time.

Results are presented for the undisturbed scenario S1-BF. Results associated with intrusions are presented only for scenarios S2-BF and S4-BF, as these are representative of the intrusions considered in scenarios S3-BF and S5-BF, respectively, with the only differences being the timing of drilling intrusions. Results from the multiple intrusion scenario S6-BF are also presented.

Summary statistics and plots were generated with Python, an open-source software package. Output quantity variable names, units, and descriptions are summarized in the **LIST OF VARIABLES**. Further discussion of the results with a focus on attribution of changed inputs in relation to the reported values is addressed in Section 6.0.

Select supplemental sensitivity analysis results are presented in Appendix A as calculated for each replicate, individually. Additional pressure and brine saturation results for Replicate 1 are presented without discussion in Appendix B to include results from Scenario S3-BF and S5-BF. Results from Replicate 2 and Replicate 3 of the CRA26_IS are compared to Replicate 1 in

Information Only

Appendix C. Finally, mean and confidence interval results for the representative waste panel pressure and brine saturation are given in Appendix D.

5.1 Pressure

Predicted pressures in the repository for Replicate 1 will be shown and discussed in this section. Brine pressures will be highlighted, gas pressures will differ from brine pressures by only the capillary pressure and will not be discussed in this report.

Summary statistics for the pressure results from RPPCR and CRA26_IS are presented in Table 5 and Table 6. In general, Replicate 1 mean pressures and maximum of the mean pressures over time for CRA26_IS are reduced in comparison to RPPCR for all reported areas and scenarios except for the S2-BF pressures in the representative waste panel, South Rest-of-Repository, and North Rest-of-Repository. The maximum pressure over time for any individual vector in Replicate 1 is generally greater for CRA26_IS in comparison to RPPCR.

Information Only

Table 5. Pressure Statistics on Vector Means, Replicate 1

Quantity	Scenario	RPPCR Mean Value[1]	CRA26_IS Mean Value[1]	RPPCR Max Value[2]	CRA26_IS Max Value[2]
WAS_PRES	S1-BF	7.4	6.7	8.5	7.7
WAS_PRES	S2-BF	11.2	11.5	12.6	12.7
WAS_PRES	S4-BF	6.9	6.3	7.8	7.1
WAS_PRES	S6-BF	8.8	8.8	10.3	10.3
SRR_PRES	S1-BF	7.4	6.7	8.5	7.7
SRR_PRES	S2-BF	11.2	11.5	12.5	12.7
SRR_PRES	S4-BF	6.9	6.3	7.8	7.1
SRR_PRES	S6-BF	8.8	8.8	10.3	10.3
NRR_PRES	S1-BF	7.0	6.3	8.2	7.3
NRR_PRES	S2-BF	9.8	10.1	10.8	11.0
NRR_PRES	S4-BF	6.8	6.0	7.8	6.9
NRR_PRES	S6-BF	8.2	8.1	9.4	9.4
SOP_PRES	S1-BF	4.3	3.2	6.3	4.9
SOP_PRES	S2-BF	5.6	5.4	8.0	7.9
SOP_PRES	S4-BF	4.3	3.1	6.1	4.7
SOP_PRES	S6-BF	4.9	4.3	7.3	6.7
EXP_PRES	S1-BF	4.3	3.2	6.3	4.9
EXP_PRES	S2-BF	5.6	5.4	8.0	7.8
EXP_PRES	S4-BF	4.2	3.1	6.1	4.6
EXP_PRES	S6-BF	4.9	4.3	7.2	6.7
WOP_PRES	S1-BF	4.3	3.2	6.3	4.9
WOP_PRES	S2-BF	5.6	5.4	8.0	7.8
WOP_PRES	S4-BF	4.2	3.1	6.1	4.6
WOP_PRES	S6-BF	4.9	4.3	7.2	6.7
WRR_PRES	S1-BF	5.5	4.5	7.0	5.6
WRR_PRES	S2-BF	6.6	6.4	8.6	8.4
WRR_PRES	S4-BF	5.5	4.4	6.9	5.4
WRR_PRES	S6-BF	6.1	5.5	7.9	7.4

Notes:

1 Average over the time interval (0-10,000 years) of the Replicate 1 mean.

2 Maximum over the time interval (0-10,000 years) for the Replicate 1 mean.

Information Only

Table 6. Pressure Statistics on Individual Vectors, Replicate 1

Quantity	Scenario	RPPCR Max Value[3]	CRA26_IS Max Value[3]
WAS_PRES	S1-BF	16.0	16.5
WAS_PRES	S2-BF	15.9	16.2
WAS_PRES	S4-BF	15.8	16.3
WAS_PRES	S6-BF	16.0	16.5
SRR_PRES	S1-BF	16.0	16.4
SRR_PRES	S2-BF	15.9	16.2
SRR_PRES	S4-BF	15.7	16.2
SRR_PRES	S6-BF	16.0	16.4
NRR_PRES	S1-BF	16.0	16.2
NRR_PRES	S2-BF	16.0	16.1
NRR_PRES	S4-BF	16.0	16.1
NRR_PRES	S6-BF	16.0	16.1
SOP_PRES	S1-BF	15.4	15.4
SOP_PRES	S2-BF	15.4	15.3
SOP_PRES	S4-BF	15.4	15.3
SOP_PRES	S6-BF	15.3	15.2
EXP_PRES	S1-BF	15.3	15.4
EXP_PRES	S2-BF	15.4	15.3
EXP_PRES	S4-BF	15.3	15.3
EXP_PRES	S6-BF	15.3	15.2
WOP_PRES	S1-BF	15.3	15.4
WOP_PRES	S2-BF	15.3	15.3
WOP_PRES	S4-BF	15.3	15.3
WOP_PRES	S6-BF	15.3	15.2
WRR_PRES	S1-BF	15.9	16.1
WRR_PRES	S2-BF	15.9	16.1
WRR_PRES	S4-BF	15.9	16.1
WRR_PRES	S6-BF	15.9	16.1

Notes:

3 Maximum over the time interval (0-10,000 years) and over all 100 Replicate 1 vectors.

Information Only

5.1.1 Undisturbed Scenario

Brine pressure in the representative waste panel for the undisturbed case (Scenario S1-BF) is shown in Figure 16, Figure 17, and Figure 18. Figure 16 shows lower mean pressure and 5th percentile pressure from the RPPCR to the CRA26_IS. Figure 17 also shows this lower mean pressure in addition to illustrating that at times past 1,000 years the median pressure is further reduced for CRA26_IS in comparison to RPPCR. The individual vector results in Figure 18 show a decrease in the number of vectors for CRA26_IS that exhibit maximum pressures above 8 MPa.

Similar lower pressures for CRA26_IS in the South Rest-of-Repository, North Rest-of-Repository, and West Rest-of-Repository can be seen in Figure 19, Figure 20, and Figure 21. The West Rest-of-Repository exhibits a decrease in the 95th percentile pressure which is also observed for the South Operations Area, West Operations Area, and Experimental Area as shown in Figure 22, Figure 23, and Figure 24, respectively.

5.1.2 Disturbed Scenarios

In Scenario S2-BF, a scenario where the repository is intruded by a borehole that also intersects a pressurized brine pocket in the Castile formation, mean, 5th, and 95th percentile predicted pressures have increased along with maximum pressures in the intruded waste panel (Figure 25 and Figure 26). The individual vector plots in Figure 27, show a denser clumping of vectors at the highest-pressure values in the CRA26_IS along with higher maximum pressures.

In Scenario S2-BF, the South Rest-of-Repository behaves similarly to the intruded panel due to the lack of panel closures between the two areas (Figure 28). The North Rest-of-Repository, representing panels on the same side of the repository as the intrusion but separated from the intrusion by at least one panel closure, shows greater pressures in the CRA26_IS than in the RPPCR, similar to the higher pressures seen in the undisturbed scenario (Figure 29). The West Rest-of-Repository, representing panels on the other side of the repository from the intrusion, shows comparatively lower mean, 5th percentile, and 95th percentile pressures for CRA26_IS (Figure 30).

In Scenario S4-BF, a scenario where the repository is intruded by a borehole that does not intersect a pressurized brine pocket in the Castile formation, the representative waste panel, South Rest-of-Repository, and North Rest-of-Repository each exhibit lower predicted mean and 5th percentile pressures and higher 95th percentile pressures with the West Rest-of-Repository pressures all lower for CRA26_IS after the intrusion (Figure 31, Figure 32, Figure 33, and Figure 34).

In the multiple intrusion scenario, S6-BF, similar to scenario S4-BF there is a lack of pressure response to the first intrusion which does not intersect pressurized brine in the Castile (Figure 35 through Figure 38). There is a noticeable pressure response to the second intrusion, which does intersect pressurized brine in the Castile. The response in terms of comparative trends for each waste areas in S6-BF is the same as observed for S4-BF.

Information Only

5.1.3 Sensitivity Analysis

A stepwise linear multiple regression analysis was performed on the pressures at 10,000 years to determine the relative importance of the sampled parameters on the results. Results for Replicate 1 in the CRA26_IS analysis are shown in Table 7 and Table 8. Truncated Stepwise output tables for all replicates of both RPPCR and CRA26_IS are provided in Section 9.1 of Appendix A.

In the undisturbed case, variability in pressure in the repository is best predicted by the intact halite porosity (S_HALITE:POROSITY). The halite porosity accounts for less variability in the CRA26_IS results than it did in the RPPCR results. Figure 39 shows the relationship between the halite porosity and the 10,000 year waste panel pressure. Increased halite porosity means more brine available in the host rock and tends to correlate with increased repository pressure.

PRCCs were calculated through time for all parameters that showed a ΔR^2 greater than ~0.03 in the STEPWISE analysis. For the undisturbed waste panel pressure, these parameters were the halite porosity (S_HALITE:POROSITY), the DRZ permeability after healing (DRZ_1:PRMX_LOG), and the energy deposition probability for wetted solid radionuclides (GLOBAL:GDEPFAC). Figure 40 shows the partial rank correlation coefficients for these three parameters through time.

For Scenario S2-BF, intact halite porosity (S_HALITE:POROSITY) again best predicted waste panel pressure, followed by the long term borehole permeability (BH_SAND:PRMX_LOG), if plastic and rubber undergo biodegradation (WAS_AREA:PROBDEG), the inundated corrosion rate for steel (STEEL:CORRMCO2), the humid biodegradation rate for cellulose (WAS_AREA:GRATMICH), the probability of attaining sampled microbial-gas-generation rates (WAS_AREA:BIOGENFC), and the brine far-field pore pressure (S_HALITE:PRESSURE). Figure 41 shows the sampled halite porosity versus the predicted 10,000 year waste panel pressure. Figure 42 shows the PRCCs through time for these seven parameters through time.

Information Only

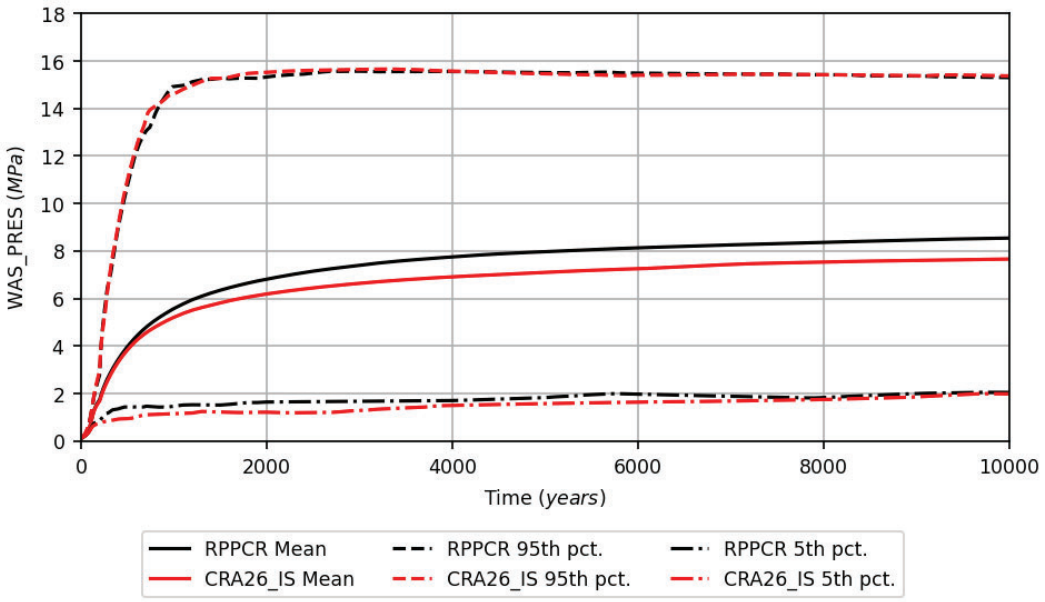

Figure 16. Pressure means with percentiles for the Waste Panel, Replicate 1, Scenario S1-BF

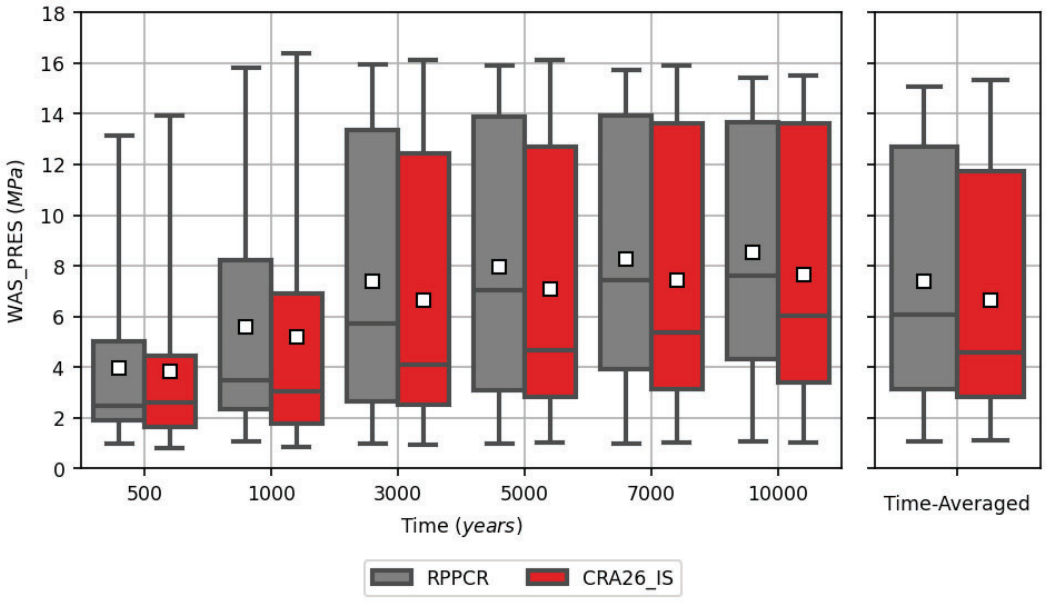

Figure 17. Pressure distributions for the Waste Panel, Replicate 1, Scenario S1-BF

Information Only

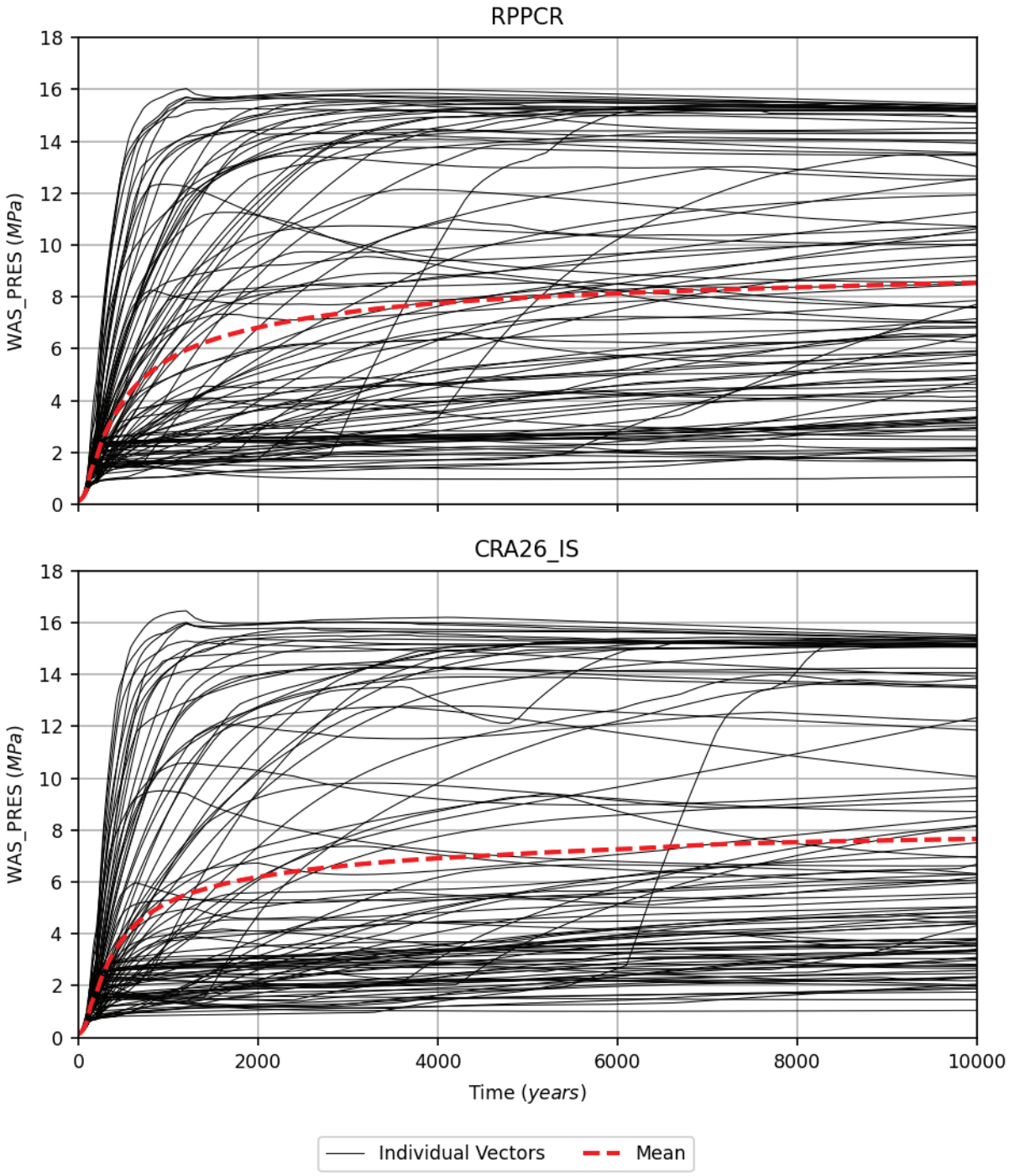

Figure 18. Pressure realizations with means for the Waste Panel, Replicate 1, Scenario S1-BF

Information Only

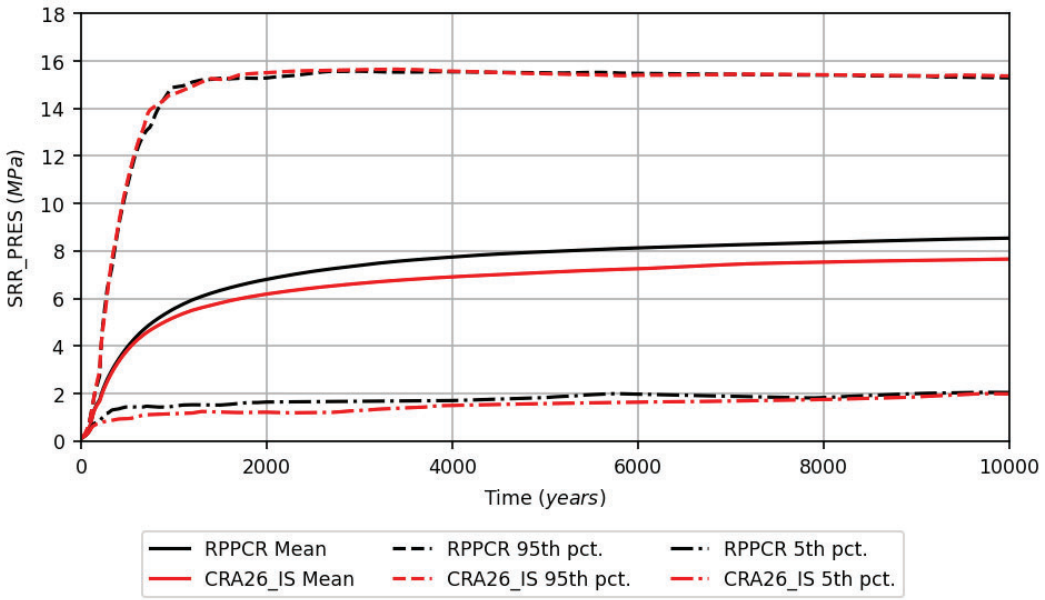

Figure 19. Pressure means with percentiles for the South Rest-of-Repository Area, Replicate 1, Scenario S1-BF

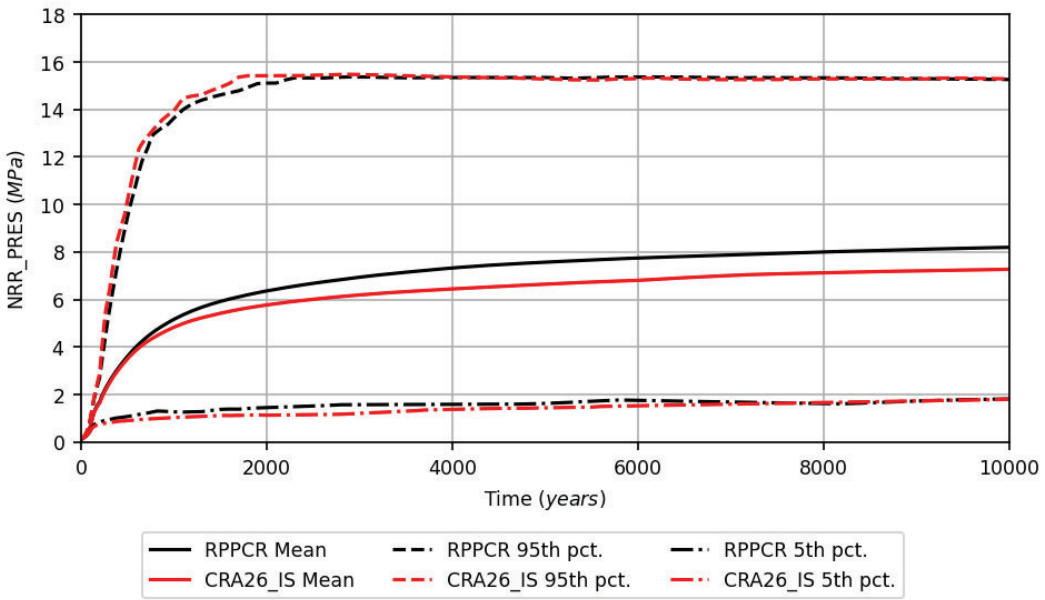

Figure 20. Pressure means with percentiles for the North Rest-of-Repository Area, Replicate 1, Scenario S1-BF

Information Only

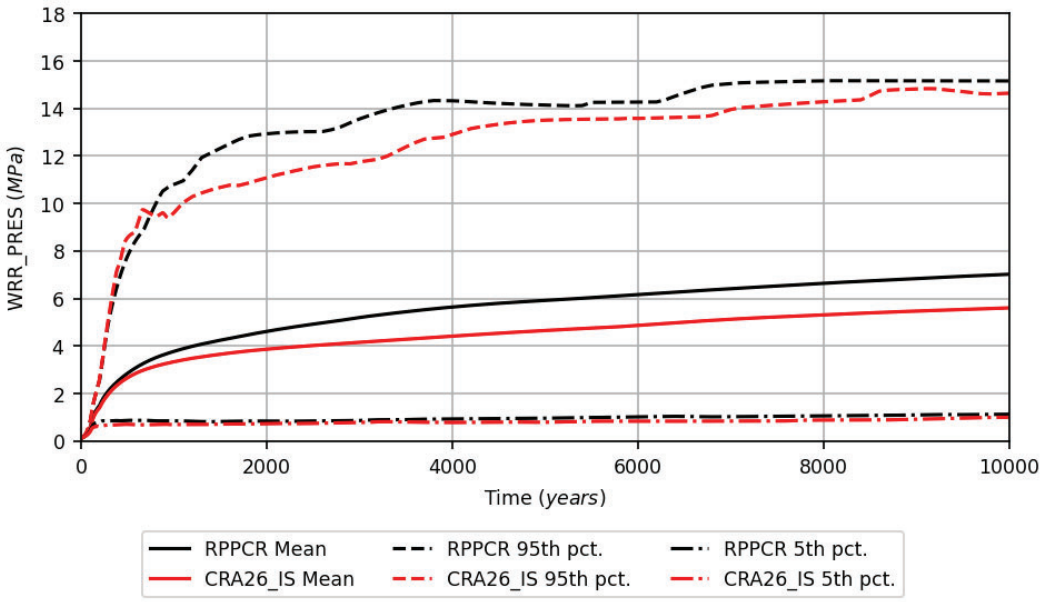

Figure 21. Pressure means with percentiles for the West Rest-of-Repository Area, Replicate 1, Scenario S1-BF

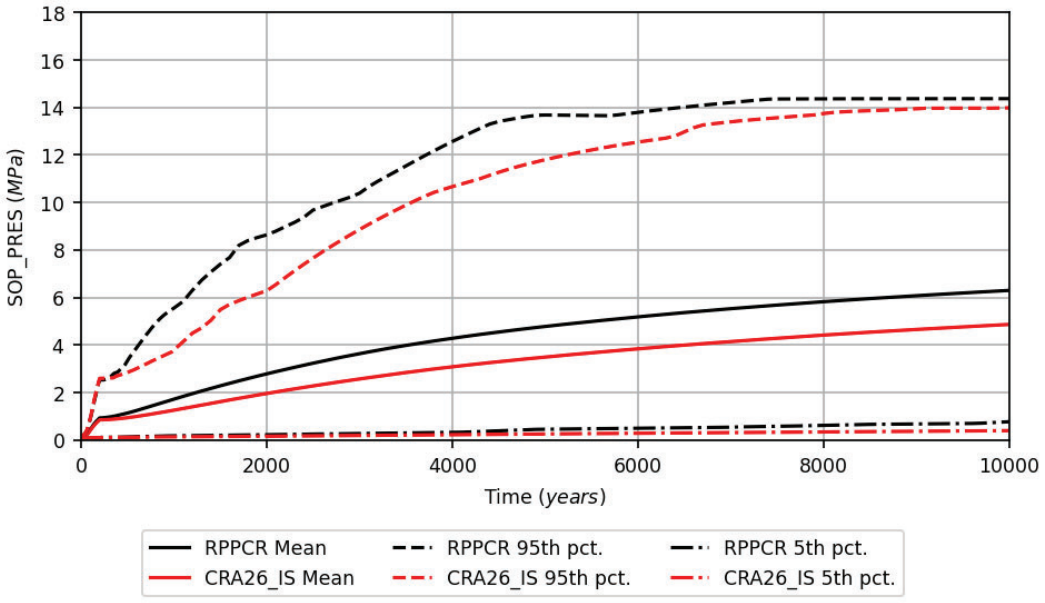

Figure 22. Pressure means with percentiles for the South Operations Area, Replicate 1, Scenario S1-BF

Information Only

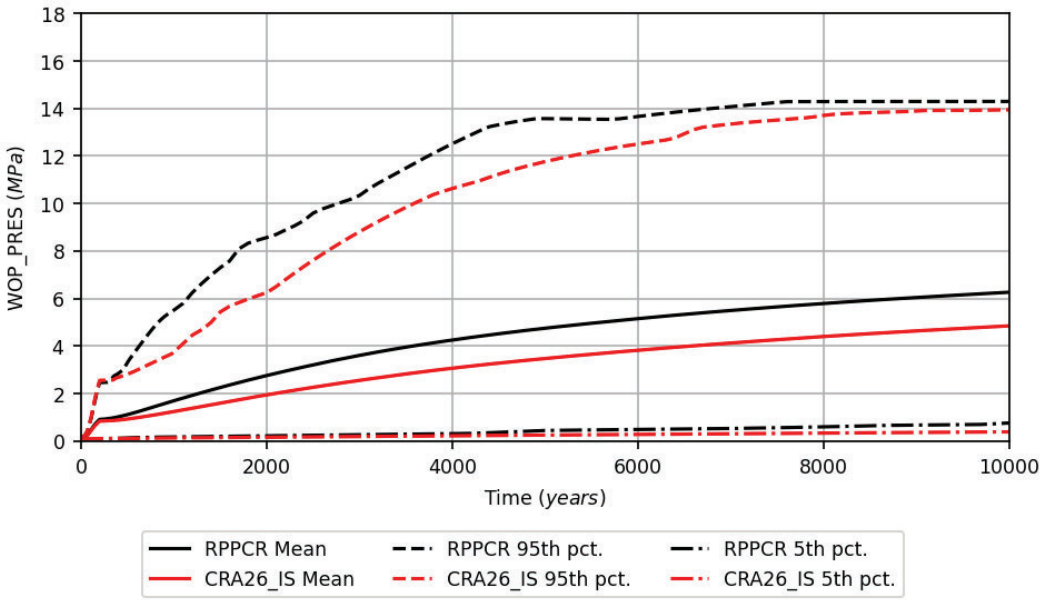

Figure 23. Pressure means with percentiles for the West Operations Area, Replicate 1, Scenario S1-BF

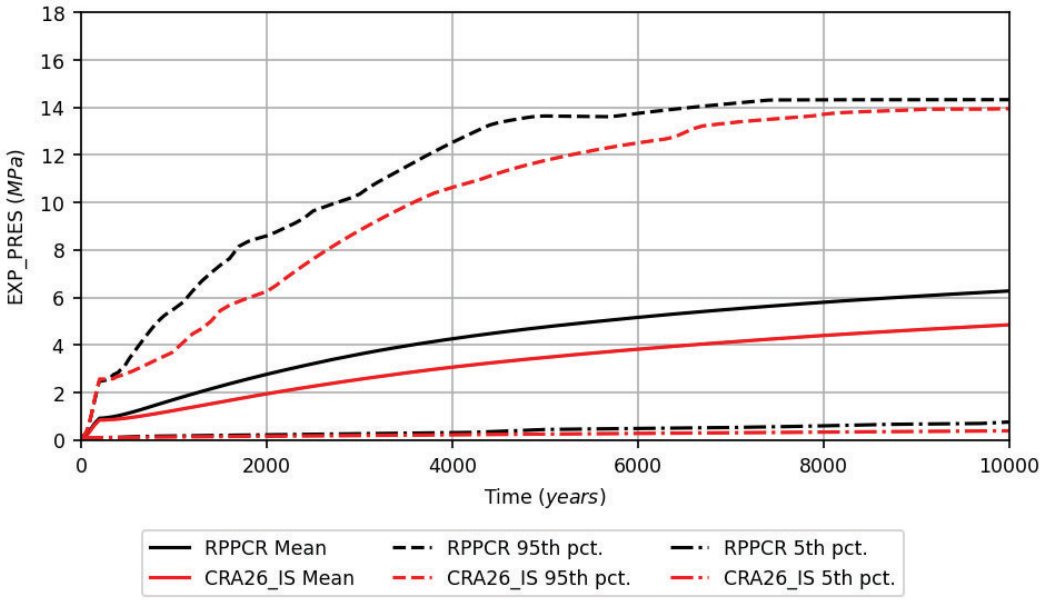

Figure 24. Pressure means with percentiles for the Experimental Area, Replicate 1, Scenario S1-BF

Information Only

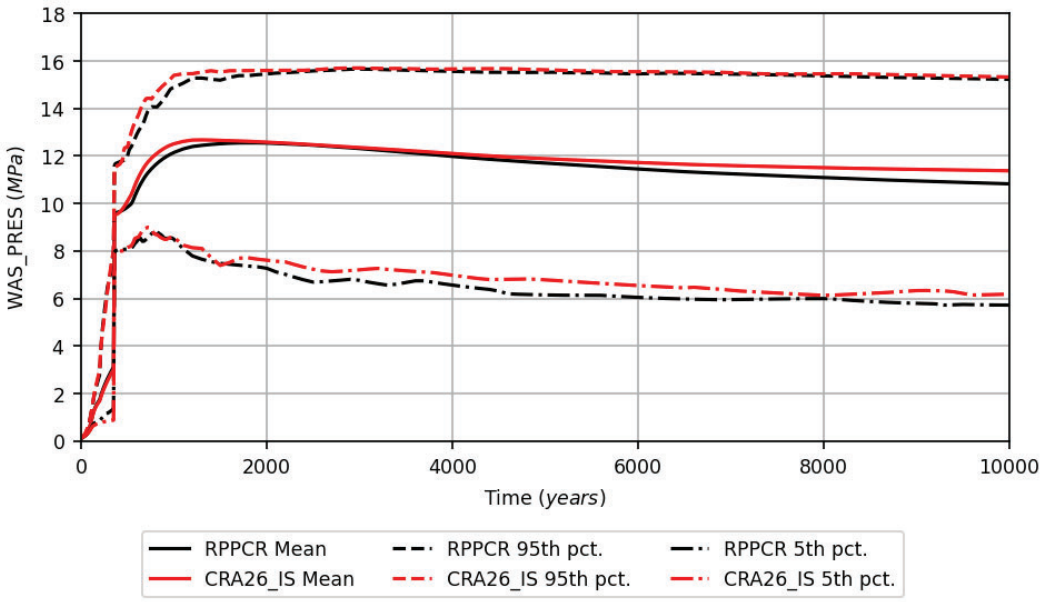

Figure 25. Pressure means with percentiles for the Waste Panel, Replicate 1, Scenario S2-BF

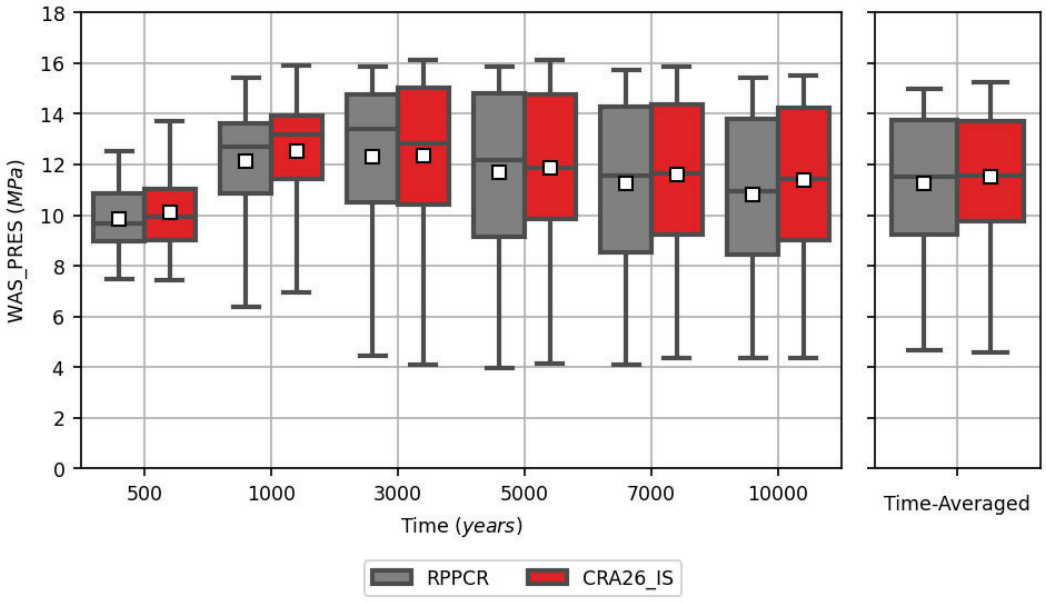

Figure 26. Pressure distributions for the Waste Panel, Replicate 1, Scenario S2-BF

Information Only

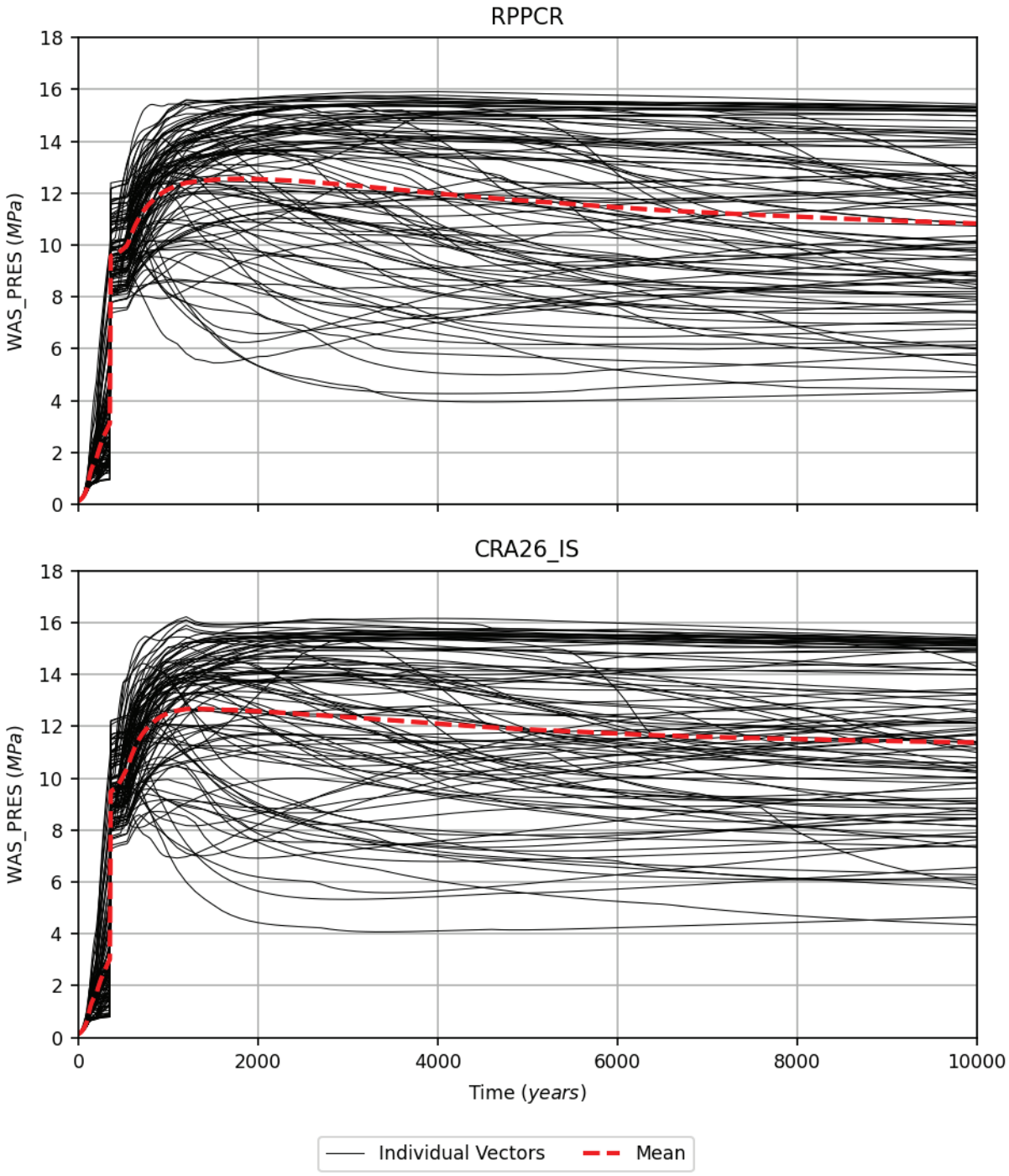

Figure 27. Pressure realizations with means for the Waste Panel, Replicate 1, Scenario S2-BF

Information Only

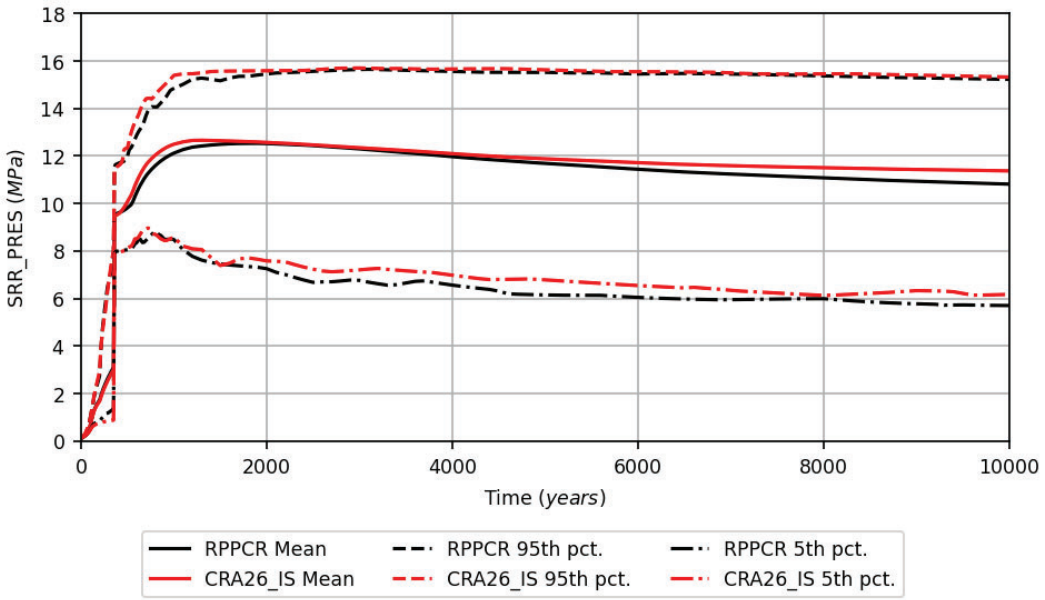

Figure 28. Pressure means with percentiles for the South Rest-of-Repository Area, Replicate 1, Scenario S2-BF

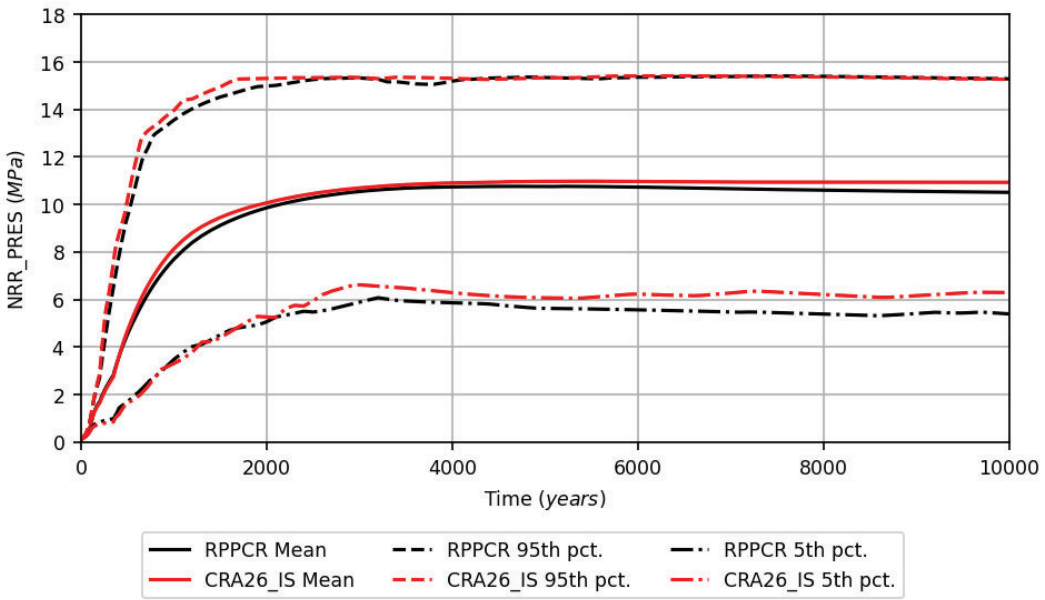

Figure 29. Pressure means with percentiles for the North Rest-of-Repository Area, Replicate 1, Scenario S2-BF

Information Only

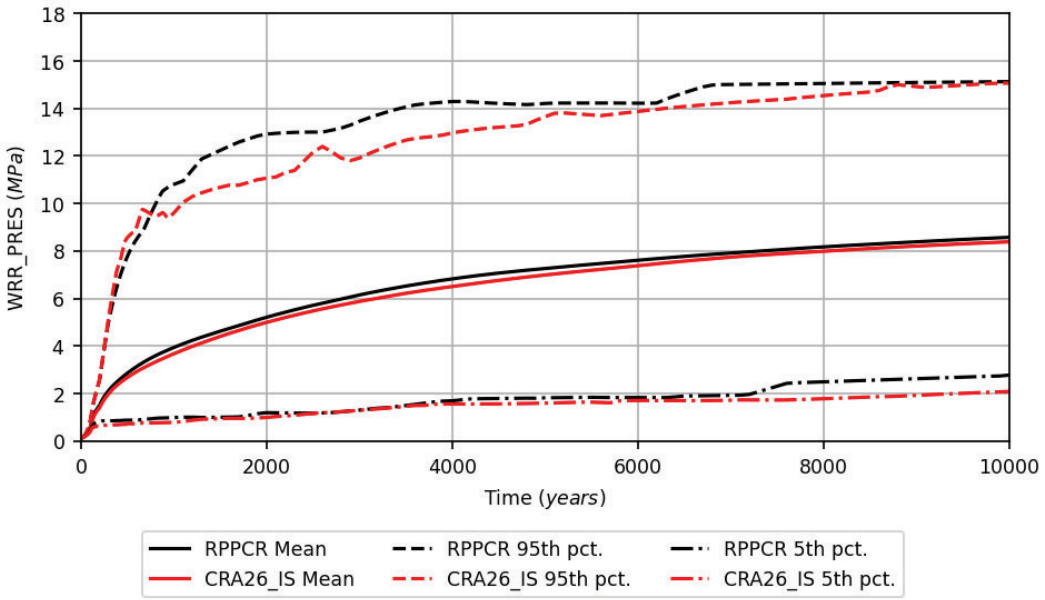

Figure 30. Pressure means with percentiles for the West Rest-of-Repository Area, Replicate 1, Scenario S2-BF

Information Only

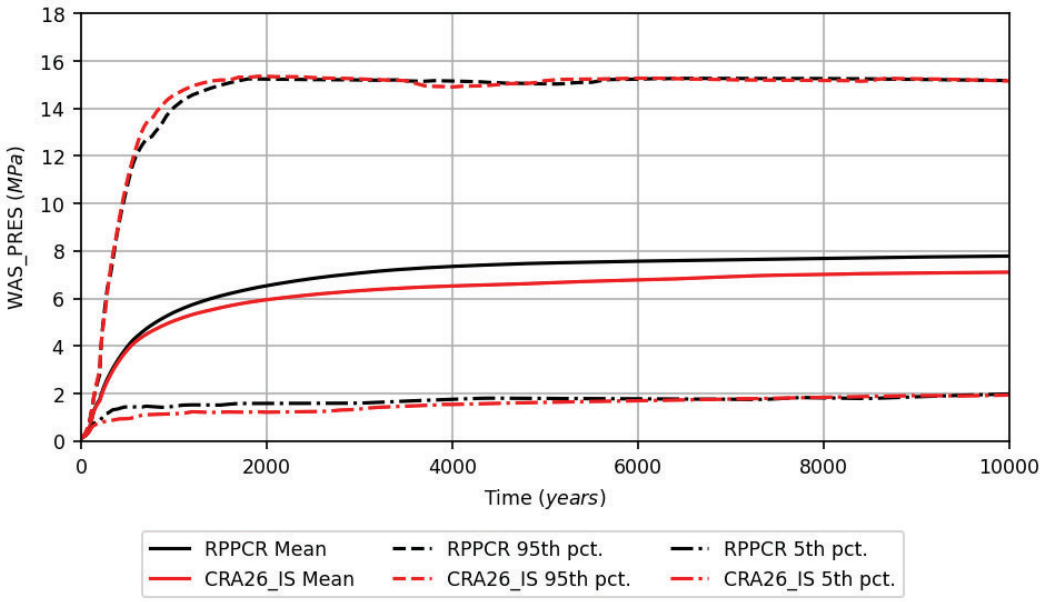

Figure 31. Pressure means with percentiles for the Waste Panel, Replicate 1, Scenario S4-BF

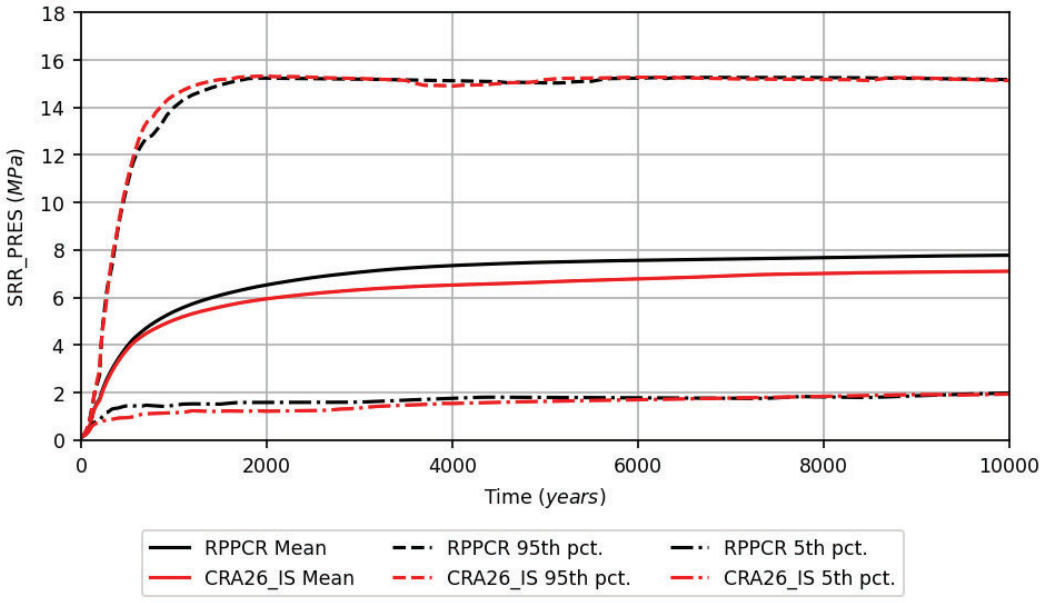

Figure 32. Pressure means with percentiles for the South Rest-of-Repository, Replicate 1, Scenario S4-BF

Information Only

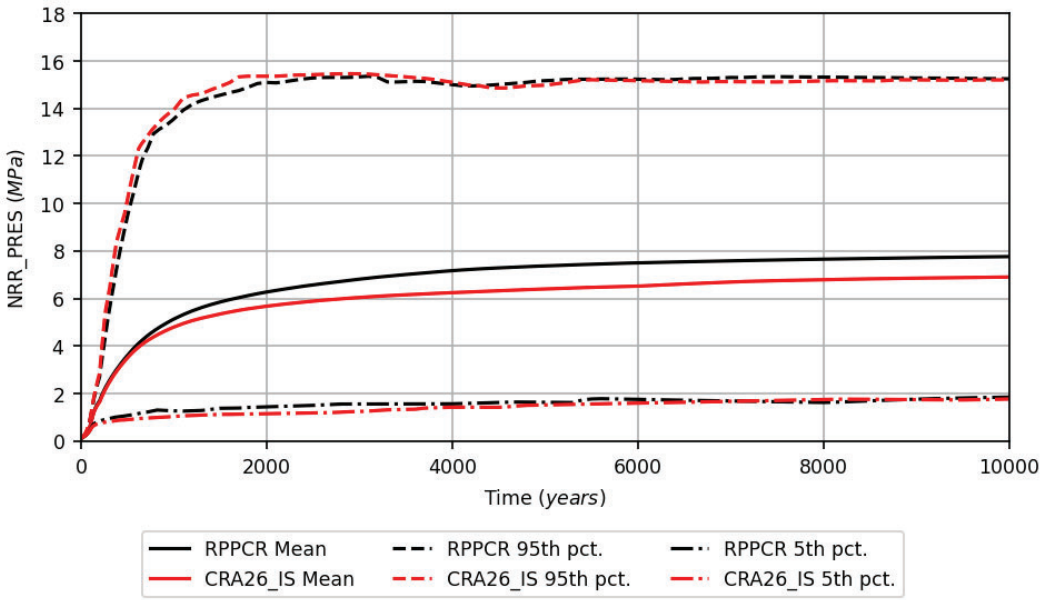

Figure 33. Pressure means with percentiles for the North Rest-of-Repository, Replicate 1, Scenario S4-BF

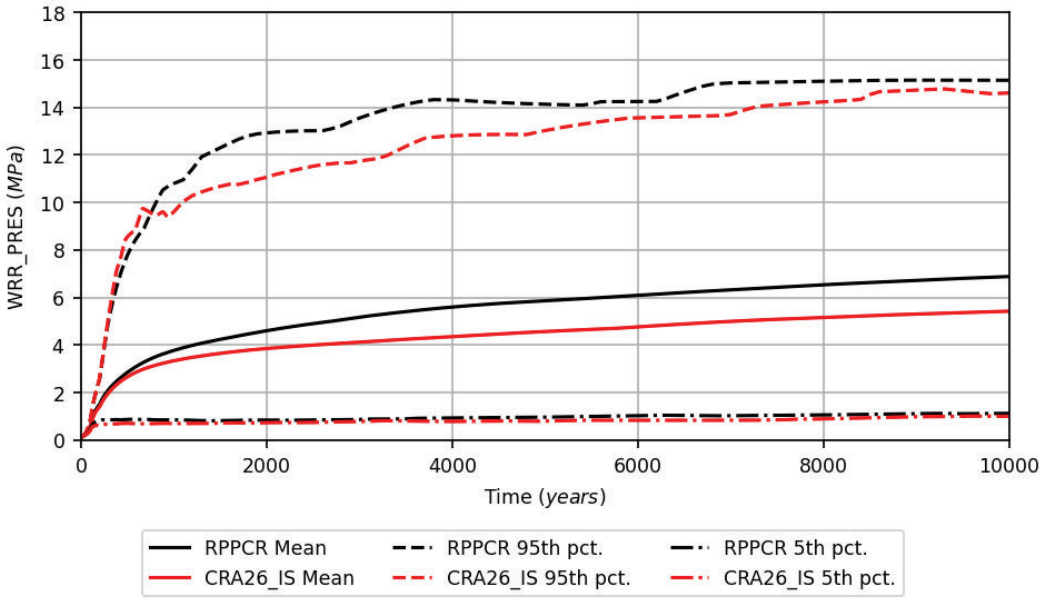

Figure 34. Pressures means with percentiles for the West Rest-of-Repository, Replicate 1, Scenario S4-BF

Information Only

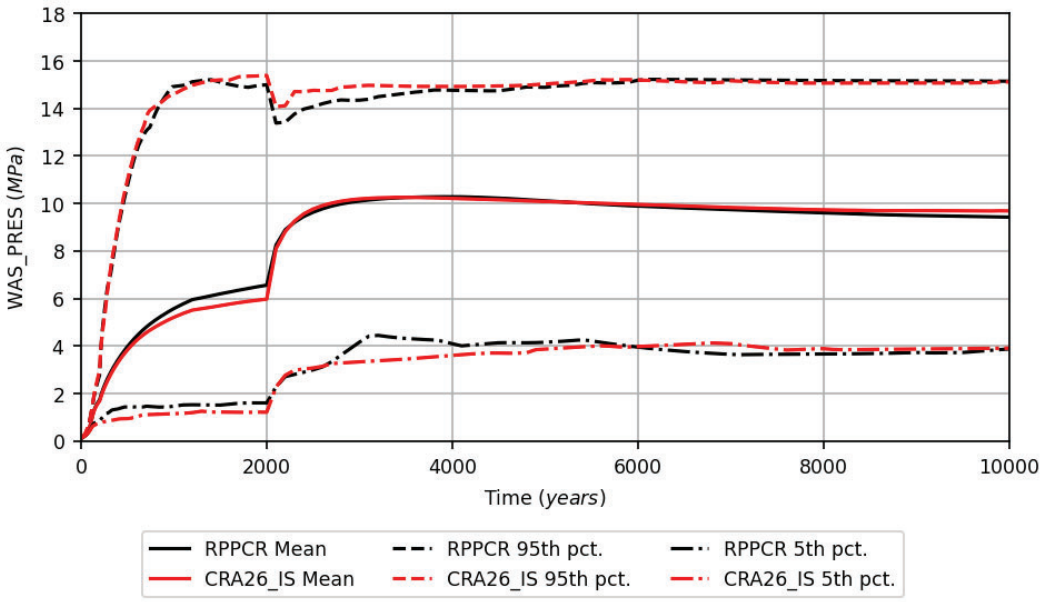

Figure 35. Pressure means with percentiles for the Waste Panel, Replicate 1, Scenario S6-BF

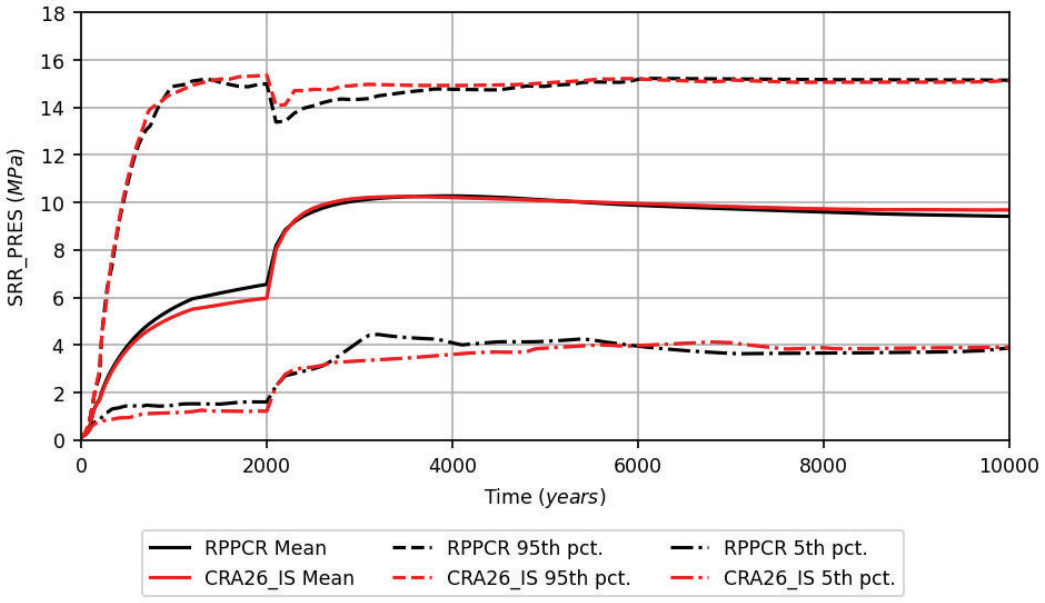

Figure 36. Pressure means with percentiles for the South Rest-of-Repository, Replicate 1, Scenario S6-BF

Information Only

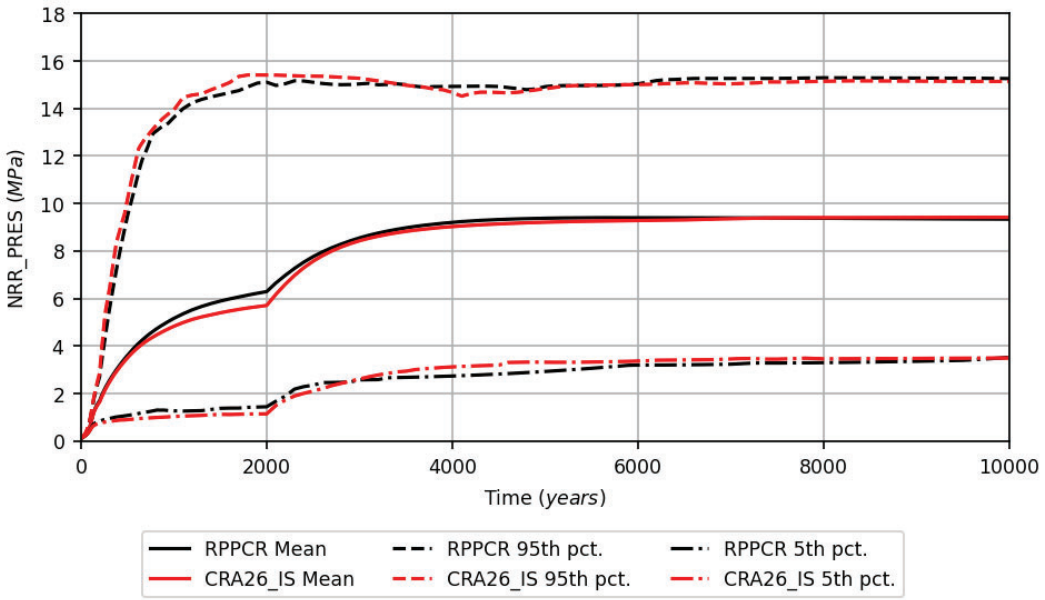

Figure 37. Pressure means with percentiles for the North Rest-of-Repository, Replicate 1, Scenario S6-BF

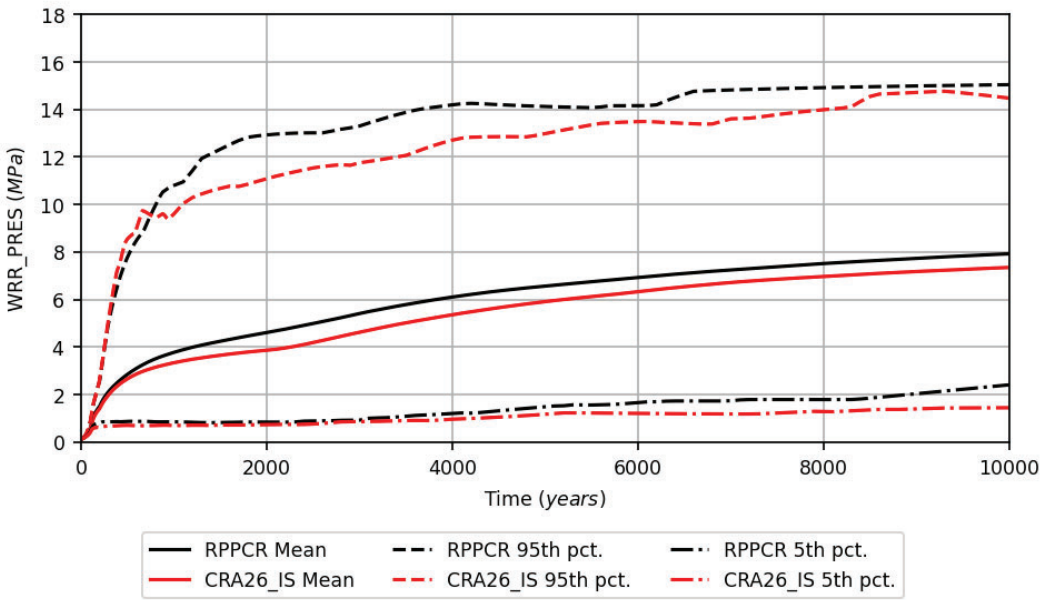

Figure 38. Pressures means with percentiles for the West Rest-of-Repository, Replicate 1, Scenario S6-BF

Information Only

Table 7. Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure, Replicate 1, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.6	0.74
2	DRZ_1:PRMX_LOG	0.64	0.21
3	GLOBAL:GDEPFAC	0.67	0.17
4	DRZ_PCS:PRMX_LOG	0.69	-0.14
5	S_MB139:PRMX_LOG	0.71	0.15
6	WAS_AREA:PROBDEG	0.73	0.16
7	S_HALITE:PRMX_LOG	0.75	0.12
8	PCS_T2:POR2PERM	0.76	-0.11
9	STEEL:HUMCORR	0.77	0.11
10	SHFTL_T1:PRMX_LOG	0.78	0.1

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 8. Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure, Replicate 1, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.24	0.48
2	BH_SAND:PRMX_LOG	0.42	-0.44
3	WAS_AREA:PROBDEG	0.54	0.36
4	STEEL:CORRMCO2	0.59	-0.22
5	WAS_AREA:GRATMICH	0.63	0.22
6	WAS_AREA:BIOGENFC	0.66	0.19
7	S_HALITE:PRESSURE	0.69	0.17
8	CASTILER:PRESSURE	0.71	0.13
9	PCS_T1:PRMX_LOG	0.72	-0.12
10	WAS_AREA:BRUCITEH	0.73	-0.12
11	GLOBAL:GDEPFAC	0.74	0.11

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

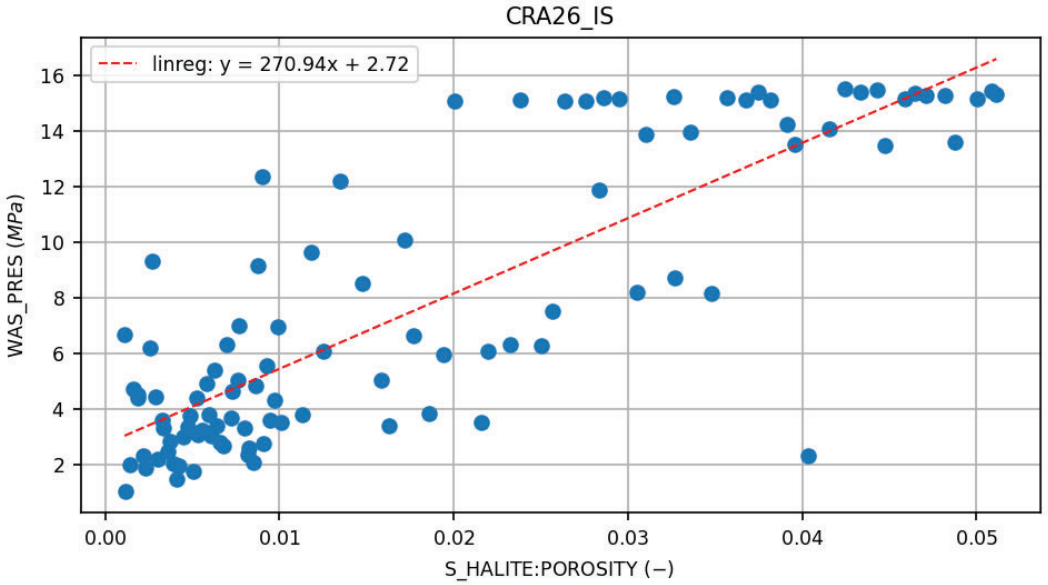

Figure 39. Intact Halite porosity versus brine pressure in the Waste Panel at 10,000 years, Replicate 1, Scenario S1-BF

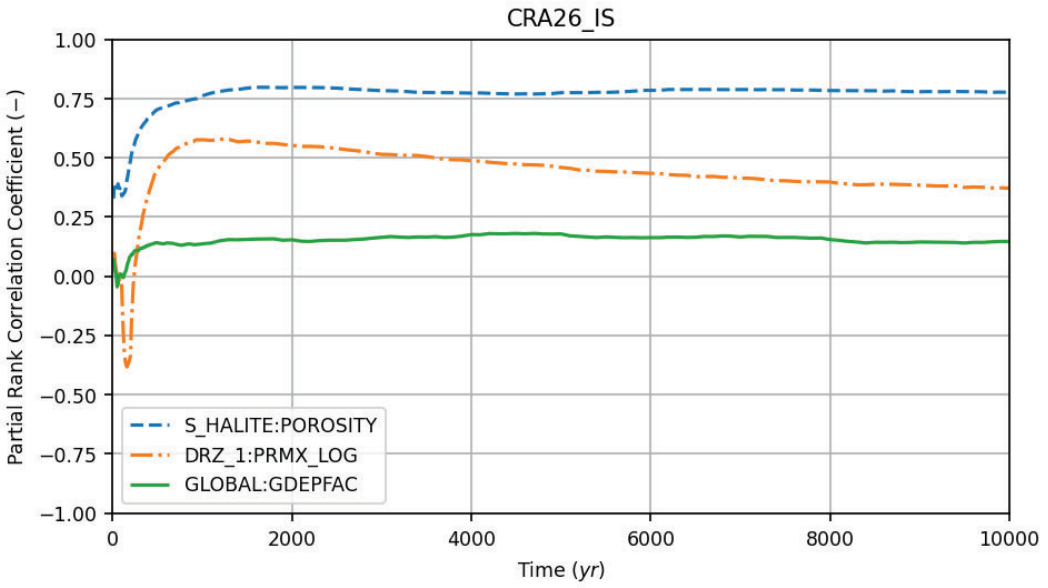

Figure 40. Partial Rank Correlation Coefficients over time for brine pressure in the Waste Panel, Replicate 1, Scenario S1-BF

Information Only

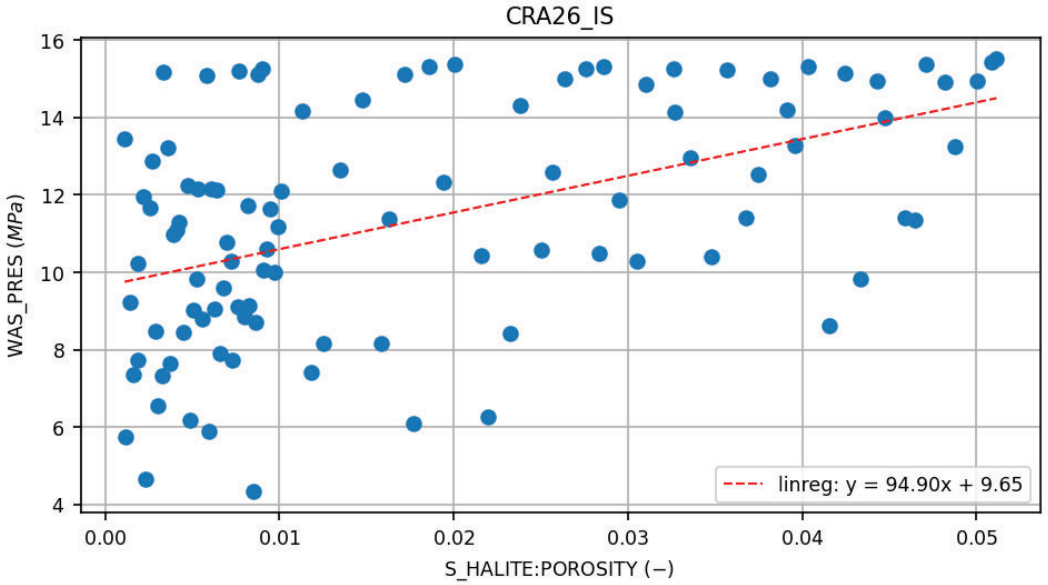

Figure 41. Intact Halite porosity versus brine pressure in the Waste Panel at 10,000 years, Replicate 1, Scenario S2-BF

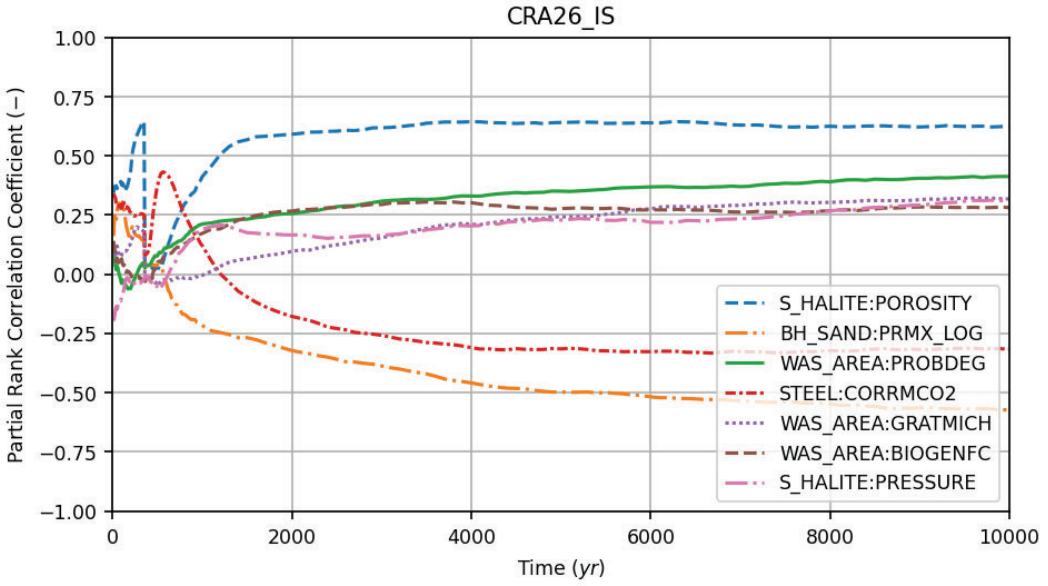

Figure 42. Partial Rank Correlation Coefficients over time for brine pressure in the Waste Panel, Replicate 1, Scenario S2-BF

Information Only

5.2 Brine Saturation

Brine saturation results for Replicate 1 will be presented in this section. The Salado Flow simulations are limited to two phases, brine and gas. As such, the gas saturation is one minus the brine saturation. Gas saturation results will not be presented in this report.

Summary statistics for the saturation results from RPPCR and CRA26_IS are presented in Table 9 and Table 10. In general, Replicate 1 mean saturations and maximum of the mean saturations over time for CRA26_IS are reduced in comparison to RPPCR for all reported areas and scenarios. The maximum saturation over time for any individual vector in Replicate 1 is generally lesser for CRA26_IS in comparison to RPPCR.

Information Only

Table 9. Brine Saturation Statistics on Vector Means, Replicate 1

Quantity	Scenario	RPPCR Mean Value[1]	CRA26_IS Mean Value[1]	RPPCR Max Value[2]	CRA26_IS Max Value[2]
WAS_SATB	S1-BF	0.24	0.14	0.32	0.26
WAS_SATB	S2-BF	0.55	0.34	0.93	0.92
WAS_SATB	S4-BF	0.27	0.16	0.32	0.26
WAS_SATB	S6-BF	0.43	0.27	0.63	0.54
SRR_SATB	S1-BF	0.08	0.04	0.21	0.16
SRR_SATB	S2-BF	0.27	0.14	0.90	0.87
SRR_SATB	S4-BF	0.10	0.05	0.21	0.16
SRR_SATB	S6-BF	0.13	0.07	0.31	0.26
NRR_SATB	S1-BF	0.09	0.04	0.21	0.15
NRR_SATB	S2-BF	0.10	0.04	0.21	0.15
NRR_SATB	S4-BF	0.09	0.04	0.21	0.15
NRR_SATB	S6-BF	0.10	0.04	0.21	0.15
SOP_SATB	S1-BF	0.65	0.53	0.71	0.58
SOP_SATB	S2-BF	0.63	0.50	0.68	0.54
SOP_SATB	S4-BF	0.65	0.53	0.71	0.58
SOP_SATB	S6-BF	0.64	0.52	0.69	0.56
EXP_SATB	S1-BF	0.27	0.15	0.30	0.16
EXP_SATB	S2-BF	0.26	0.14	0.29	0.16
EXP_SATB	S4-BF	0.27	0.15	0.30	0.16
EXP_SATB	S6-BF	0.26	0.14	0.30	0.16
WOP_SATB	S1-BF	0.03	0.01	0.09	0.09
WOP_SATB	S2-BF	0.03	0.01	0.09	0.09
WOP_SATB	S4-BF	0.03	0.01	0.09	0.09
WOP_SATB	S6-BF	0.03	0.01	0.09	0.09
WRR_SATB	S1-BF	0.08	0.03	0.18	0.12
WRR_SATB	S2-BF	0.08	0.03	0.18	0.12
WRR_SATB	S4-BF	0.08	0.03	0.18	0.12
WRR_SATB	S6-BF	0.08	0.03	0.18	0.12

Notes:

1 Average over the time interval (0-10,000 years) of the Replicate 1 mean.

2 Maximum over the time interval (0-10,000 years) for the Replicate 1 mean.

Information Only

Table 10. Brine Saturation Statistics on Individual Vectors, Replicate 1

Quantity	Scenario	RPPCR Max Value[3]	CRA26_IS Max Value[3]
WAS_SATB	S1-BF	0.99	0.99
WAS_SATB	S2-BF	1.00	0.99
WAS_SATB	S4-BF	0.99	0.99
WAS_SATB	S6-BF	0.99	0.99
SRR_SATB	S1-BF	0.98	0.97
SRR_SATB	S2-BF	0.99	0.99
SRR_SATB	S4-BF	0.98	0.97
SRR_SATB	S6-BF	0.98	0.98
NRR_SATB	S1-BF	0.99	0.97
NRR_SATB	S2-BF	0.99	0.97
NRR_SATB	S4-BF	0.99	0.97
NRR_SATB	S6-BF	0.99	0.97
SOP_SATB	S1-BF	1.00	1.00
SOP_SATB	S2-BF	1.00	1.00
SOP_SATB	S4-BF	1.00	1.00
SOP_SATB	S6-BF	1.00	1.00
EXP_SATB	S1-BF	1.00	0.96
EXP_SATB	S2-BF	1.00	0.93
EXP_SATB	S4-BF	1.00	0.96
EXP_SATB	S6-BF	1.00	0.93
WOP_SATB	S1-BF	0.88	0.53
WOP_SATB	S2-BF	0.88	0.53
WOP_SATB	S4-BF	0.88	0.53
WOP_SATB	S6-BF	0.88	0.53
WRR_SATB	S1-BF	0.99	0.94
WRR_SATB	S2-BF	0.99	0.94
WRR_SATB	S4-BF	0.99	0.94
WRR_SATB	S6-BF	0.99	0.94

Notes:

3 Maximum over the time interval (0-10,000 years) and over all 100 Replicate 1 vectors.

Information Only

5.2.1 Undisturbed Scenario

Brine saturations for the undisturbed scenario (S1-BF) in the representative waste panel are shown in Figure 43, Figure 44, and Figure 45. Mean brine saturations are lesser over all times for CRA26_IS in comparison to RPPCR. The South, North, and West Rest-of-Repository areas similarly exhibit lower brine saturations for CRA26_IS with greater reductions displayed in the upper 95th percentile results (Figure 46, Figure 47, and Figure 48). Brine saturations in the South and West Operations areas and the Experimental area are also reduced for CRA26_IS in comparison to RPPCR with mean brine saturations generally increasing from North to South across these areas (Figure 49, Figure 50, and Figure 51).

5.2.2 Disturbed Scenarios

Brine saturations for the representative waste panel in Scenario S2-BF are plotted in Figure 52, Figure 53, and Figure 54. Mean brine saturations in CRA26_IS are lower prior to intrusion, roughly equivalent shortly after the intrusion, and less over the remaining 10,000 regulatory period in comparison to RPPCR. The mean saturation trend extends to both 5th percentile and 95th percentile results. Brine saturations for the South, North, and West Rest-of-Repository show a similar decrease as the waste panel (Figure 55, Figure 56, and Figure 57) with relative magnitudes seen to increase from North to South across these areas.

Brine saturations for the representative waste panel in Scenario S4-BF are shown in Figure 58. Brine saturations for the South, North, and West Rest-of-Repository in Scenario S4-BF are shown in Figure 59, Figure 60, and Figure 61. All the waste areas show lower brine saturations for CRA26_IS in comparison to RPPCR for Scenario S4-BF.

Brine saturations for the representative waste panel subject to the multi-intrusion Scenario S6-BF are shown in Figure 62. Much like the other scenarios, mean and 95th percentile brine saturations are lower over all time for CRA26_IS in the representative waste panel, South, North, and West Rest-of-Repository (Figure 63, Figure 64, and Figure 65).

5.2.3 Sensitivity Analysis

STEPWISE regression results for brine saturation in the waste panel in Scenario S1-BF and Scenario S2-BF for replicate 1 of the CRA26_IS are shown in Table 11 and Table 12. In the undisturbed case, the long term (time=10,000 years) variability in brine saturation in the waste panel is most impacted by variability in the long term DRZ permeability (DRZ_1:PRMX_LOG), followed by the marker bed permeability (S_MB139:PRMX_LOG). Brine saturation in the waste panel at 10,000 years post-closure versus the healed DRZ permeability is plotted in Figure 66. PRCCs for brine saturation over time are plotted in Figure 67.

For Scenario S2-BF, intact halite porosity (S_HALITE:POROSITY) again best predicted waste panel brine saturation, followed by long term DRZ permeability (DRZ_1:PRMX_LOG). Figure 68 shows the sampled halite porosity versus the predicted 10,000 year waste panel saturation. Figure 69 shows the PRCCs through time for the most impactive parameters in the representative waste panel.

Information Only

Truncated Stepwise output tables for all replicates of both RPPCR and CRA26_IS are provided in Section 9.2 of Appendix A.

Information Only

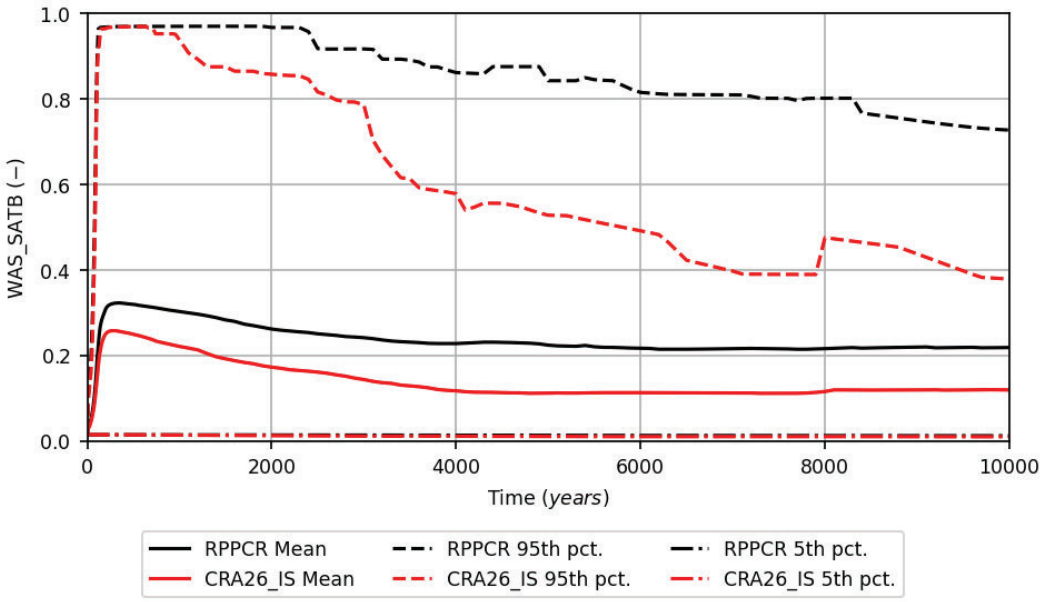

Figure 43. Brine saturation means with percentiles for the Waste Panel, Replicate 1, Scenario S1-BF

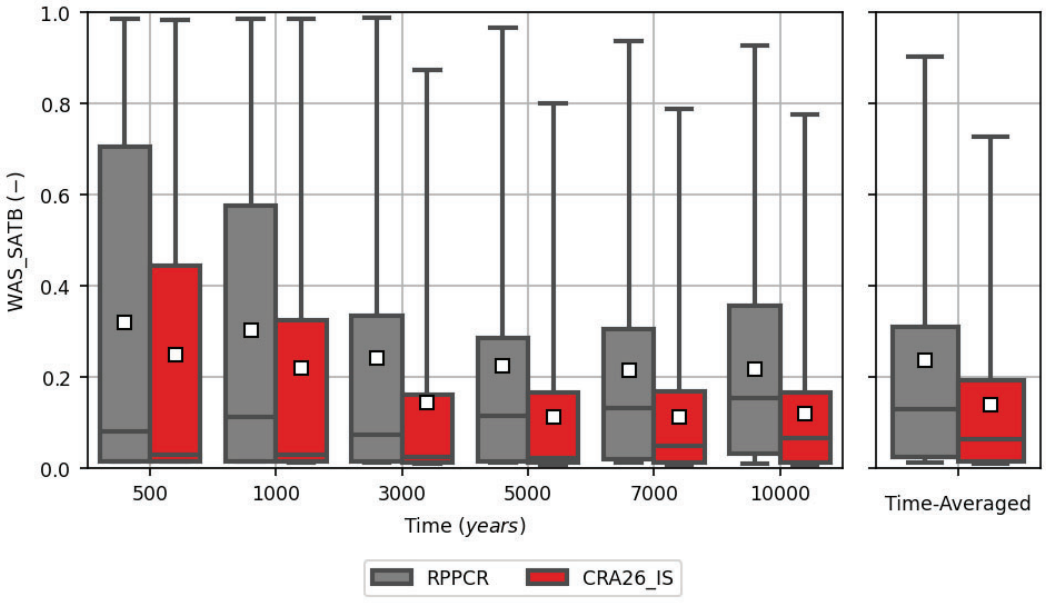

Figure 44. Brine saturation distributions for the Waste Panel, Replicate 1, Scenario S1-BF

Information Only

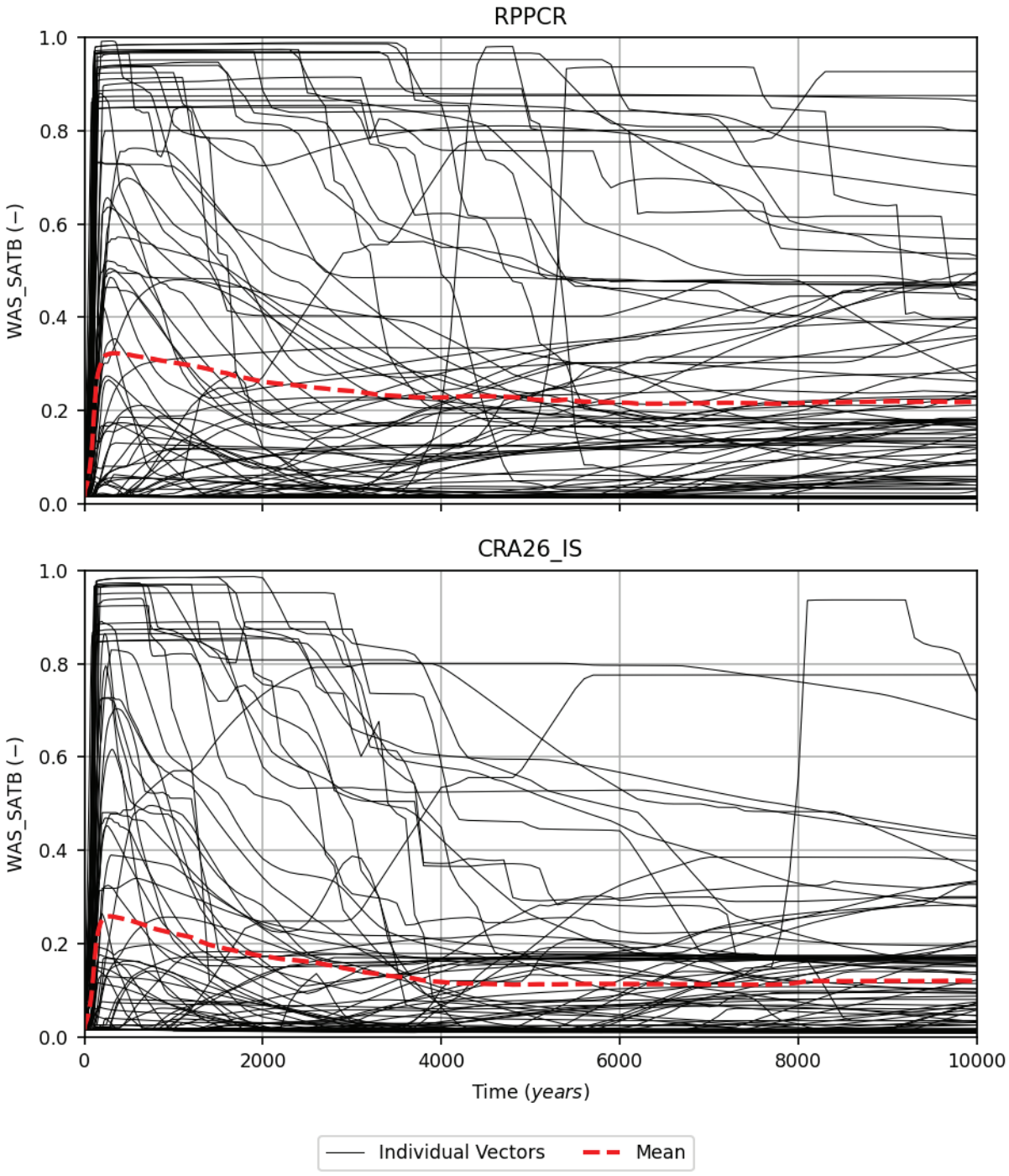

Figure 45. Brine saturation realizations with means for the Waste Panel, Replicate 1, Scenario S1-BF

Information Only

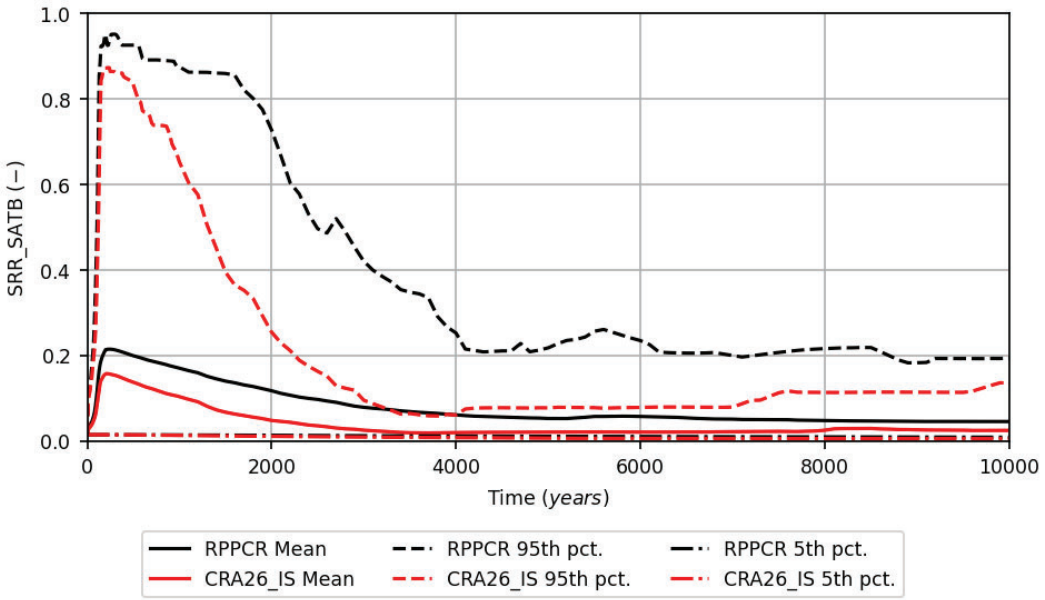

Figure 46. Brine saturation means with percentiles for the South Rest-of-Repository Area, Replicate 1, Scenario S1-BF

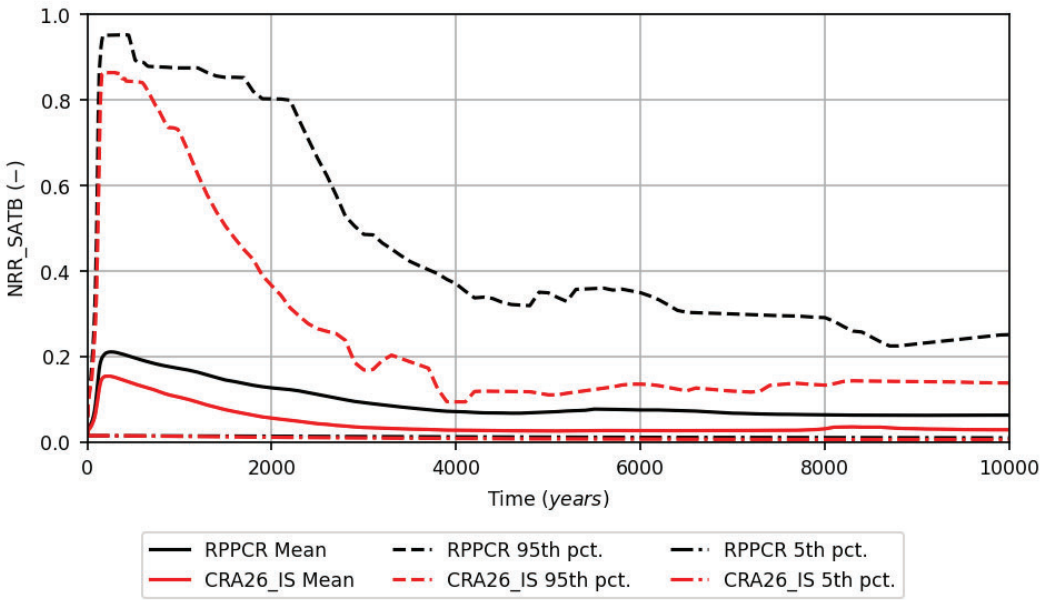

Figure 47. Brine saturation means with percentiles for the North Rest-of-Repository Area, Replicate 1, Scenario S1-BF

Information Only

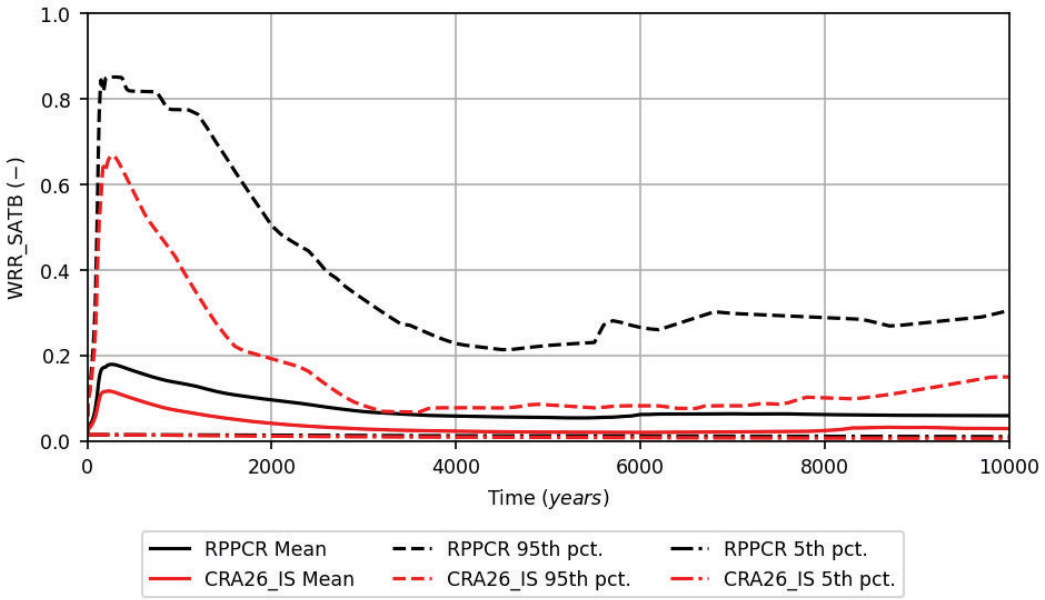

Figure 48. Brine saturation means with percentiles for the West Rest-of-Repository Area, Replicate 1, Scenario S1-BF

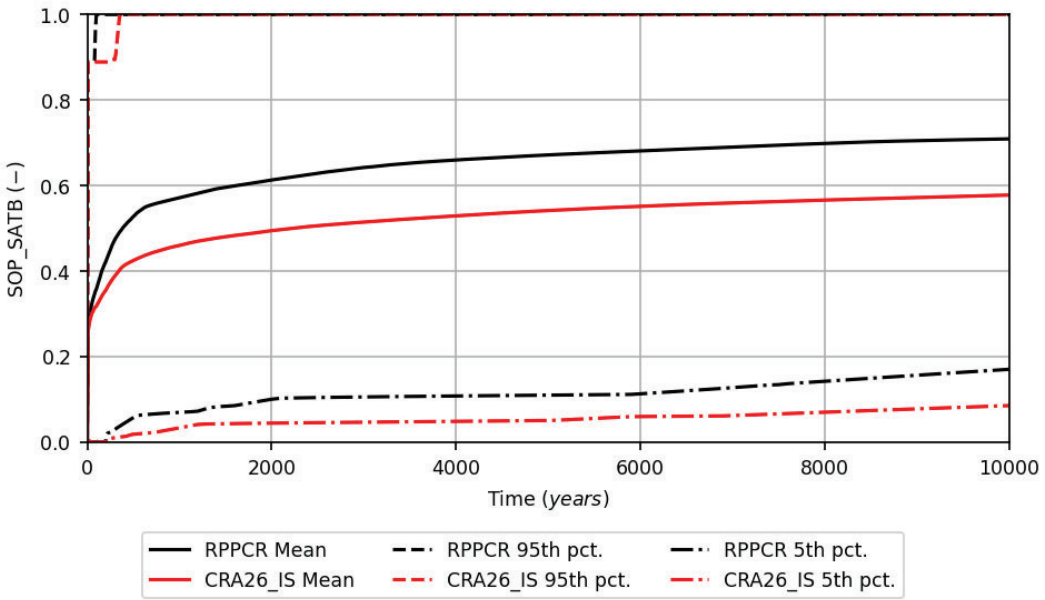

Figure 49. Brine saturation means with percentiles for the South Operations Area, Replicate 1, Scenario S1-BF

Information Only

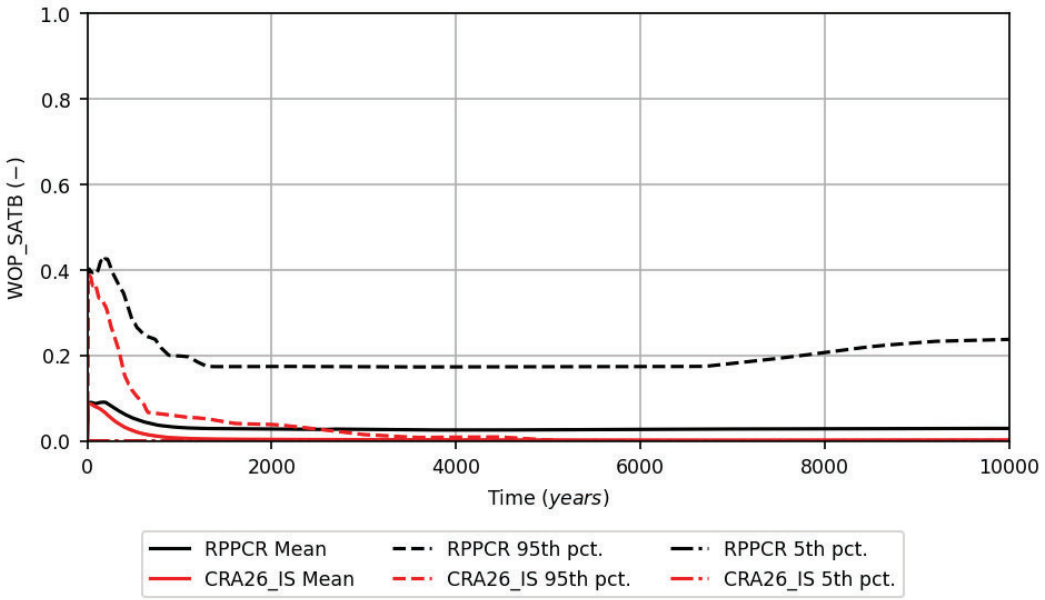

Figure 50. Brine saturation means with percentiles for the West Operations Area, Replicate 1, Scenario S1-BF

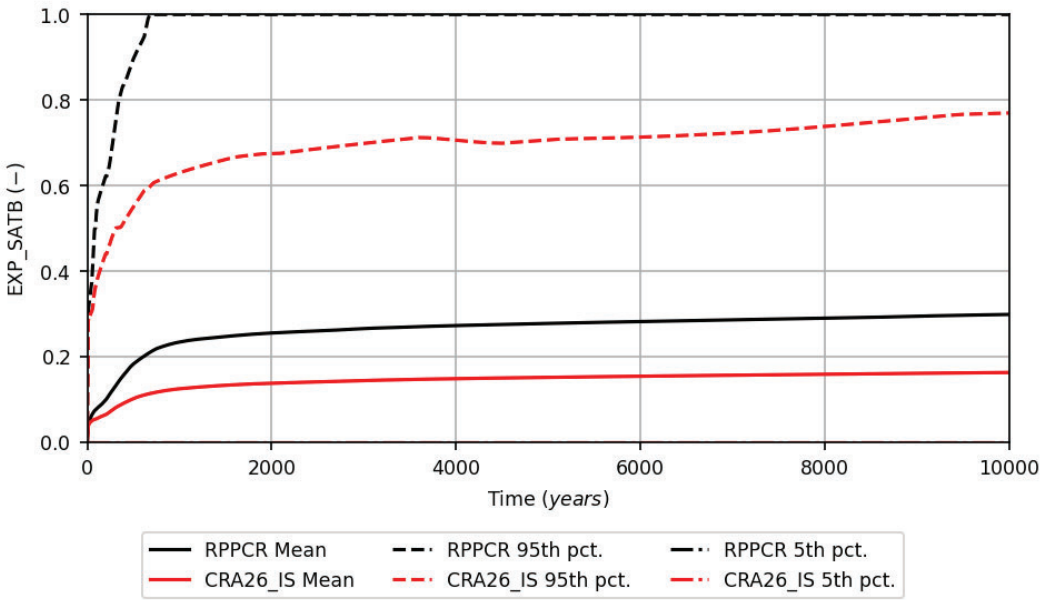

Figure 51. Brine saturation means with percentiles for the Experimental Area, Replicate 1, Scenario S1-BF

Information Only

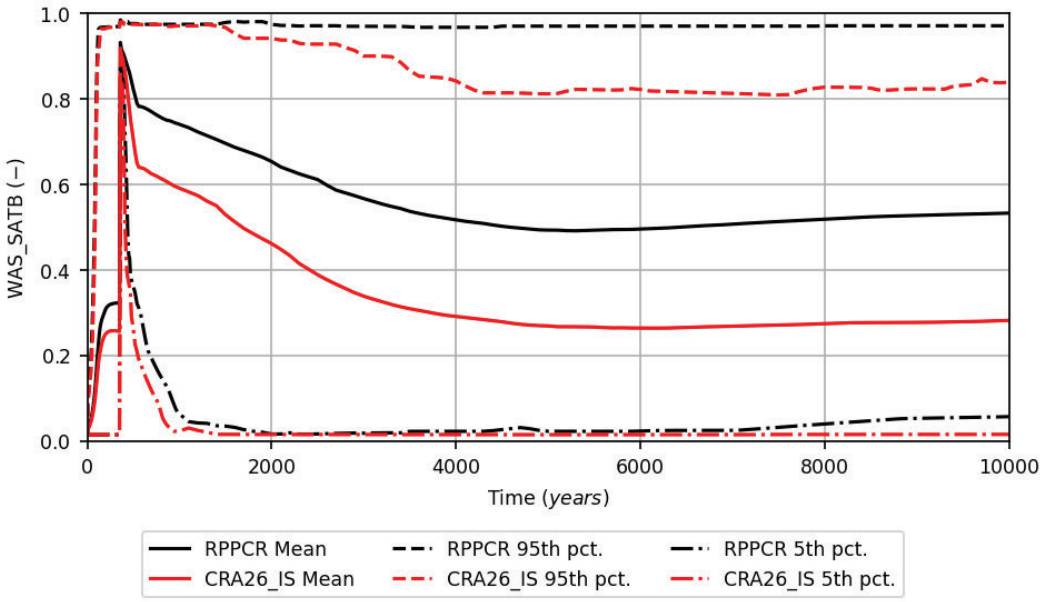

Figure 52. Brine saturation means with percentiles for the Waste Panel, Replicate 1, Scenario S2-BF

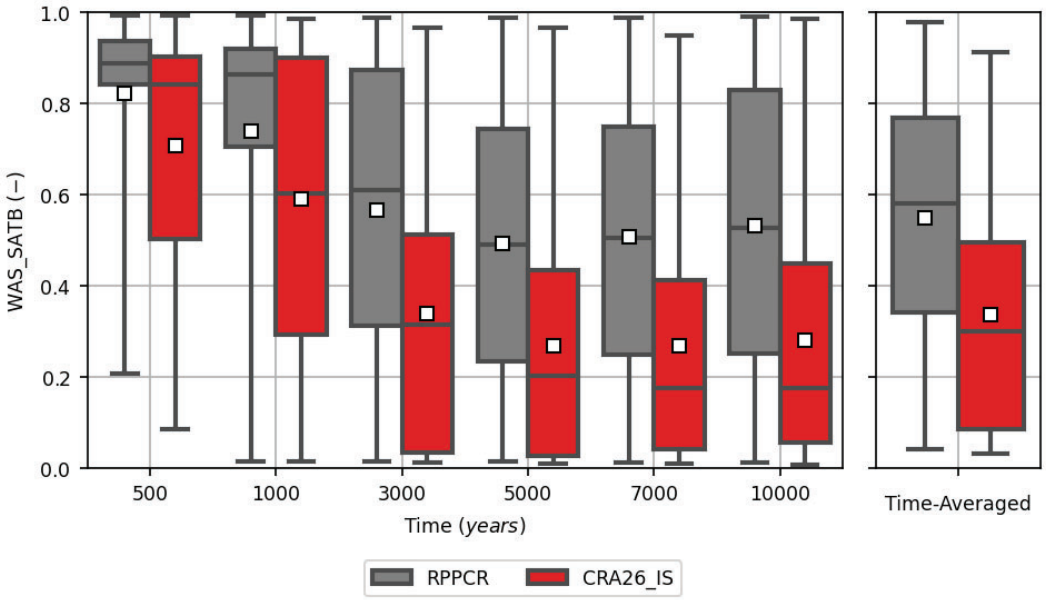

Figure 53. Brine saturation distributions for the Waste Panel, Replicate 1, Scenario S2-BF

Information Only

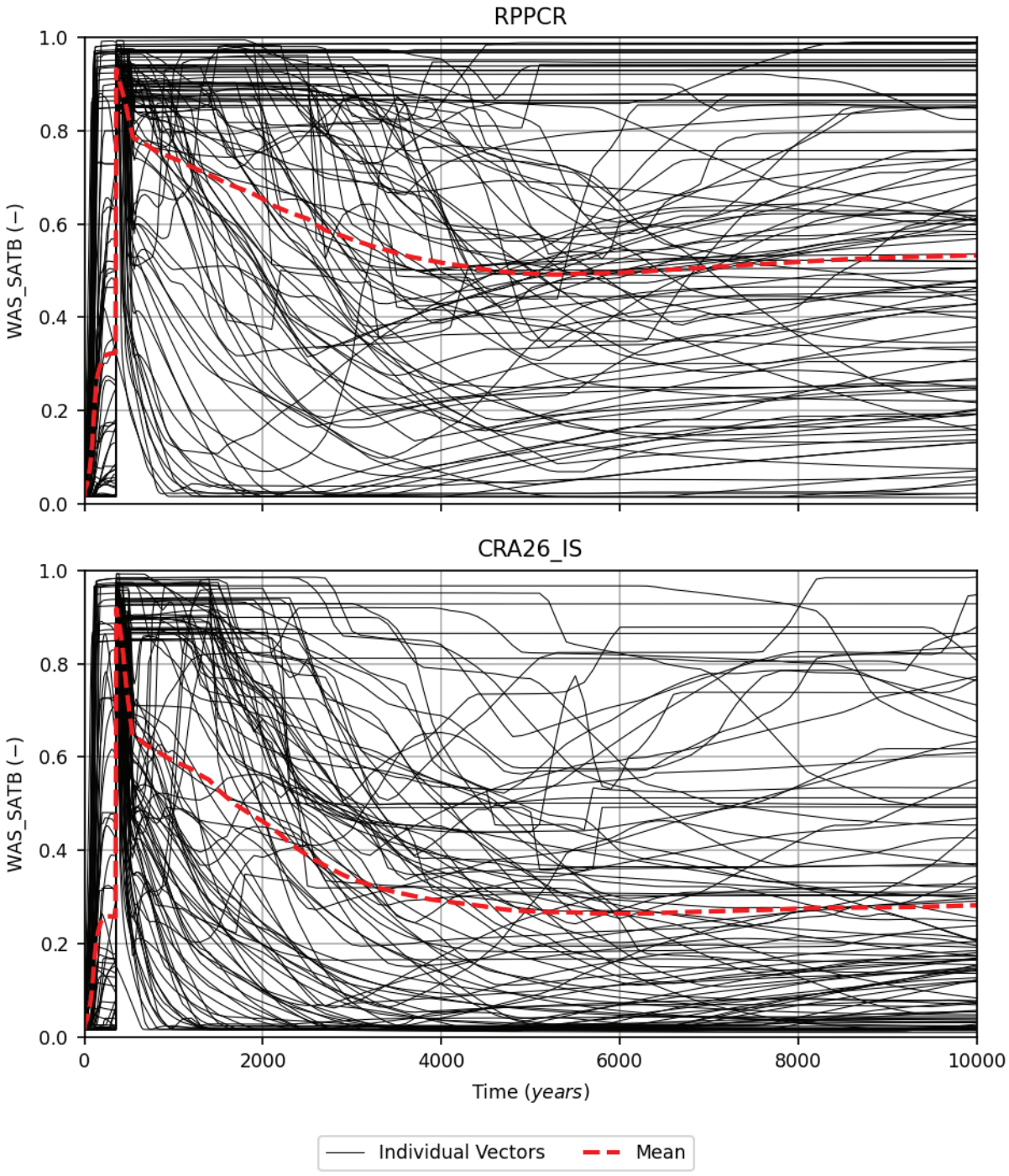

Figure 54. Brine saturation realizations with means for the Waste Panel, Replicate 1, Scenario S2-BF

Information Only

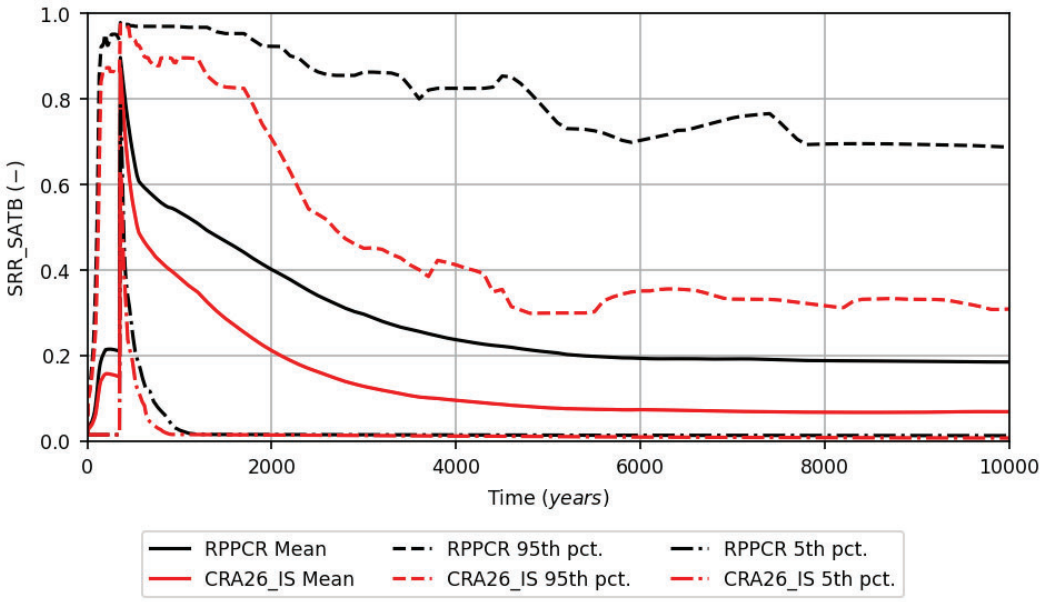

Figure 55. Brine saturation means with percentiles for the South Rest-of-Repository Area, Replicate 1, Scenario S2-BF

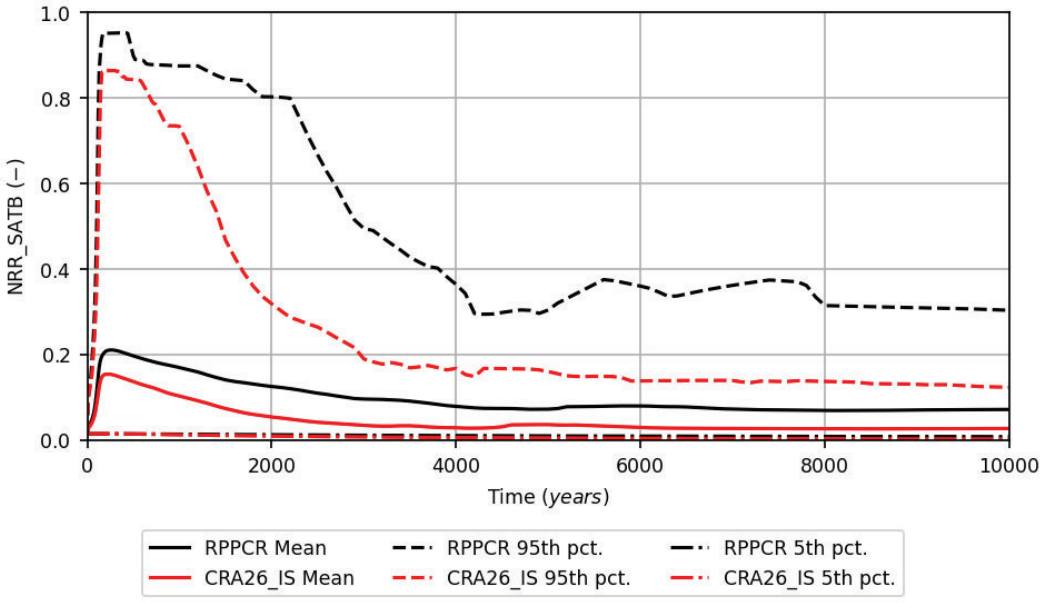

Figure 56. Brine saturation means with percentiles for the North Rest-of-Repository Area, Replicate 1, Scenario S2-BF

Information Only

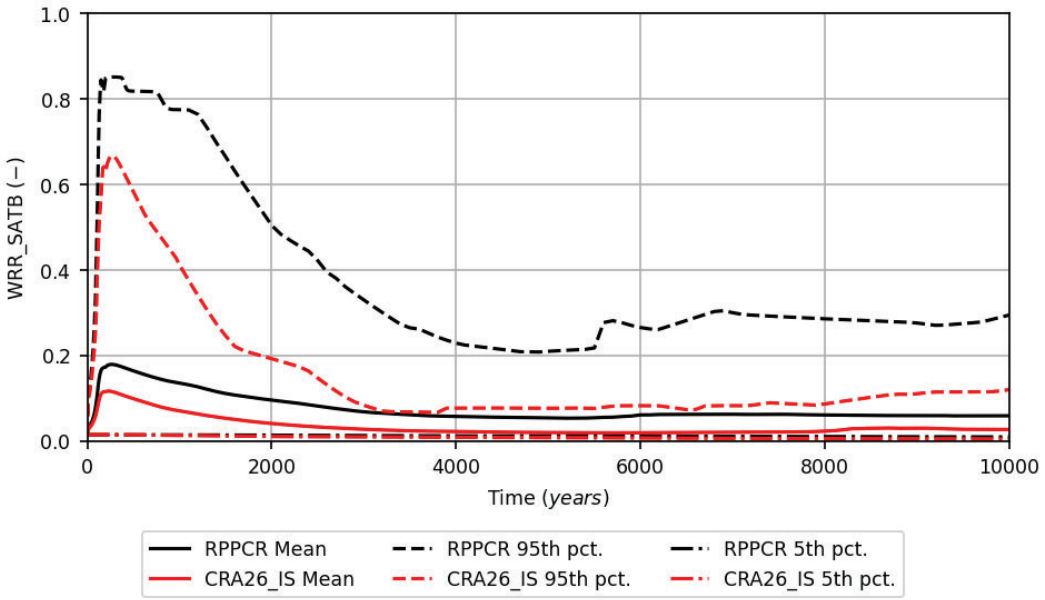

Figure 57. Brine saturation means with percentiles for the West Rest-of-Repository Area, Replicate 1, Scenario S2-BF

Information Only

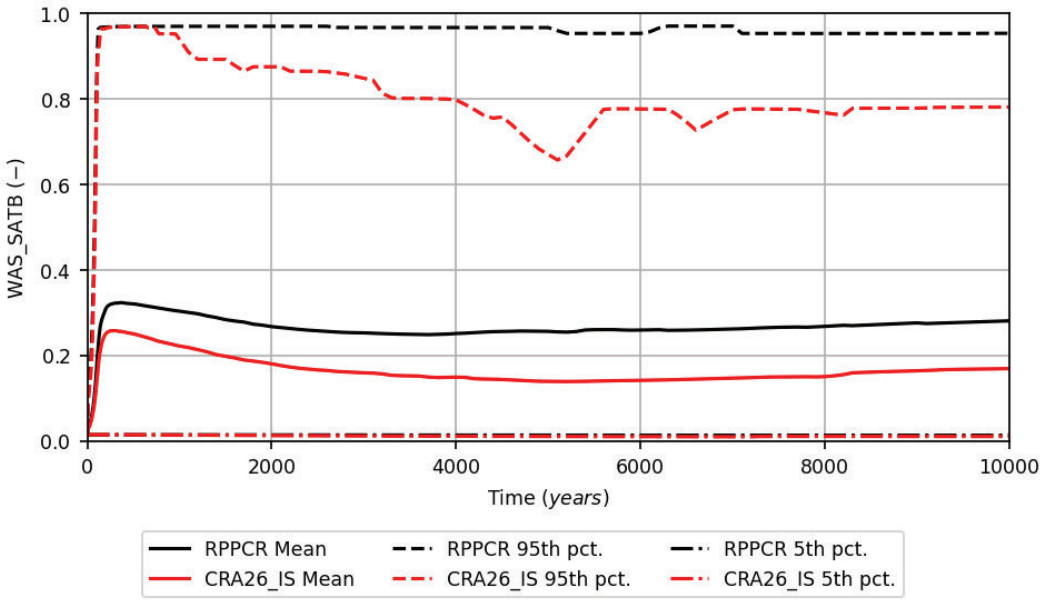

Figure 58. Brine saturation means with percentiles for the Waste Panel, Replicate 1, Scenario S4-BF

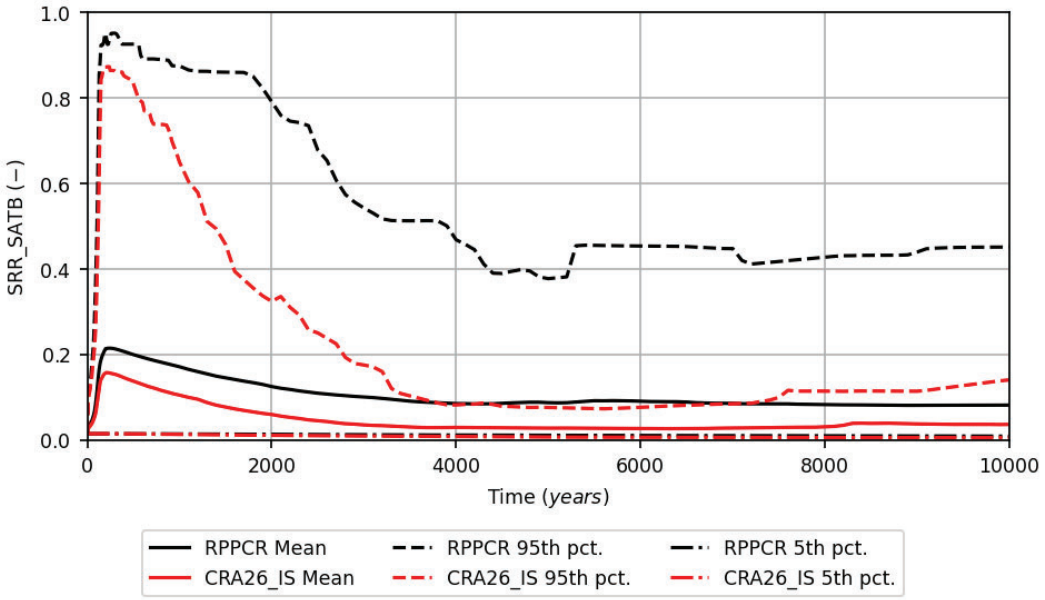

Figure 59. Brine saturation means with percentiles for the South Rest-of-Repository, Replicate 1, Scenario S4-BF

Information Only

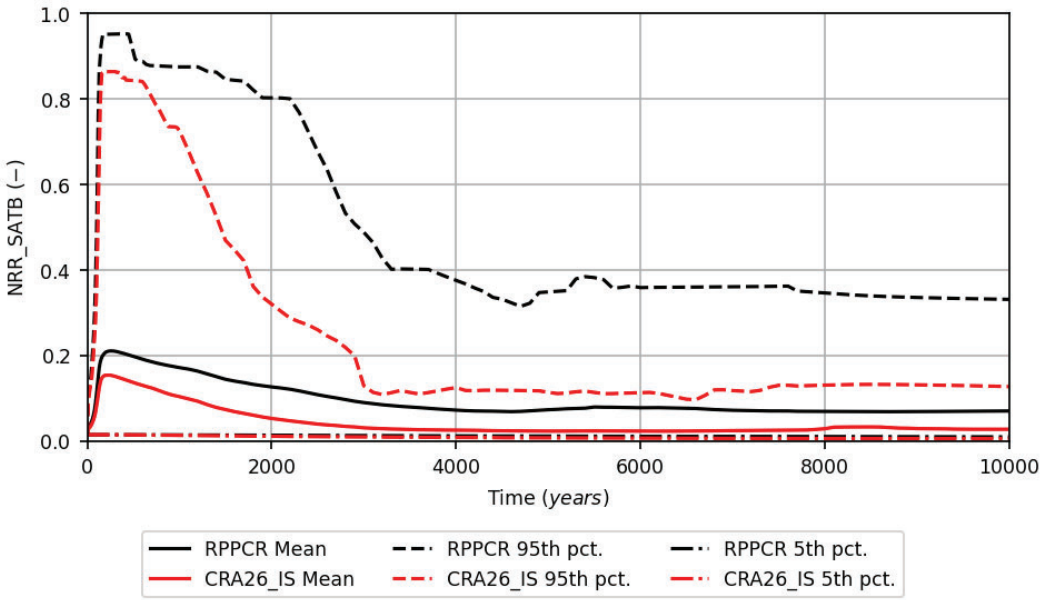

Figure 60. Brine saturation means with percentiles for the North Rest-of-Repository, Replicate 1, Scenario S4-BF

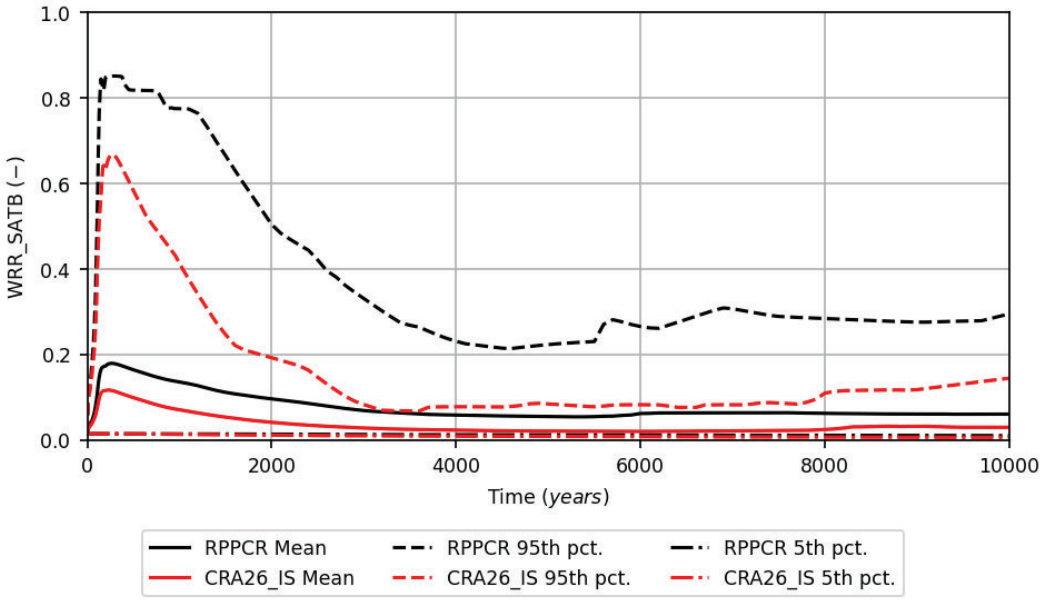

Figure 61. Brine saturation means with percentiles for the West Rest-of-Repository, Replicate 1, Scenario S4-BF

Information Only

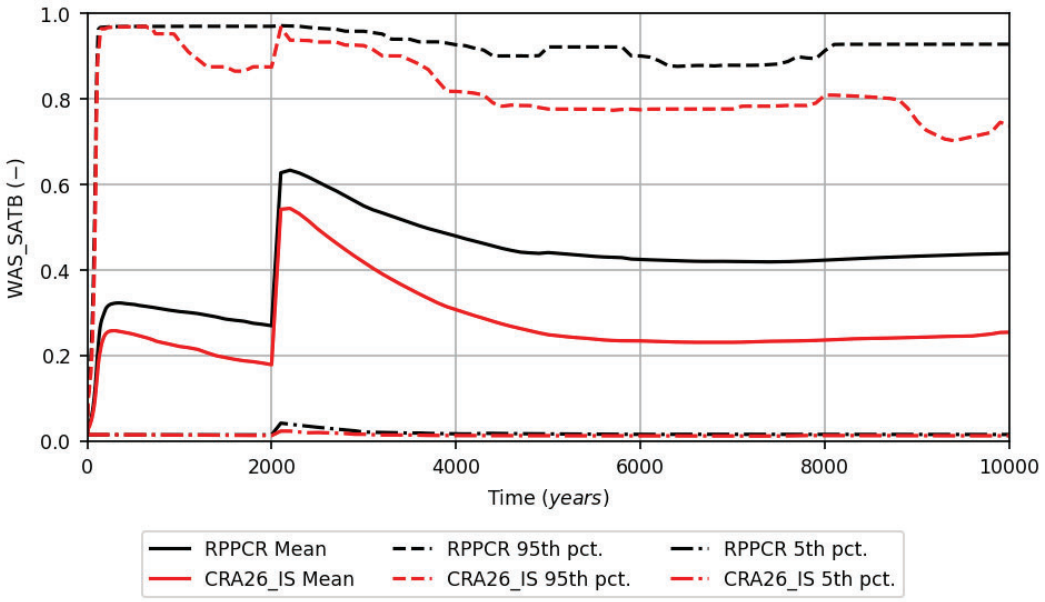

Figure 62. Brine saturation means with percentiles for the Waste Panel, Replicate 1, Scenario S6-BF

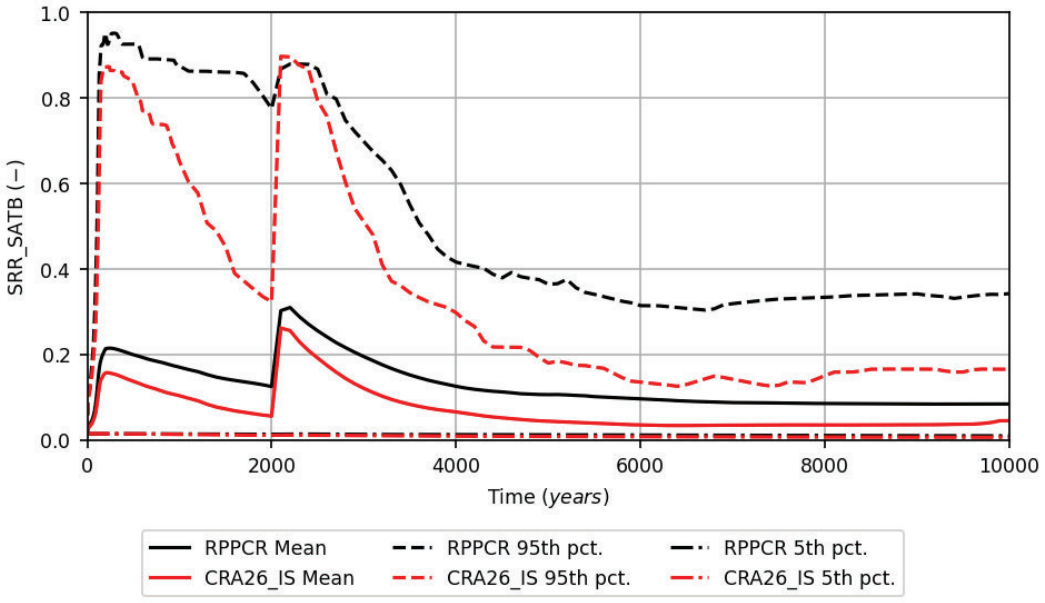

Figure 63. Brine saturation means with percentiles for the South Rest-of-Repository, Replicate 1, Scenario S6-BF

Information Only

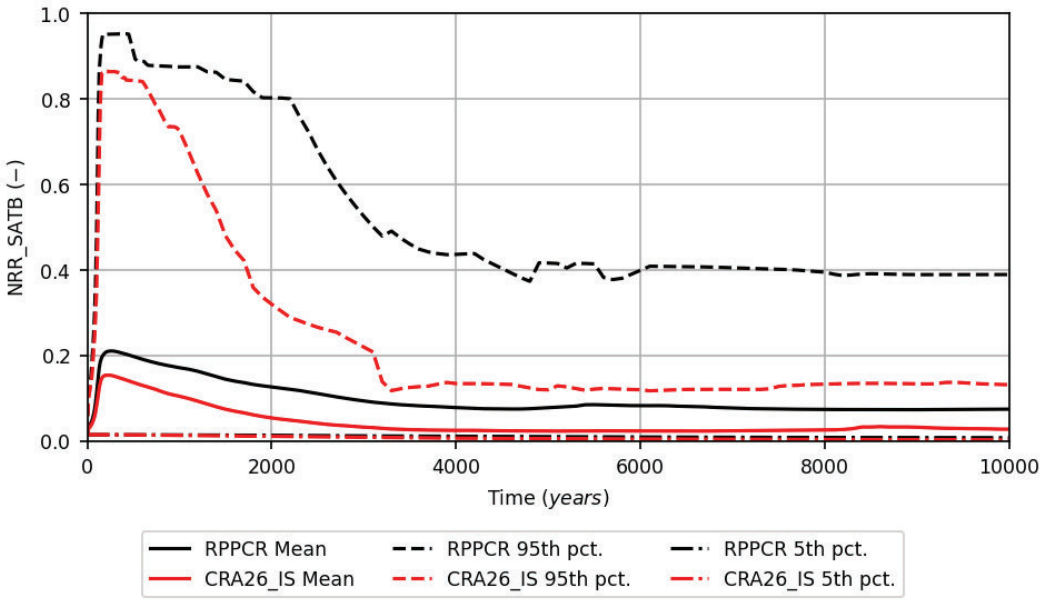

Figure 64. Brine saturation means with percentiles for the North Rest-of-Repository, Replicate 1, Scenario S6-BF

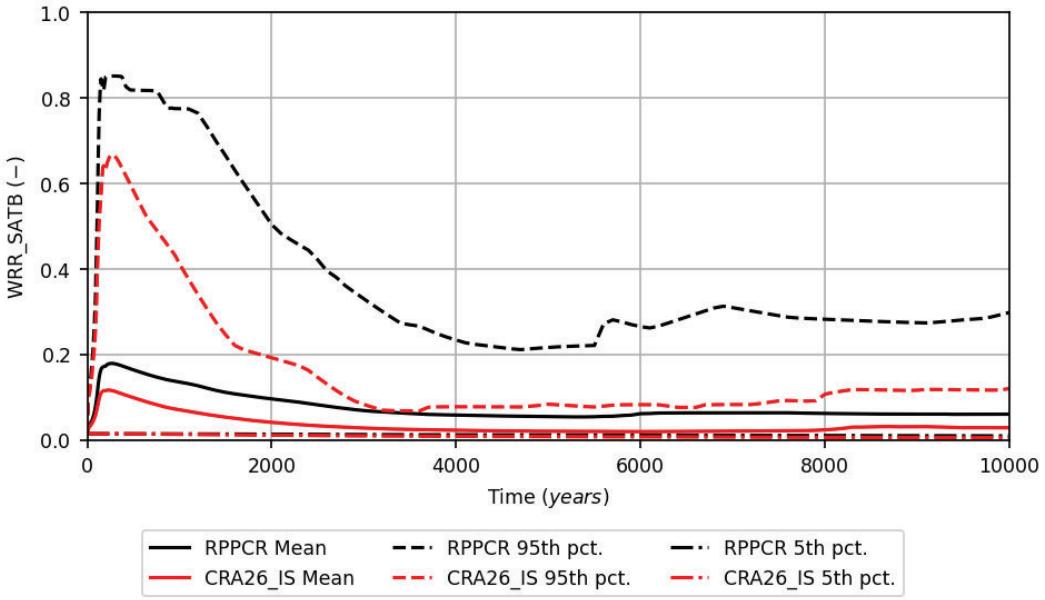

Figure 65. Brine saturation means with percentiles for the West Rest-of-Repository, Replicate 1, Scenario S6-BF

Information Only

Table 11. Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation, Replicate 1, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.29	0.56
2	S_MB139:PRMX_LOG	0.39	0.31
3	SOLMOD4:SOLVAR	0.43	-0.19
4	S_HALITE:PRMX_LOG	0.46	0.18
5	S_HALITE:POROSITY	0.5	0.17
6	WAS_AREA:PROBDEG	0.52	0.18
7	S_HALITE:PRESSURE	0.55	0.17
8	SHFTU:SAT_RGAS	0.57	0.15
9	GLOBAL:GDEPFAC	0.59	-0.14
10	PCS_T1:POROSITY	0.61	-0.14
11	WAS_AREA:BRUCITEC	0.63	0.13

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 12. Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation, Replicate 1, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.17	0.39
2	DRZ_1:PRMX_LOG	0.28	0.33
3	GLOBAL:GDEPFAC	0.33	-0.24
4	WAS_AREA:SAT_RBRN	0.38	-0.23
5	BH_SAND:PRMX_LOG	0.42	0.2

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

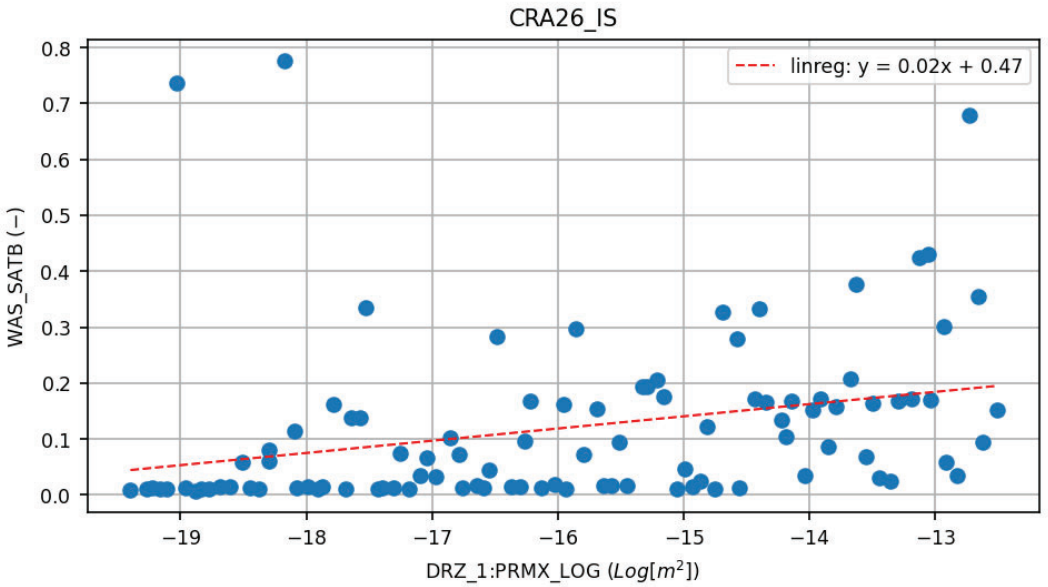

Figure 66. Healed DRZ permeability versus brine saturation in the Waste Panel at 10,000 years, Replicate 1, Scenario S1-BF

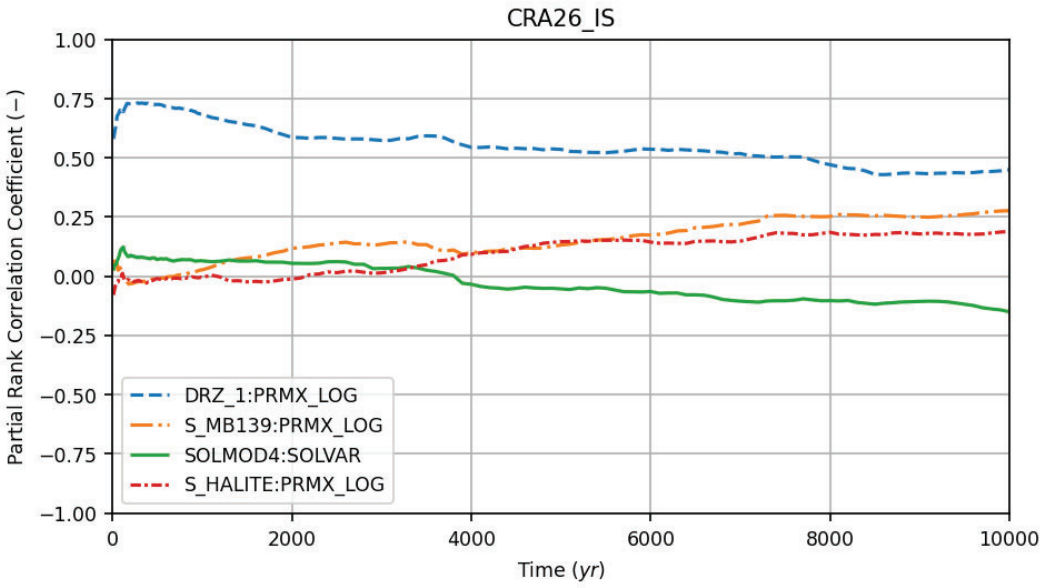

Figure 67. Partial Rank Correlation Coefficients over time for brine saturation in the Waste Panel, Replicate 1, Scenario S1-BF

Information Only

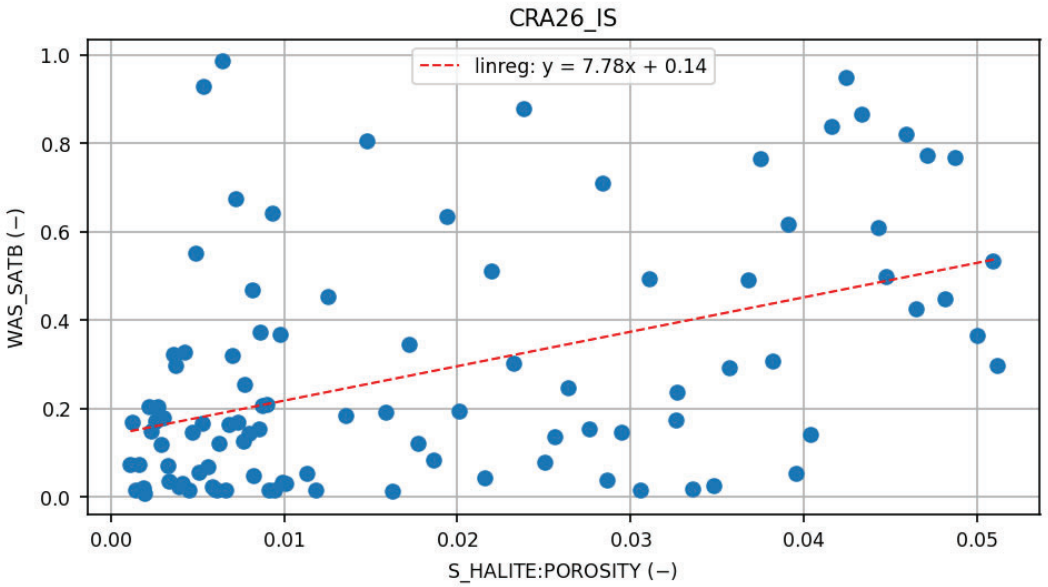

Figure 68. Intact Halite porosity versus brine saturation in the Waste Panel at 10,000 years, Replicate 1, Scenario S2-BF

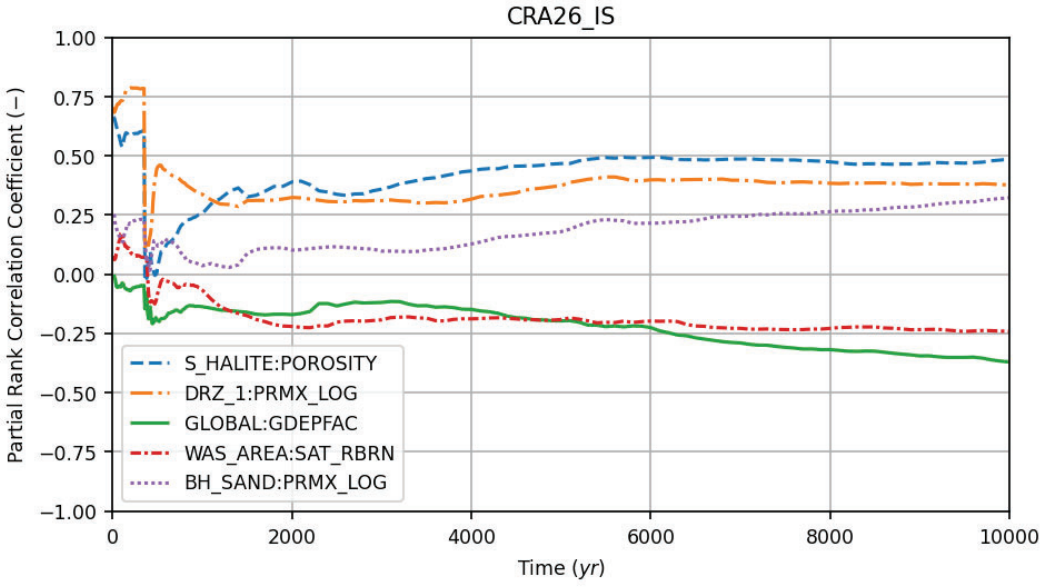

Figure 69. Partial Rank Correlation Coefficients over time for brine saturation in the Waste Panel, Replicate 1, Scenario S2-BF

Information Only

5.3 Porosity

Porosity results in the waste areas for Replicate 1 will be presented in this section. Porosity results reflect creep closure of salt onto the waste as a function of time and brine pressure via the new porosity response surface as based on the new disposal room porosity model by Vignes et al. (2023). The pressures reported in Section 5.1 for CRA26_IS were all within the porosity response surface maximum pressures for all times greater than 30 years. In the less than 30-year time frame, fluid pressures exceed the porosity response surface maximum pressures by less than 0.13 MPa. The creep closure process is dominated during the first 30 years by shear stresses in the surrounding rock salt rather than by back pressure, such that porosities are effectively independent of small pressure deviations.

Summary statistics for the end-time realized porosities in the waste areas are given in Table 13. The mean at 10,000 years porosity decreases when moving up-dip within the repository and the maximum at 10,000 years porosity is generally larger for CRA26_IS in comparison to RPPCR due to a small number of vectors with a larger magnitude.

The realized porosities in the representative waste panel are plotted in Figure 70 through Figure 73. Mean porosity in the waste panel is seen to be highly similar between CRA26_IS and RPPCR with the CRA26_IS having fewer vectors that exceed the mean, but by a larger magnitude, in comparison to RPPCR.

Information Only

Table 13. Porosity Statistics, Replicate 1

Quantity	Scenario	RPPCR Mean Value[1]	CRA26_IS Mean Value[1]	RPPCR Max Value[2]	CRA26_IS Max Value[2]
WAS_POR	S1-BF	0.06	0.06	0.30	0.45
WAS_POR	S2-BF	0.05	0.06	0.29	0.43
WAS_POR	S4-BF	0.05	0.05	0.14	0.27
WAS_POR	S6-BF	0.05	0.05	0.22	0.18
SRR_POR	S1-BF	0.06	0.06	0.29	0.45
SRR_POR	S2-BF	0.05	0.06	0.28	0.43
SRR_POR	S4-BF	0.05	0.05	0.14	0.25
SRR_POR	S6-BF	0.05	0.04	0.20	0.18
NRR_POR	S1-BF	0.05	0.05	0.29	0.44
NRR_POR	S2-BF	0.05	0.06	0.27	0.36
NRR_POR	S4-BF	0.05	0.05	0.27	0.36
NRR_POR	S6-BF	0.05	0.05	0.28	0.39
WRR_POR	S1-BF	0.04	0.05	0.22	0.36
WRR_POR	S2-BF	0.05	0.05	0.22	0.36
WRR_POR	S4-BF	0.04	0.05	0.22	0.36
WRR_POR	S6-BF	0.04	0.05	0.22	0.36

Notes:

1 Replicate 1 mean at 10,000 years.

2 Maximum over all 100 Replicate 1 vectors at 10,000 years.

Information Only

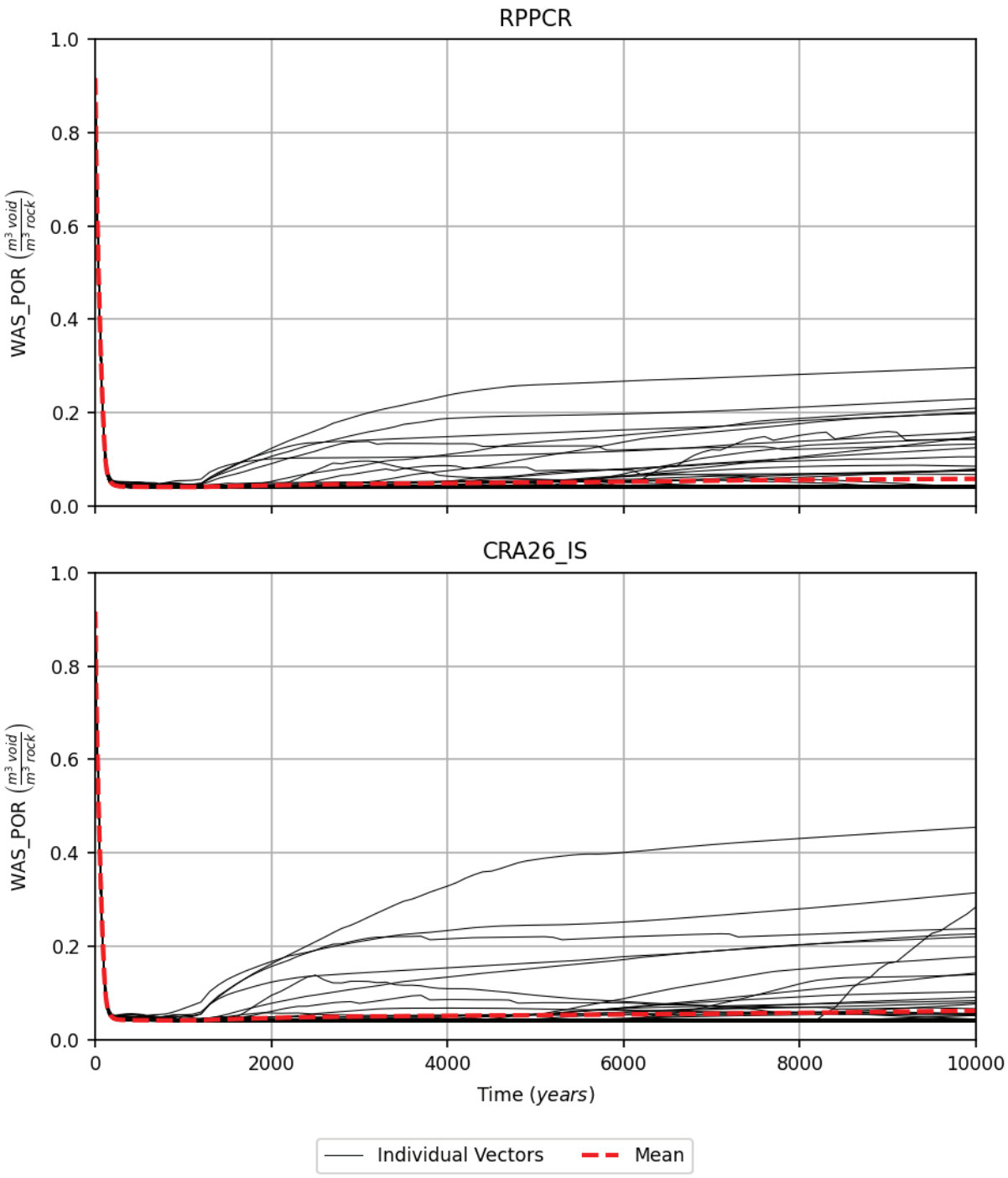

Figure 70. Porosity realizations with means in the Waste Panel, Replicate 1, Scenario S1-BF

Information Only

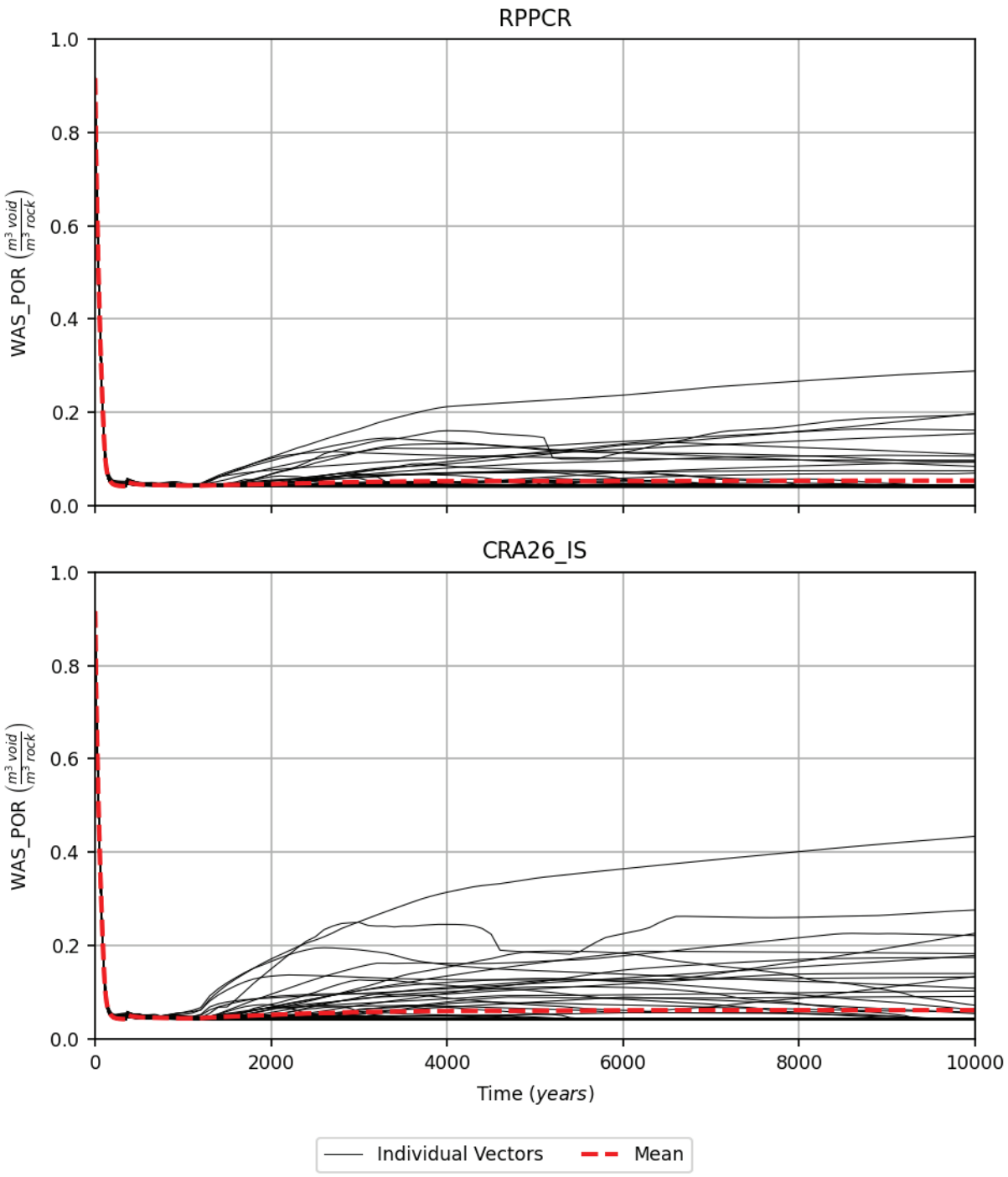

Figure 71. Porosity realizations with means in the Waste Panel, Replicate 1, Scenario S2-BF

Information Only

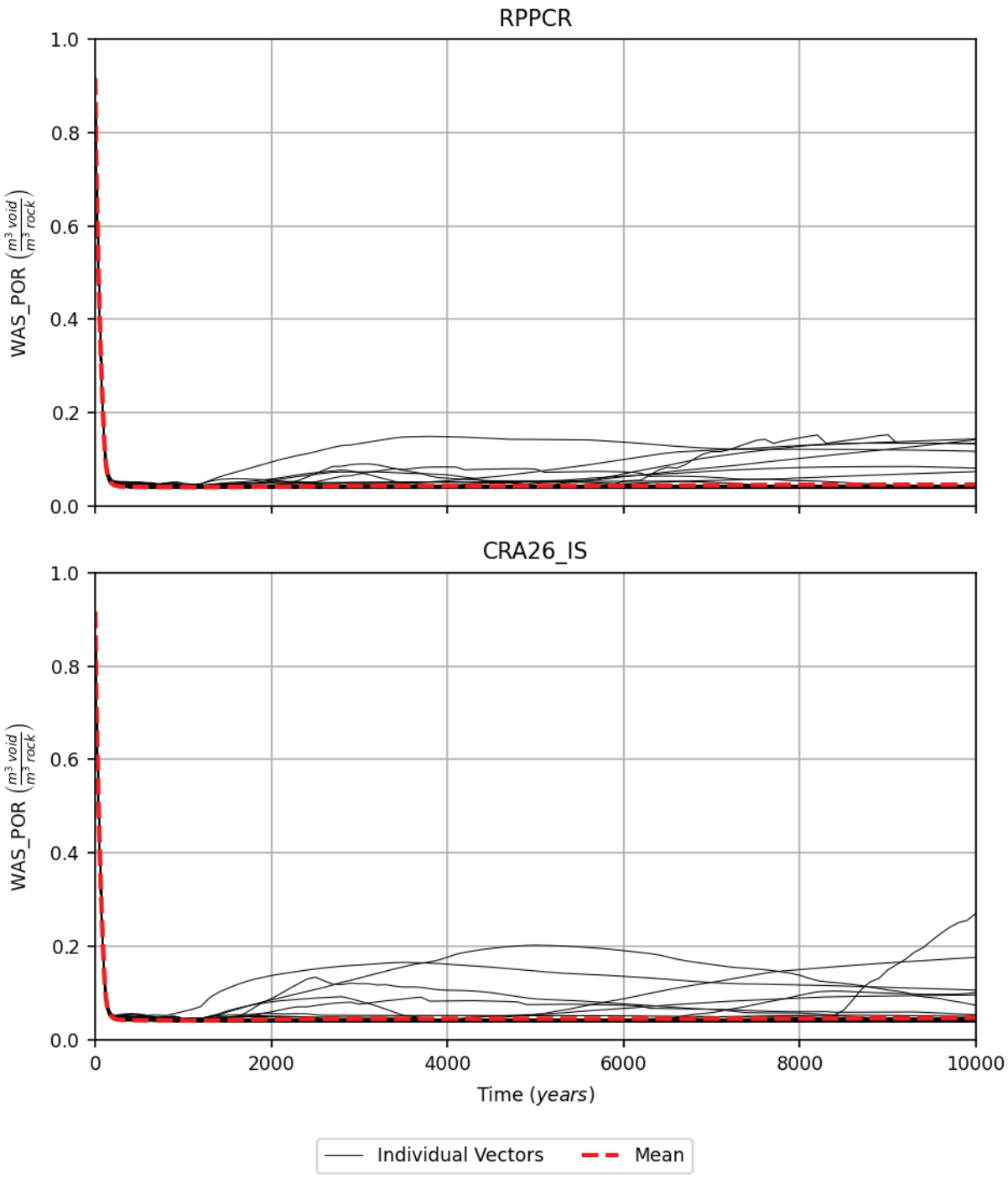

Figure 72. Porosity realizations with means in the Waste Panel, Replicate 1, Scenario S4-BF

Information Only

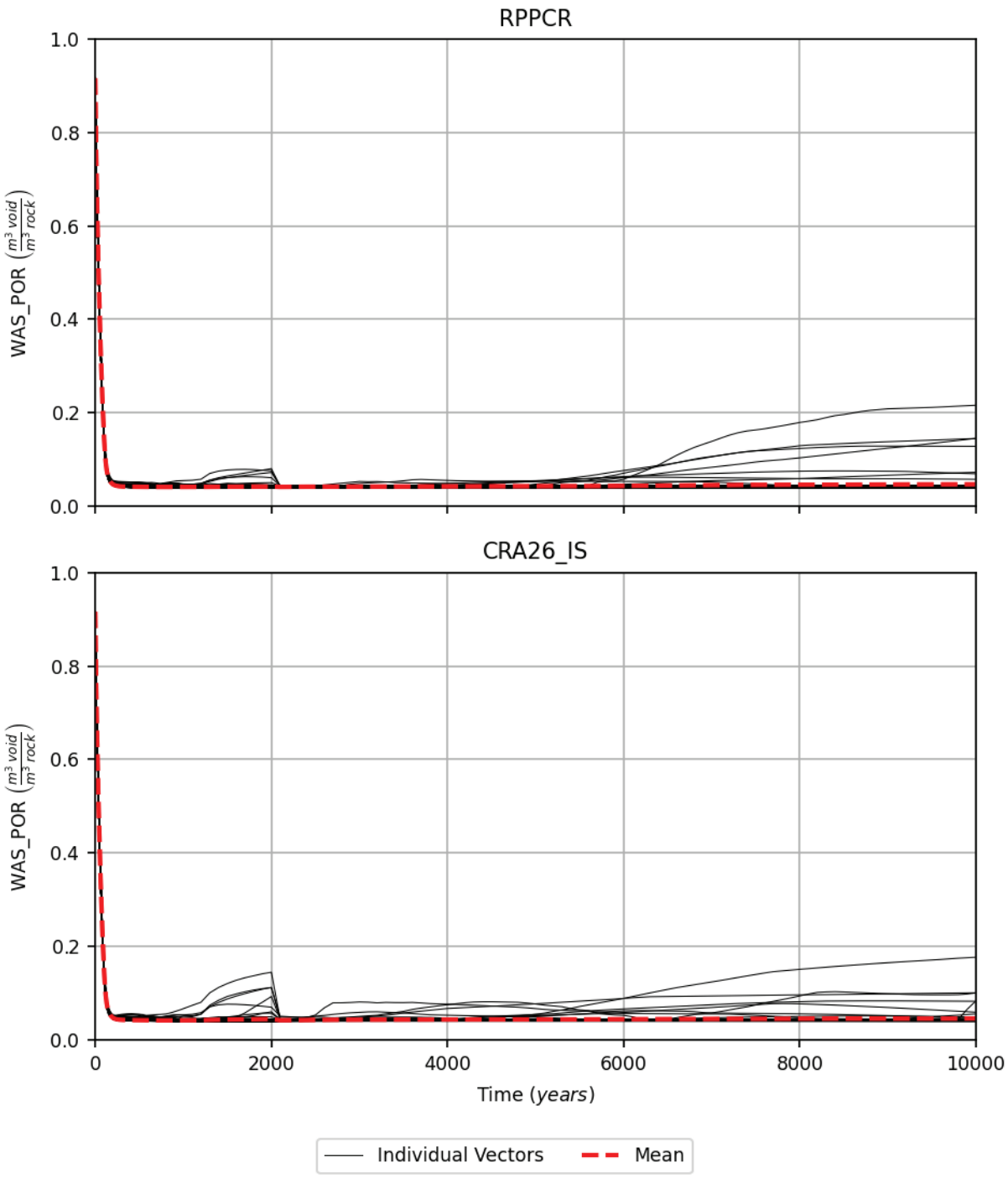

Figure 73. Porosity realizations with means in the Waste Panel, Replicate 1, Scenario S6-BF

Information Only

5.4 Gas Generation

Gas generation results in the waste areas for Replicate 1 will be presented in this section.

Summary statistics for the cumulative gas generation from iron corrosion, cellulose biodegradation, brine radiolysis, and all three sources combined within the repository from RPPCR and CRA26_IS are presented in Table 14. Except for cellulose biodegradation and radiolysis under Scenario B2-BF, mean cumulative gas generation is decreased for CRA26_IS in comparison to RPPCR over all reported scenarios. For individual vector maximums, only gas generation due to cellulose biodegradation is increased for CRA26_IS in comparison to RPPCR.

Cumulative total gas generation means and percentiles from all sources in the repository are shown in Figure 74 through Figure 77. The mean and 95th percentile results for cumulative total gas generation are seen to be less for CRA26_IS in comparison to RPPCR over all reported scenarios with Scenario S2-BF exhibiting the greatest parity between the two analyses.

Cumulative gas generation means by mechanism are plotted for CRA26_IS in Figure 78 through Figure 81. In all scenarios, total gas generation is dominated by iron corrosion, followed by brine radiolysis, and finally CPR biodegradation. This comparative trend is unchanged from that observed for RPPCR.

Information Only

Table 14. Cumulative Gas Generation Statistics, Replicate 1

Quantity	Scenario	RPPCR Mean Value[1]	CRA26_IS Mean Value[1]	RPPCR Max Value[2]	CRA26_IS Max Value[2]
FEMOL_T	S1-BF	4.05E+08	2.68E+08	1.34E+09	1.27E+09
FEMOL_T	S2-BF	5.37E+08	4.47E+08	1.34E+09	1.27E+09
FEMOL_T	S4-BF	4.07E+08	2.69E+08	1.34E+09	1.27E+09
FEMOL_T	S6-BF	4.65E+08	3.53E+08	1.34E+09	1.27E+09
CELMOL_T	S1-BF	7.61E+07	6.24E+07	5.58E+08	5.69E+08
CELMOL_T	S2-BF	9.36E+07	1.02E+08	5.58E+08	5.69E+08
CELMOL_T	S4-BF	7.64E+07	6.25E+07	5.58E+08	5.69E+08
CELMOL_T	S6-BF	8.48E+07	8.02E+07	5.58E+08	5.69E+08
ALL_HRDC	S1-BF	9.00E+07	8.17E+07	7.53E+08	6.98E+08
ALL_HRDC	S2-BF	1.38E+08	1.48E+08	8.66E+08	7.00E+08
ALL_HRDC	S4-BF	9.54E+07	8.66E+07	8.11E+08	7.82E+08
ALL_HRDC	S6-BF	1.06E+08	1.04E+08	7.65E+08	6.51E+08
ALL_HTTC	S1-BF	5.70E+08	4.11E+08	2.15E+09	2.02E+09
ALL_HTTC	S2-BF	7.66E+08	6.95E+08	2.20E+09	2.05E+09
ALL_HTTC	S4-BF	5.76E+08	4.16E+08	2.22E+09	2.08E+09
ALL_HTTC	S6-BF	6.54E+08	5.35E+08	2.18E+09	2.12E+09

Notes:

1 Replicate 1 mean at 10,000 years.

2 Maximum over all 100 Replicate 1 vectors at 10,000 years.

Information Only

5.4.1 Iron Corrosion

Mean cumulative gas generation from iron corrosion is shown in Figure 82. Gas generation due to iron corrosion in the total waste area is decreased in all reported scenarios for CRA26_IS in comparison to RPPCR. However, it is noted that the comparative total quantity of gas generation due to iron corrosion, when normalized by the excavated storage volume of the repository (REFCON:VREPOS) indicates that scenarios with an E1 intrusion (S2-BF and S6-BF) produce more gas per unit volume for CRA26_IS in comparison to RPPCR with non-E1 intruded scenarios producing generally equivalent quantities of gas per unit volume on average (Figure 83).

5.4.2 CPR Biodegradation

Mean cumulative gas generation from CPR biodegradation is shown in Figure 84. Gas generation due to CPR biodegradation in the total waste area is greater in Scenario S2-BF and less in Scenarios B1-BF, B4-BF, and S6-BF for CRA26_IS. Again, normalizing the gas generation means by the excavated storage volume of the repository illustrates that CRA26_IS produces more gas per unit volume via CPR biodegradation than RPPCR over all reported scenarios (Figure 85).

5.4.3 Brine Radiolysis

Mean cumulative gas generation from brine radiolysis is shown in Figure 86. Gas generation from brine radiolysis in the total waste area for CRA26_IS is slightly greater at earlier times and slightly less at later times for all reported scenarios except for Scenario B2-BF which has greater radiolytic gas generation over all times in comparison to RPPCR. Again, normalizing the gas generation means by the excavated storage volume of the repository illustrates that CRA26_IS produces more gas per unit volume via radiolysis than RPPCR over all reported scenarios (Figure 87).

5.4.4 Sensitivity Analysis

All three gas generation reactions are dependent on brine saturation, and its primary controlling parameters (S_HALITE:POROSITY, DRZ_1:PRMX_LOG) also have the most control of variability in overall gas generation. Each reaction is also sensitive to the input parameters directly related to each gas generation mechanism (STEEL:CORRMCO2 for iron corrosion; WAS_AREA:PROBDEG, BIOGENFC, GRATMICI, and GRATMICH for CPR biodegradation; and GLOBAL:GDEPFAC for brine radiolysis). Section 9.3 of Appendix A provides the truncated Ranked Regression Analysis for the Total Cumulative Gas Generation.

Information Only

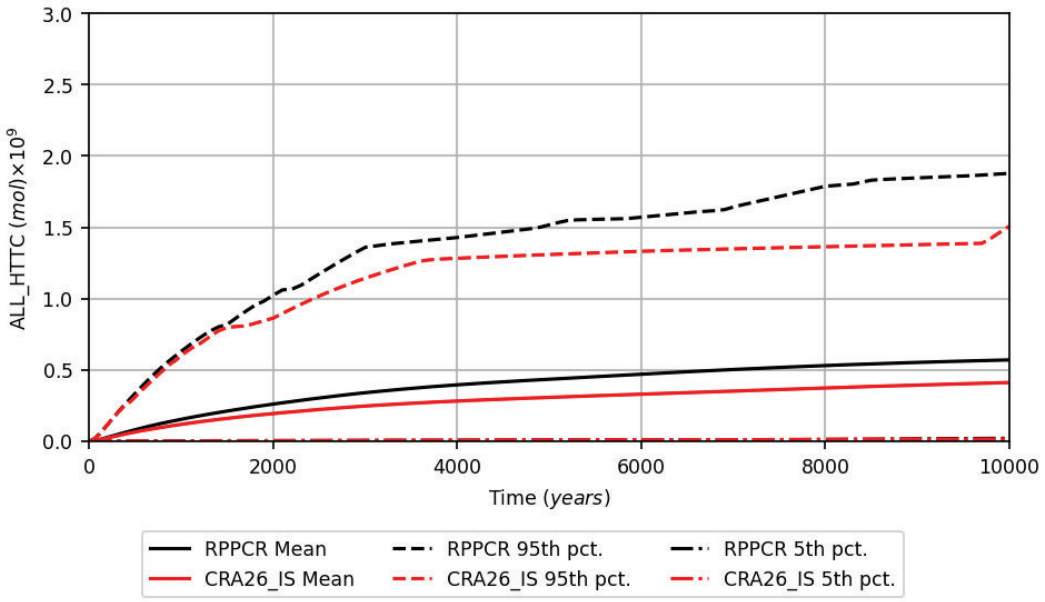

Figure 74. Gas generation means with percentiles from all sources in Total Waste Areas, Replicate 1, Scenario S1-BF

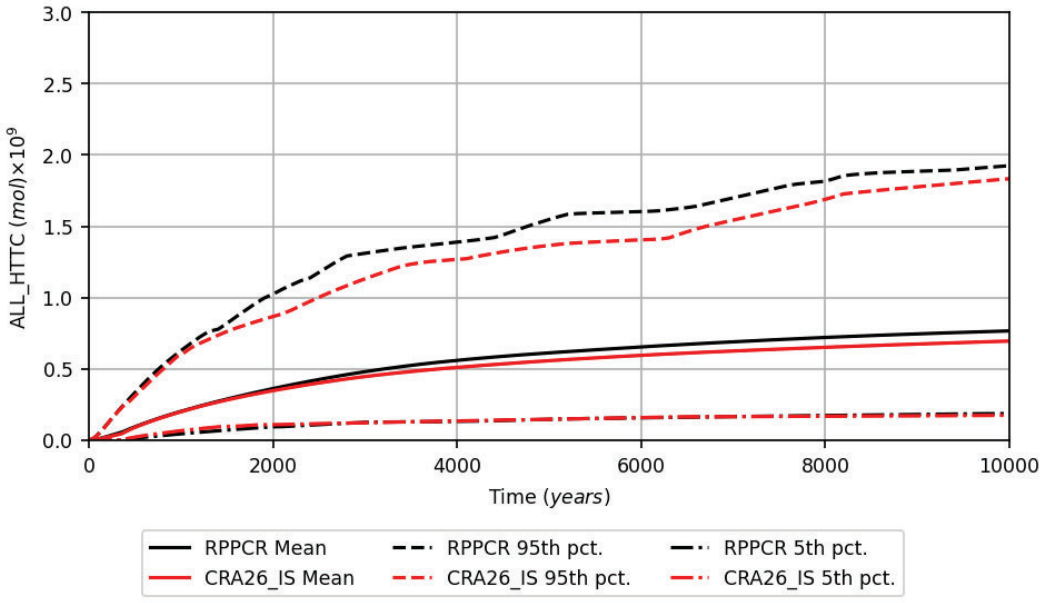

Figure 75. Gas generation means with percentiles from all sources in Total Waste Areas, Replicate 1, Scenario S2-BF

Information Only

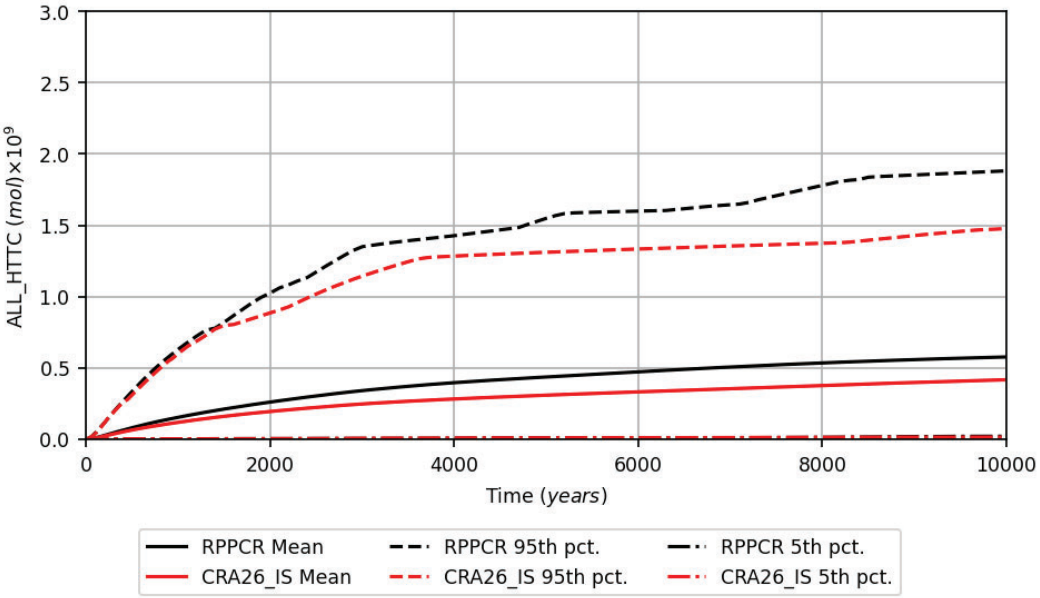

Figure 76. Gas generation means with percentiles from all sources in Total Waste Areas, Replicate 1, Scenario S4-BF

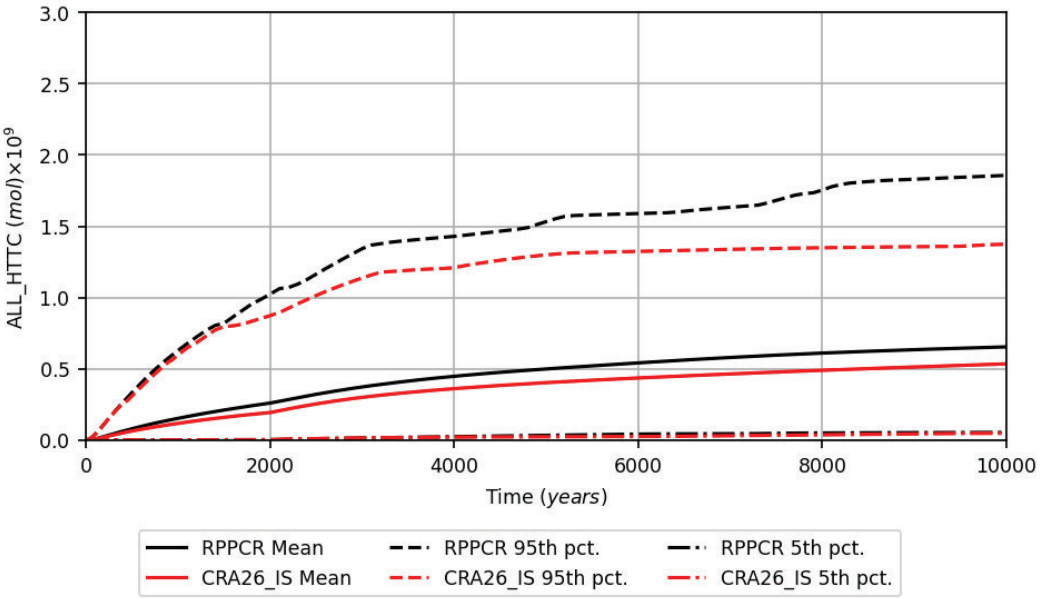

Figure 77. Gas generation means with percentiles from all sources in Total Waste Areas, Replicate 1, Scenario S6-BF

Information Only

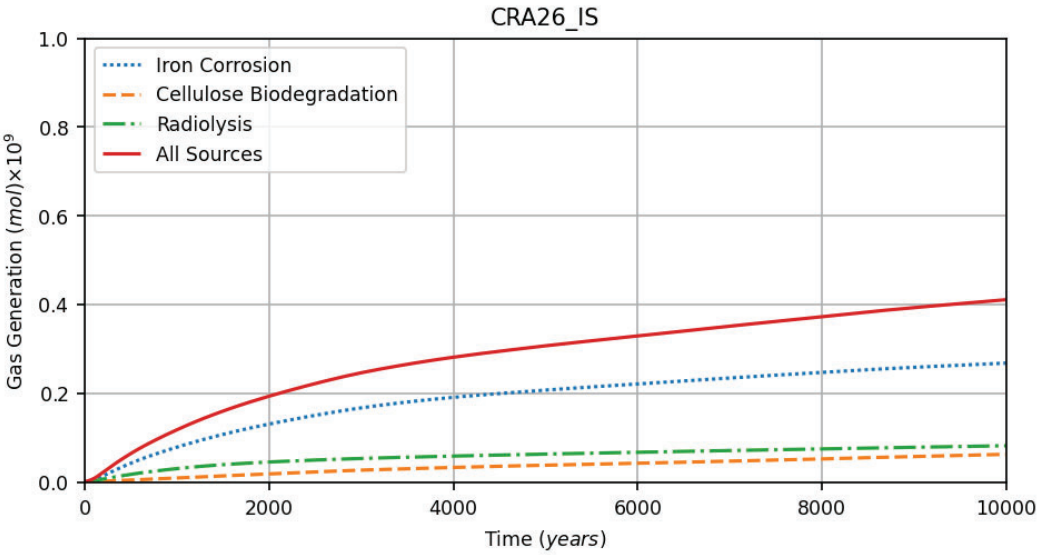

Figure 78. Gas generation means by source in Total Waste Areas, Replicate 1, Scenario S1-BF

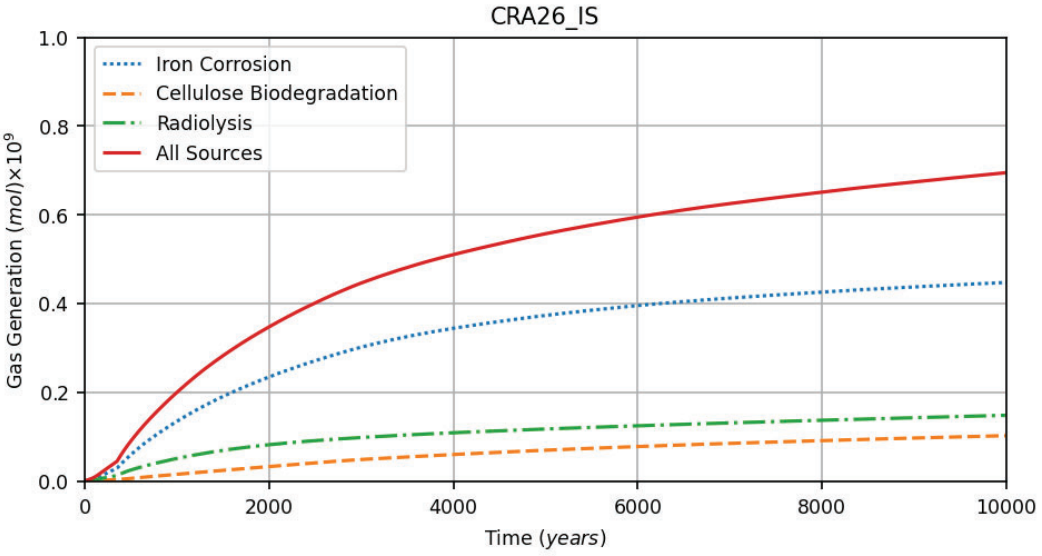

Figure 79. Gas generation means by source in Total Waste Areas, Replicate 1, Scenario S2-BF

Information Only

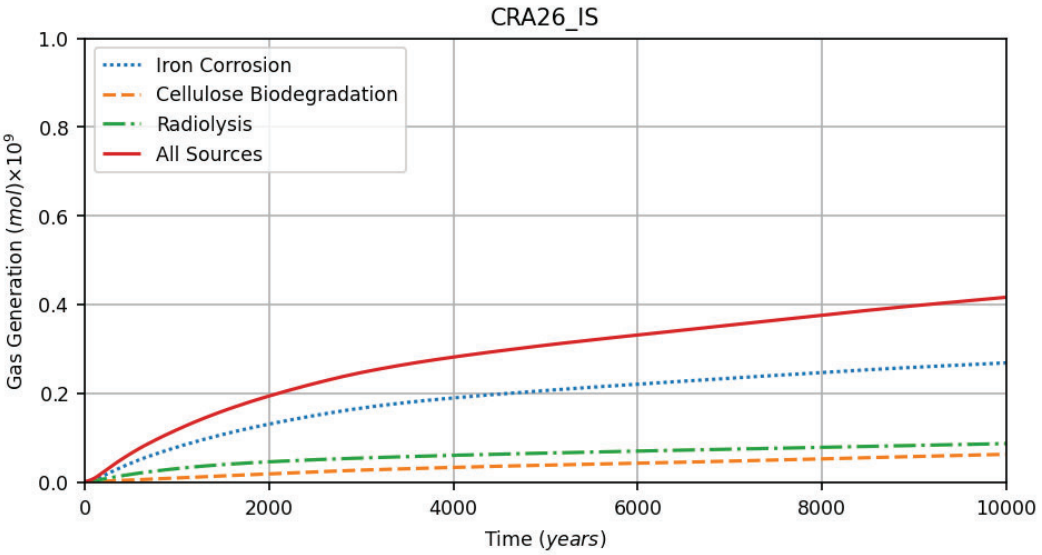

Figure 80. Gas generation means by source in Total Waste Areas, Replicate 1, Scenario S4-BF

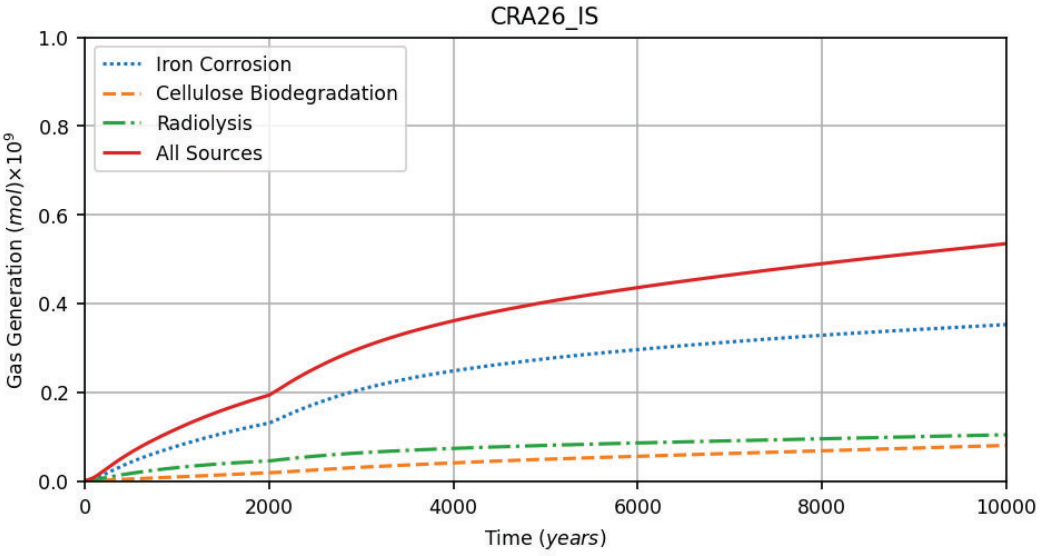

Figure 81. Gas generation means by source in Total Waste Areas, Replicate 1, Scenario S6-BF

Information Only

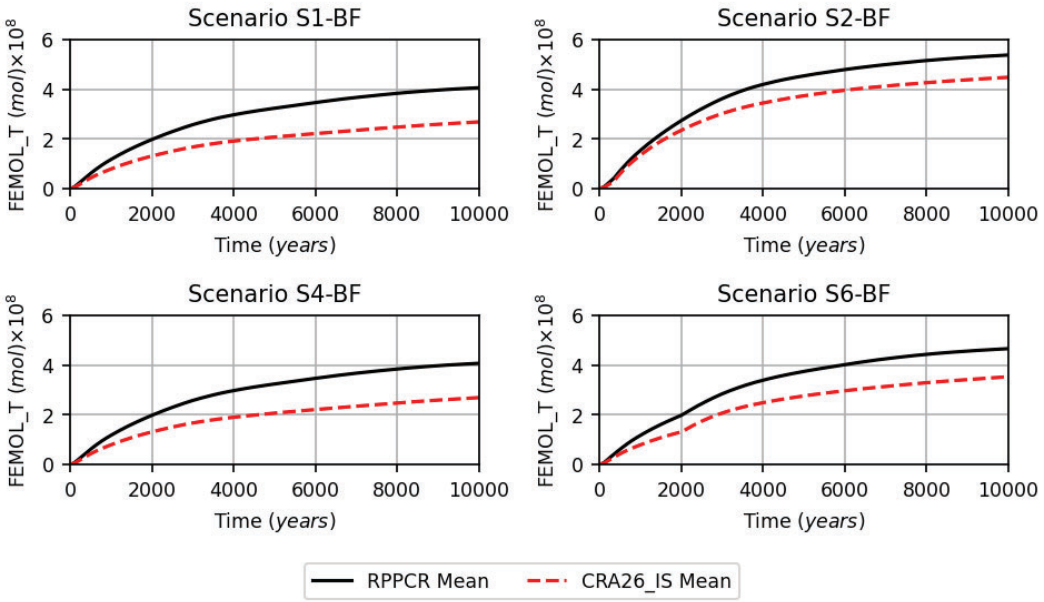

Figure 82. Gas generation from iron corrosion means in Total Waste Areas, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

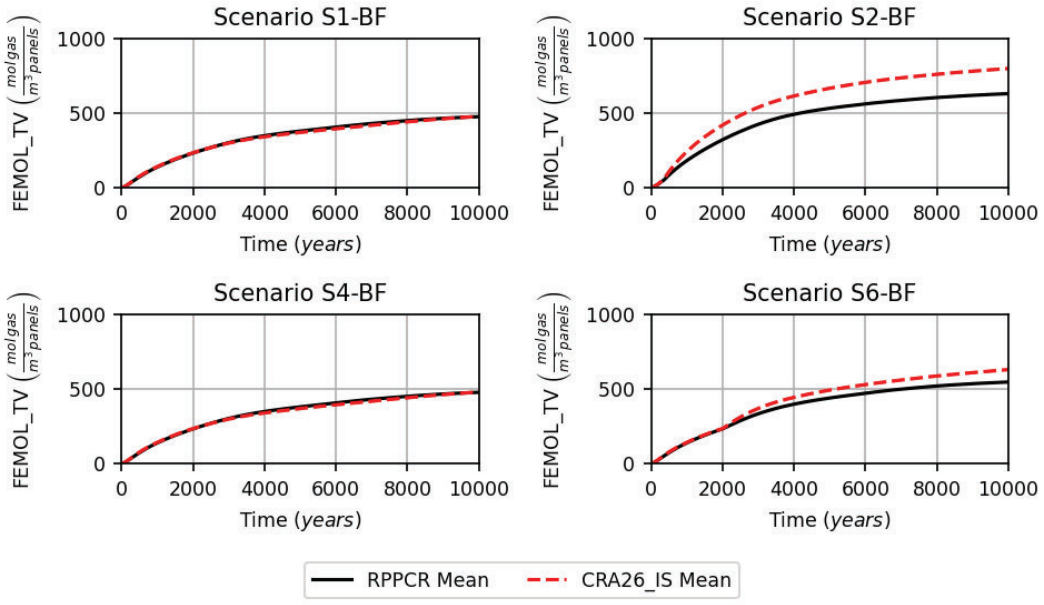

Figure 83. Normalized gas generation from iron corrosion means in Total Waste Areas, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

Information Only

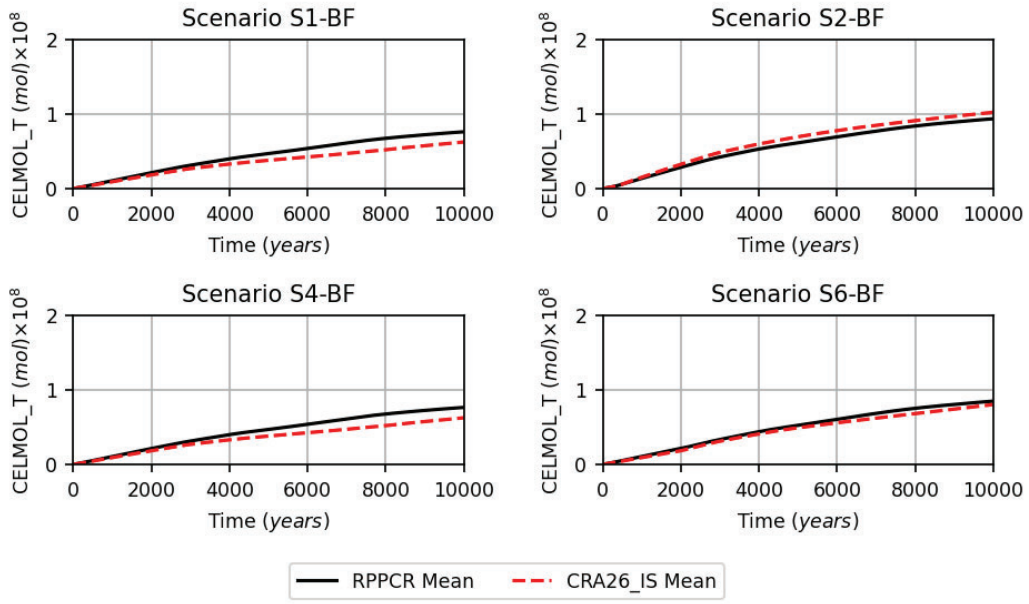

Figure 84. Gas generation from cellulose biodegradation means in Total Waste Areas, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

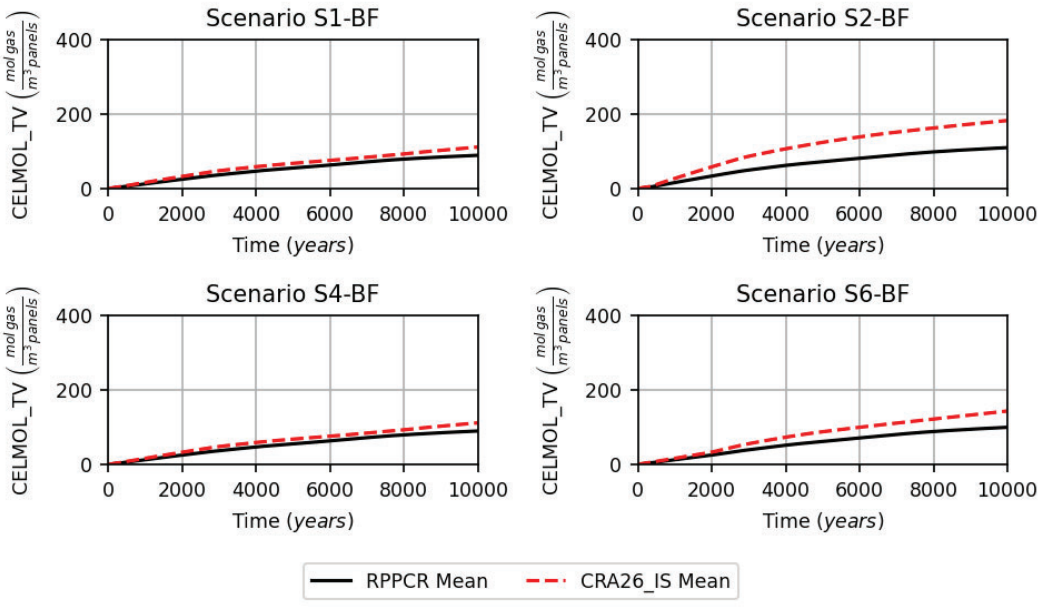

Figure 85. Normalized gas generation from cellulose biodegradation means in Total Waste Areas, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

Information Only

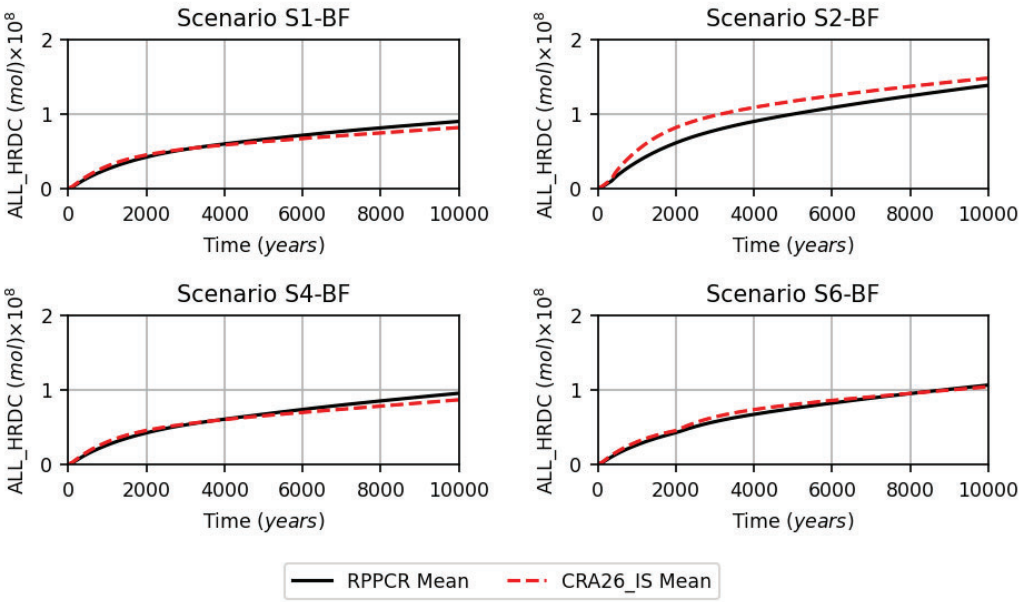

Figure 86. Gas generation from radiolysis means in Total Waste Areas, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

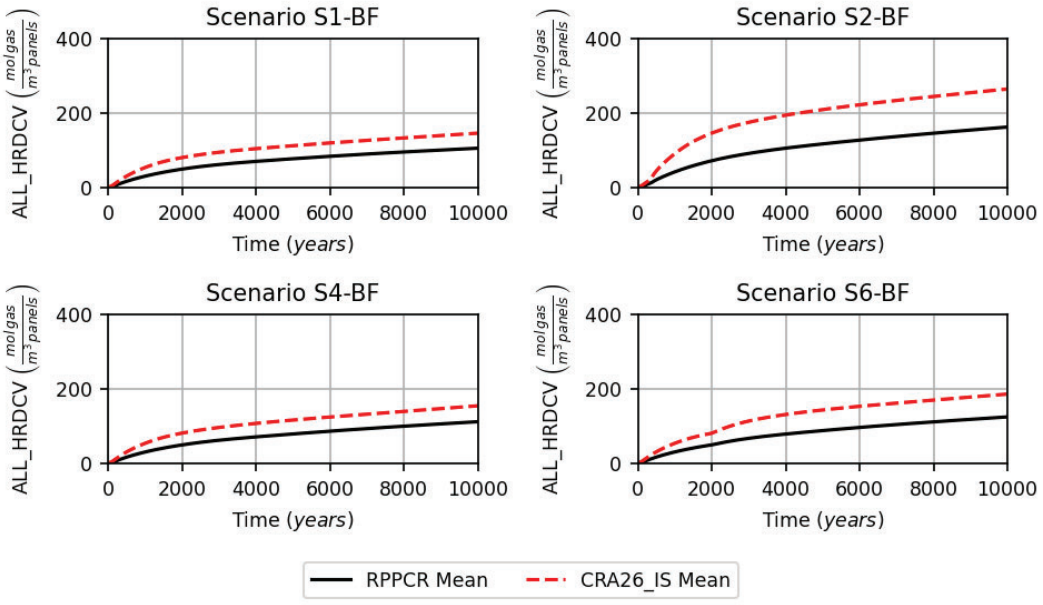

Figure 87. Normalized gas generation from radiolysis means in Total Waste Areas, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

Information Only

5.5 Brine and Gas Flow

Brine and gas flow results for Replicate 1 will be presented in this section.

Summary statistics for the end-time realized cumulative brine flow into the repository, net cumulative brine and gas flow in/out of the repository, cumulative brine flow up the shaft, cumulative brine flow up the borehole, cumulative brine flow into all anhydrite layers away from the repository, and cumulative brine flow in all anhydrite layers across the land withdrawal boundary are given in Table 15. The mean and maximum over all vectors at 10,000 years cumulative brine inflow, net cumulative brine flow into the repository, and net cumulative gas flow out of the repository is decreased for CRA26_IS in comparison to RPPCR. Brine flow up the shaft and borehole is small in magnitude and generally lower for CRA26_IS in comparison to RPPCR with a noted exception that the mean brine flow up the shaft is slightly greater for CRA26_IS under Scenario S2-BF. Brine flow into all anhydrite layers away from the repository and in all anhydrite layers across the land withdrawal boundary are all reduced for CRA26_IS in comparison to RPPCR except for the individual vector maximum under Scenario S6-BF.

Summary statistics for the end-time realized net cumulative brine flow in/out of the individual waste areas and cumulative brine consumption within the individual waste areas are given in Table 16. The mean and maximum net brine flows into the representative waste panel, South Rest-of-Repository, and North Rest-of-Repository are increased for CRA26_IS in comparison to RPPCR whereas net brine flows into the West Rest-of-Repository are reduced. Consumption of brine due to chemical reactions within the waste areas follows the same trend with consumption amounts shown to be on the order of net brine inflows in all waste areas for scenarios without a Castile intrusion. For waste areas without direct access to the Castile-intruded borehole, the consumption magnitudes are again on the order of the net brine inflow whereas they are on average nearly doubled for waste areas with direct access to the intruded borehole.

Information Only

Table 15. Brine and Gas Flow Statistics, Replicate 1

Quantity	Scenario	RPPCR Mean Value[1]	CRA26_IS Mean Value[1]	RPPCR Max Value[2]	CRA26_IS Max Value[2]
BRNREPIC	S1-BF	5.91E+04	4.20E+04	3.09E+05	2.44E+05
BRNREPIC	S2-BF	7.83E+04	6.62E+04	3.09E+05	2.51E+05
BRNREPIC	S4-BF	5.88E+04	4.21E+04	3.11E+05	2.55E+05
BRNREPIC	S6-BF	6.38E+04	4.96E+04	3.03E+05	2.38E+05
BRNREP	S1-BF	4.73E+04	3.45E+04	1.90E+05	1.38E+05
BRNREP	S2-BF	6.07E+04	5.02E+04	2.11E+05	1.42E+05
BRNREP	S4-BF	4.80E+04	3.47E+04	1.93E+05	1.52E+05
BRNREP	S6-BF	5.20E+04	4.10E+04	1.95E+05	1.29E+05
GASREP	S1-BF	8.58E+06	5.90E+06	6.21E+07	4.24E+07
GASREP	S2-BF	1.17E+07	1.04E+07	4.72E+07	4.31E+07
GASREP	S4-BF	9.11E+06	6.83E+06	4.59E+07	4.25E+07
GASREP	S6-BF	9.81E+06	8.03E+06	4.60E+07	4.25E+07
BNSHUDRZ	S1-BF	3.73E+00	2.71E+00	3.60E+01	3.43E+01
BNSHUDRZ	S2-BF	5.11E+00	5.13E+00	3.46E+01	2.96E+01
BNSHUDRZ	S4-BF	3.64E+00	2.41E+00	3.42E+01	2.93E+01
BNSHUDRZ	S6-BF	4.31E+00	3.89E+00	3.19E+01	2.93E+01
BNBHUDRZ	S1-BF	-	-	-	-
BNBHUDRZ	S2-BF	4.44E+00	3.41E+00	5.55E+01	1.10E+01
BNBHUDRZ	S4-BF	2.23E-01	4.53E-02	1.26E+01	1.91E+00
BNBHUDRZ	S6-BF	1.46E+00	5.94E-01	4.70E+01	1.04E+01
BRTOMBOC	S1-BF	2.38E+03	1.43E+03	6.11E+04	2.47E+04
BRTOMBOC	S2-BF	1.51E+03	9.21E+02	3.49E+04	1.92E+04
BRTOMBOC	S4-BF	1.75E+03	9.99E+02	6.21E+04	2.11E+04
BRTOMBOC	S6-BF	8.88E+02	3.75E+02	2.95E+04	8.21E+03
BRTOLWBC	S1-BF	3.36E+01	2.93E+01	2.70E+03	2.49E+03
BRTOLWBC	S2-BF	3.24E+01	3.00E+01	2.38E+03	2.30E+03
BRTOLWBC	S4-BF	3.12E+01	2.86E+01	2.68E+03	2.62E+03
BRTOLWBC	S6-BF	2.41E+01	2.76E+01	2.06E+03	2.53E+03

Notes:

1 Replicate 1 mean at 10,000 years.

2 Maximum over all 100 Replicate 1 vectors at 10,000 years.

Information Only

Table 16. Brine Flow and Consumption Statistics, Replicate 1

Quantity	Scenario	RPPCR Mean Value[1]	CRA26_IS Mean Value[1]	RPPCR Max Value[2]	CRA26_IS Max Value[2]
WAS_BBALN	S1-BF	2.91E+03	3.28E+03	1.46E+04	1.49E+04
WAS_BBALN	S2-BF	4.91E+03	5.78E+03	1.09E+04	1.34E+04
WAS_BBALN	S4-BF	2.80E+03	3.33E+03	1.07E+04	1.37E+04
WAS_BBALN	S6-BF	4.12E+03	4.93E+03	7.48E+03	9.77E+03
WAS_BBALC	S1-BF	2.67E+03	3.24E+03	5.92E+03	9.21E+03
WAS_BBALC	S2-BF	4.07E+03	5.26E+03	6.24E+03	9.05E+03
WAS_BBALC	S4-BF	2.71E+03	3.34E+03	6.24E+03	1.00E+04
WAS_BBALC	S6-BF	3.69E+03	4.80E+03	5.98E+03	9.22E+03
SRR_BBALN	S1-BF	5.36E+03	6.20E+03	2.50E+04	2.69E+04
SRR_BBALN	S2-BF	1.25E+04	1.54E+04	2.97E+04	3.44E+04
SRR_BBALN	S4-BF	5.58E+03	6.32E+03	2.71E+04	3.81E+04
SRR_BBALN	S6-BF	7.96E+03	1.00E+04	2.27E+04	2.36E+04
SRR_BBALC	S1-BF	6.80E+03	7.84E+03	1.98E+04	2.81E+04
SRR_BBALC	S2-BF	1.24E+04	1.59E+04	2.07E+04	3.08E+04
SRR_BBALC	S4-BF	6.88E+03	7.96E+03	2.02E+04	3.31E+04
SRR_BBALC	S6-BF	9.04E+03	1.13E+04	1.89E+04	2.59E+04
NRR_BBALN	S1-BF	7.02E+03	7.94E+03	3.19E+04	3.79E+04
NRR_BBALN	S2-BF	7.01E+03	7.78E+03	2.77E+04	3.23E+04
NRR_BBALN	S4-BF	6.95E+03	7.72E+03	2.78E+04	3.25E+04
NRR_BBALN	S6-BF	6.94E+03	7.62E+03	2.69E+04	3.26E+04
NRR_BBALC	S1-BF	8.60E+03	9.95E+03	2.46E+04	3.27E+04
NRR_BBALC	S2-BF	8.54E+03	9.82E+03	2.39E+04	3.24E+04
NRR_BBALC	S4-BF	8.58E+03	9.86E+03	2.36E+04	3.22E+04
NRR_BBALC	S6-BF	8.50E+03	9.74E+03	2.49E+04	3.28E+04
WRR_BBALN	S1-BF	1.24E+04	3.19E+03	4.28E+04	1.16E+04
WRR_BBALN	S2-BF	1.21E+04	3.05E+03	4.54E+04	1.16E+04
WRR_BBALN	S4-BF	1.24E+04	3.18E+03	4.54E+04	1.16E+04
WRR_BBALN	S6-BF	1.22E+04	3.11E+03	4.54E+04	1.16E+04
WRR_BBALC	S1-BF	1.60E+04	4.12E+03	4.84E+04	1.25E+04
WRR_BBALC	S2-BF	1.56E+04	3.96E+03	4.55E+04	1.27E+04
WRR_BBALC	S4-BF	1.60E+04	4.12E+03	4.51E+04	1.25E+04
WRR_BBALC	S6-BF	1.58E+04	4.02E+03	4.55E+04	1.27E+04

Notes:

1 Replicate 1 mean at 10,000 years.

2 Maximum over all 100 Replicate 1 vectors at 10,000 years.

Information Only

5.5.1 Brine Flow into the Repository

Brine flows into the repository are shown in Figure 88 through Figure 91. Brine flow into the repository is decreased for all reported scenarios in CRA26_IS in comparison to RPPCR with means decreased more for scenarios without an E1 intrusion.

5.5.2 Net Brine Flow into and Gas Flow out of the Repository

Net brine flows into the repository and net gas flows out of the repository are shown for multiple scenarios in Figure 92 and Figure 93, respectively. Over all reported scenarios, CRA26_IS exhibits less net brine inflow and less net gas outflow from the repository in comparison to RPPCR.

5.5.3 Brine and Gas Flow across Panel Closure Systems

To demonstrate fluid communication across repository areas, brine and gas flows are measured across the panel closure systems (PCS) that separate the a) South Rest-of-Repository from the North Rest-of-Repository, b) North Rest-of-Repository from the South Operations Area, and c) West Rest-of-Repository from the West Operations Area. Only results from the undisturbed case are shown as there is little impact from intrusions on these fluid flows. Figure 94 and Figure 95 show the mean brine and gas flow between the South Rest-of-Repository and the North Rest-of-Repository. In this PCS, North to South flow is into the South Rest-of-Repository and South to North flow is into the North Rest-of-Repository. Brine flows are seen to be predominantly North to South through the Lower DRZ and highly similar while gas flows are seen to be predominantly South to North through the Upper DRZ and slightly increased for CRA26_IS in comparison to RPPCR. Figure 96 and Figure 97 show the mean brine and gas flow between the North Rest-of-Repository and the South Operations Area. In this PCS, North to South flow is into the waste area and South to North flow is out of the waste area. Brine flows are seen to be predominantly North to South through the Lower DRZ and highly similar while gas flows are seen to be predominantly South to North through the Upper DRZ and also highly similar for CRA26_IS in comparison to RPPCR. Figure 98 and Figure 99 show the brine and gas flows between the West Rest-of-Repository and the West Operations Area. In this PCS, South to North flow is into the waste area, North to South flow is out of the waste area. Brine flows are seen to be predominantly North to South through the Lower DRZ and substantially decreased while gas flows are also seen to be predominantly North to South through the Upper DRZ and substantially decreased for CRA26_IS in comparison to RPPCR.

5.5.4 Brine Flow up the Shaft

Brine flows up the shaft are shown in Figure 100 through Figure 103. Brine flows up the shaft continue to be very small in volume. Brine flow means up the shaft are slightly decreased over all reported scenarios for CRA26_IS in comparison to RPPCR.

Information Only

5.5.5 Brine Flow up the Borehole

Cumulative brine flow up the borehole, as measured at marker bed 138, is shown in Figure 104 through Figure 106. Brine flow means up the borehole are decreased over all reported scenarios for CRA26_IS in comparison to RPPCR.

5.5.6 Brine Flow in Anhydrite Layers

Cumulative brine flow in all anhydrite layers away from the repository and cumulative brine flow in all anhydrite layers across the land withdrawal boundary are shown for multiple scenarios in Figure 107 and Figure 108, respectively. Over all reported scenarios, CRA26_IS and RPPCR experience similar flows into and out of the anhydrite layers.

5.5.7 Brine Inflow and Consumption by Waste Area

The net brine flow into the representative waste panel shown in Figure 109 is greater for CRA26_IS over all reported scenarios in comparison to RPPCR and the magnitude of brine consumption shown in Figure 110 for the representative waste panel follows the same trend with mean consumption outpacing net inflow. The same behavior is observed for the South and North Rest-of-Repository (Figure 111 through Figure 114). Due to the significant size difference in the West Rest-of-Repository between CRA26_IS (2 panels) and RPPCR (9 panels), the net brine inflow and consumption for RPPCR significantly exceeds that seen for CRA26_IS (Figure 115 and Figure 116).

5.5.8 Sensitivity Analysis

Variability in brine flow into the repository is controlled by the same parameters that impact brine saturation (S_HALITE:POROSITY and DRZ_1:PRMX_LOG). Section 9.4 of Appendix A provides the truncated Ranked Regression Analysis for the brine flow into the repository.

Information Only

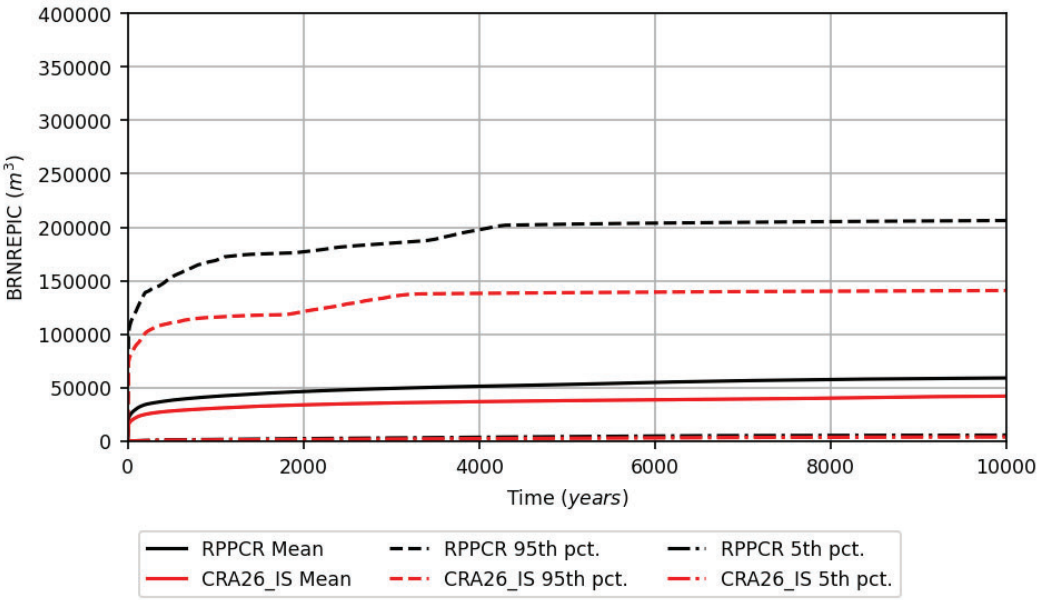

Figure 88. Brine flow into repository means with percentiles, Replicate 1, Scenario S1-BF

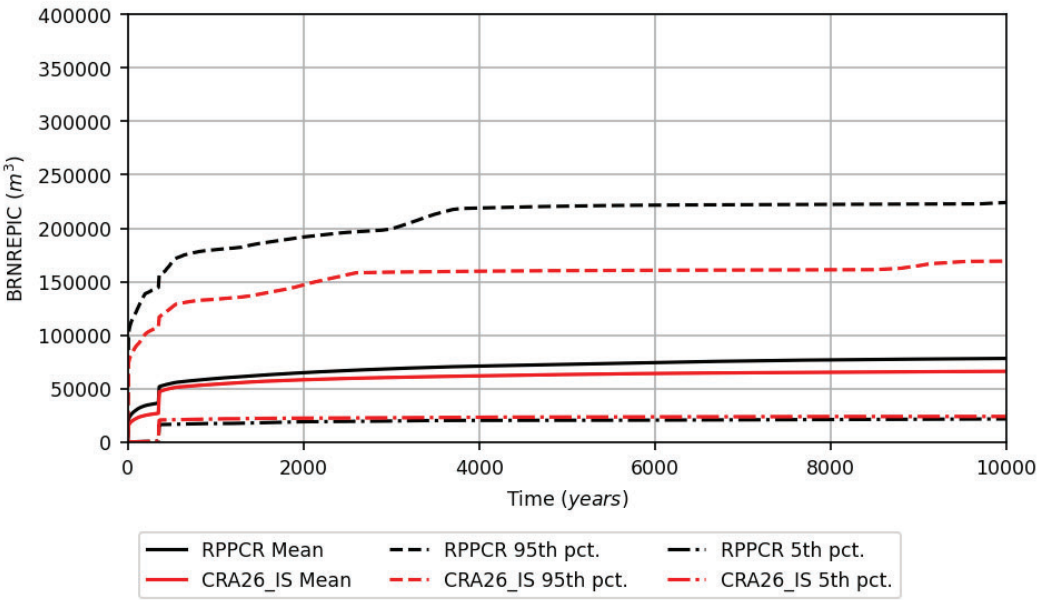

Figure 89. Brine flow into repository means with percentiles, Replicate 1, Scenario S2-BF

Information Only

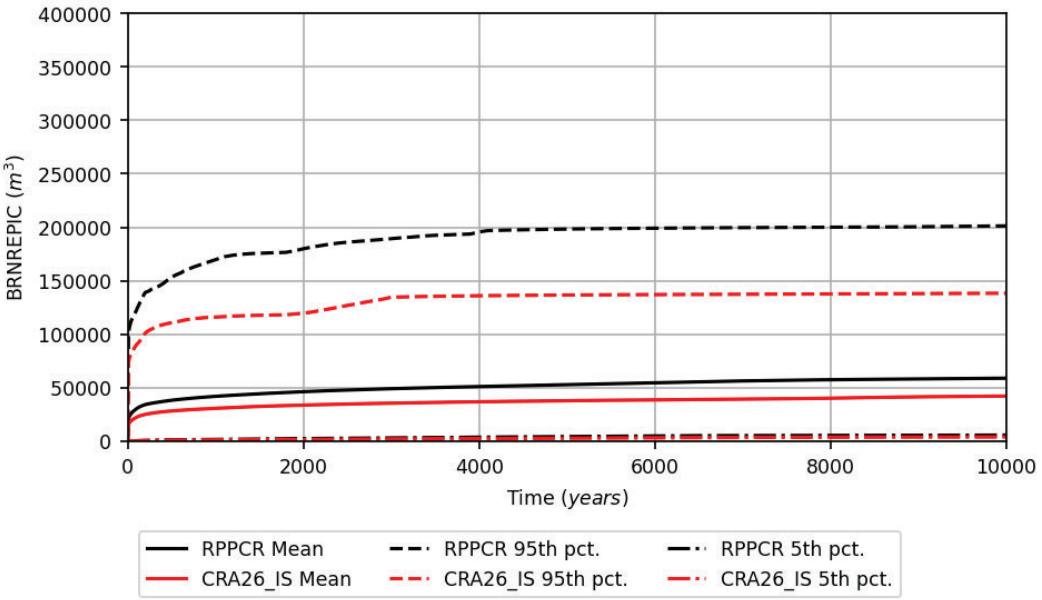

Figure 90. Brine flow into repository means with percentiles, Replicate 1, Scenario S4-BF

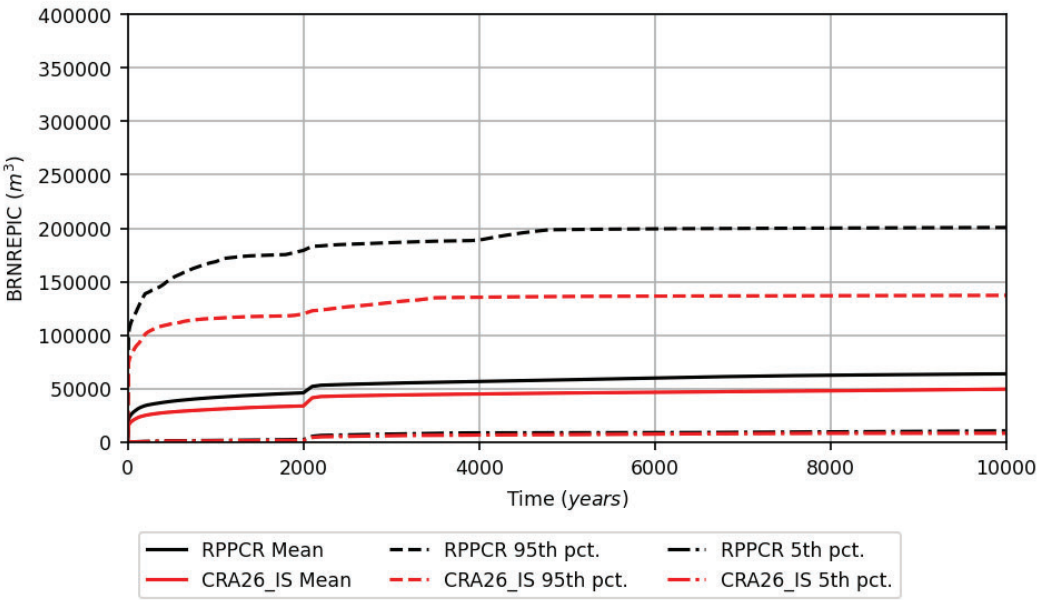

Figure 91. Brine flow into repository means with percentiles, Replicate 1, Scenario S6-BF

Information Only

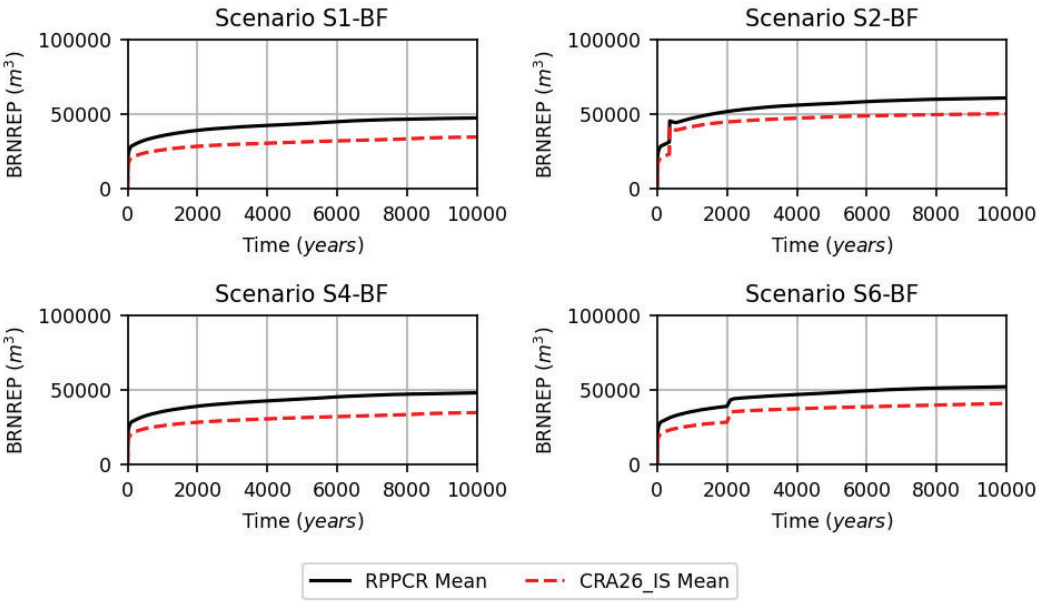

Figure 92. Net brine flow means into the repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

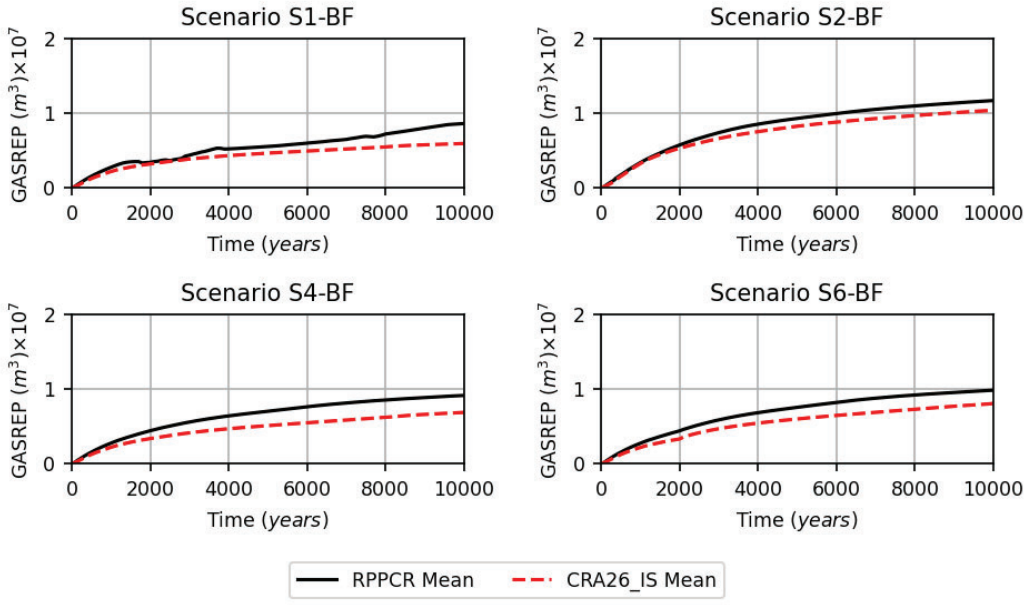

Figure 93. Net gas flow means out of the repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

Information Only

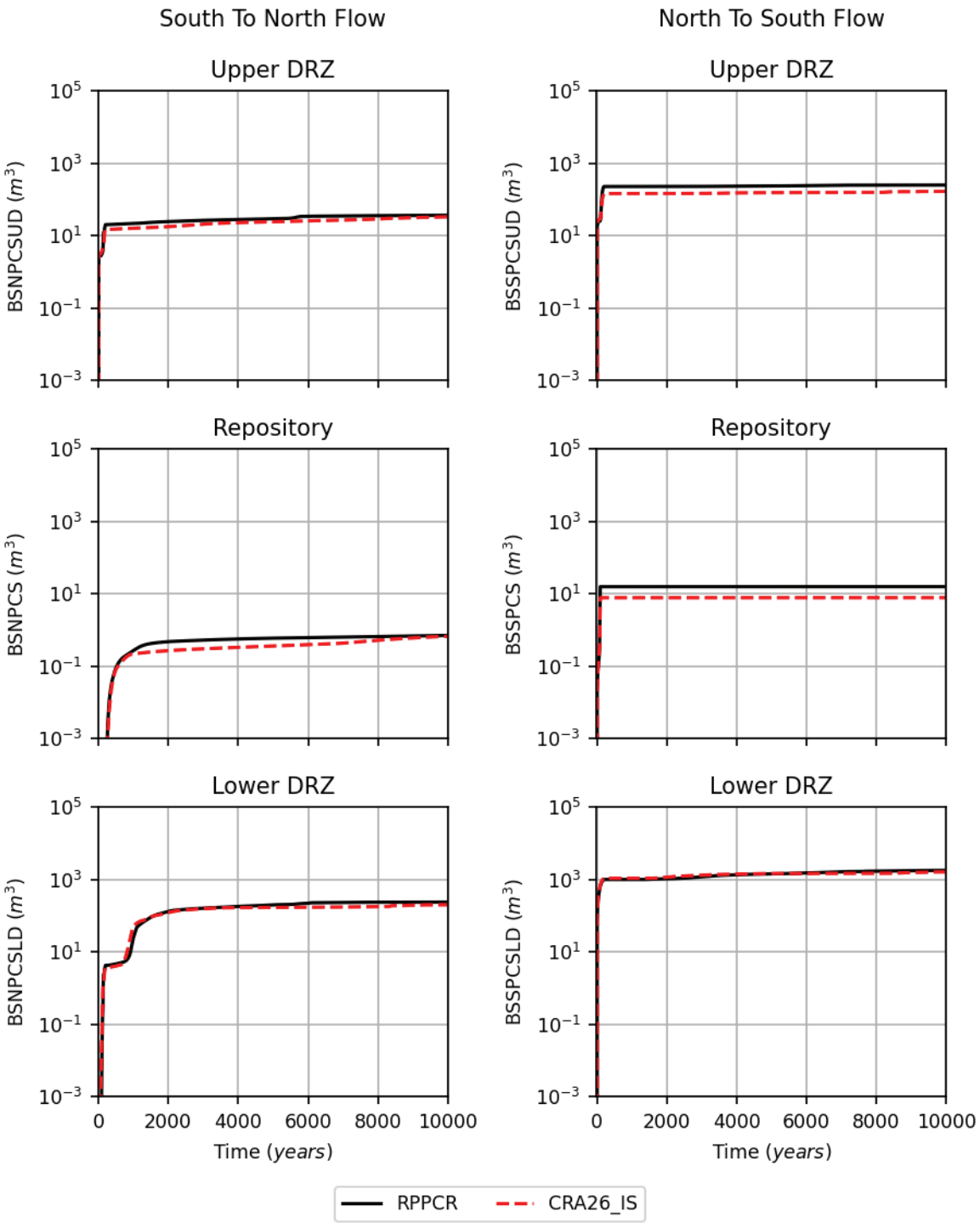

Figure 94. Brine flow means across the South Rest-of-Repository PCS, Replicate 1, Scenario S1-BF

Information Only

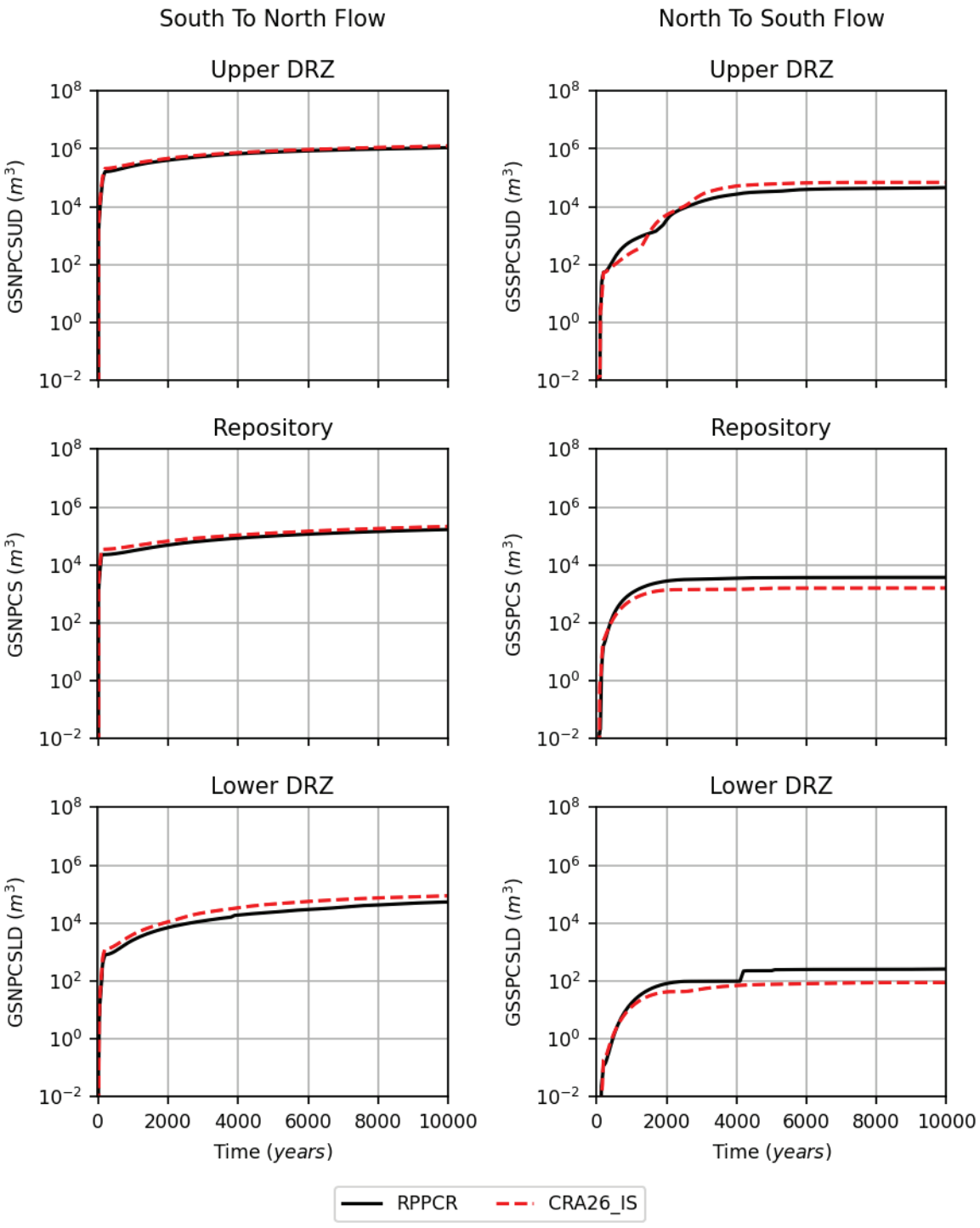

Figure 95. Gas flow means across the South Rest-of-Repository PCS, Replicate 1, Scenario S1-BF

Information Only

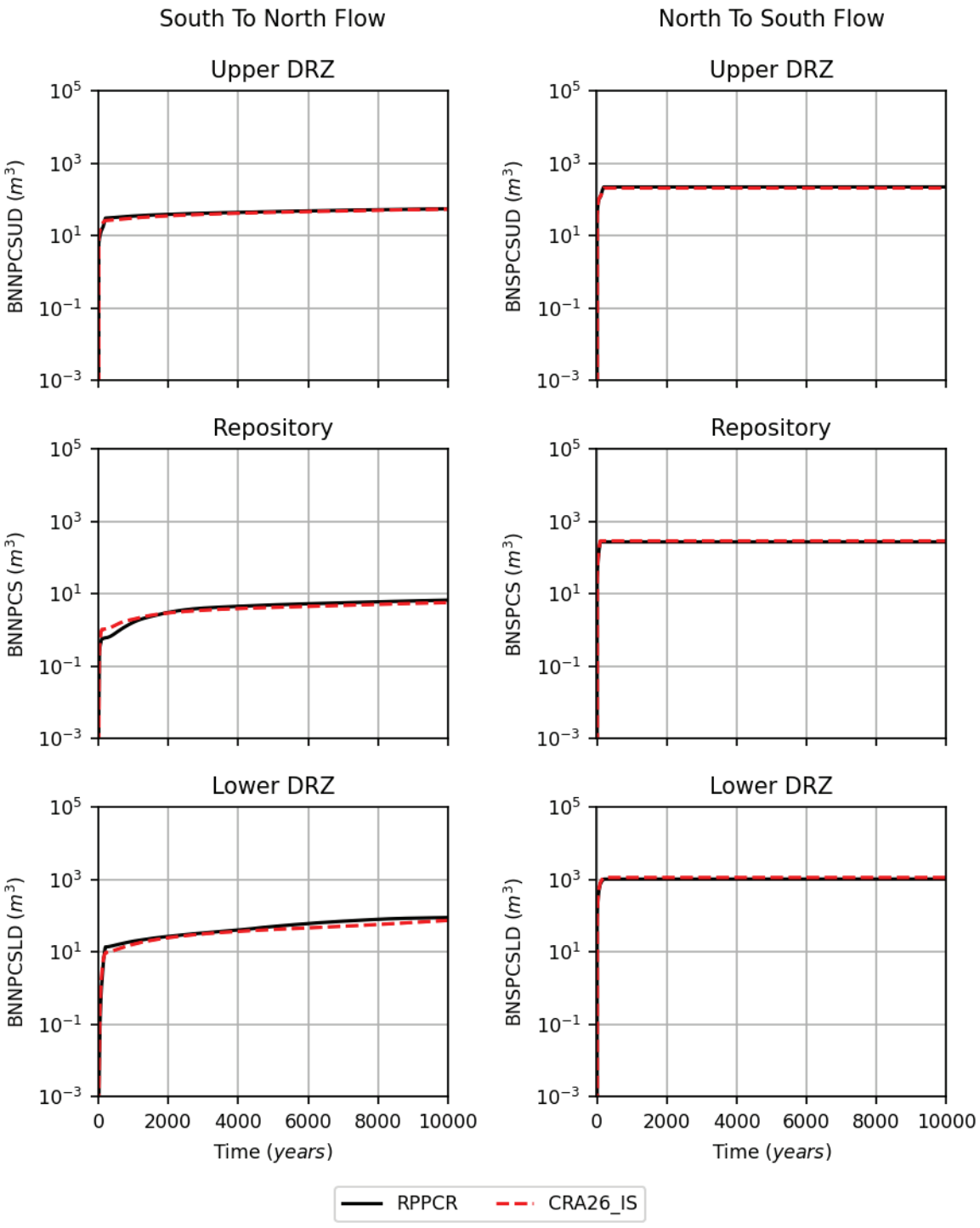

Figure 96. Brine flow means across the North Rest-of-Repository PCS, Replicate 1, Scenario S1-BF

Information Only

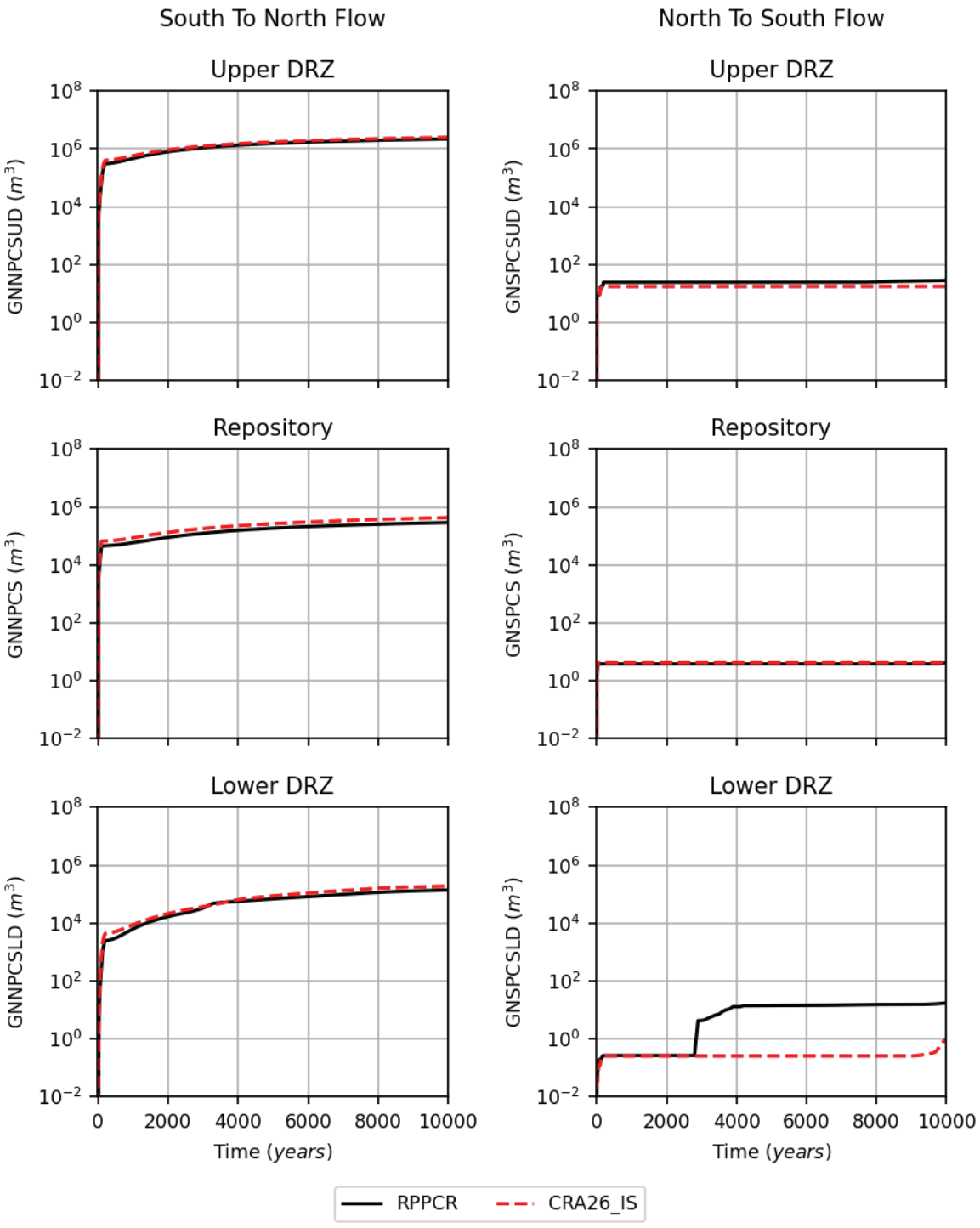

Figure 97. Gas flow means across the North Rest-of-Repository PCS, Replicate 1, Scenario S1-BF

Information Only

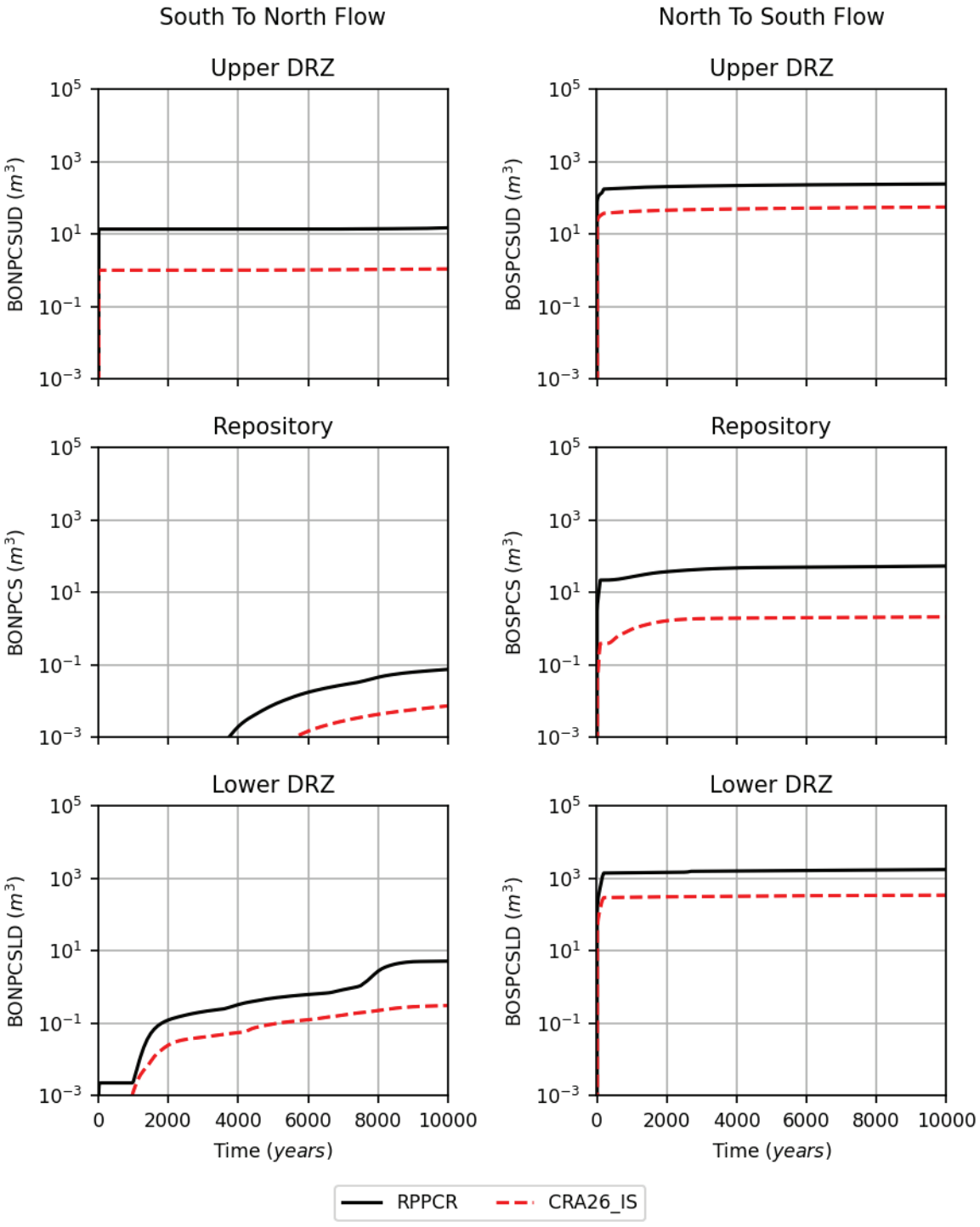

Figure 98. Brine flow means across the West Rest-of-Repository PCS, Replicate 1, Scenario S1-BF

Information Only

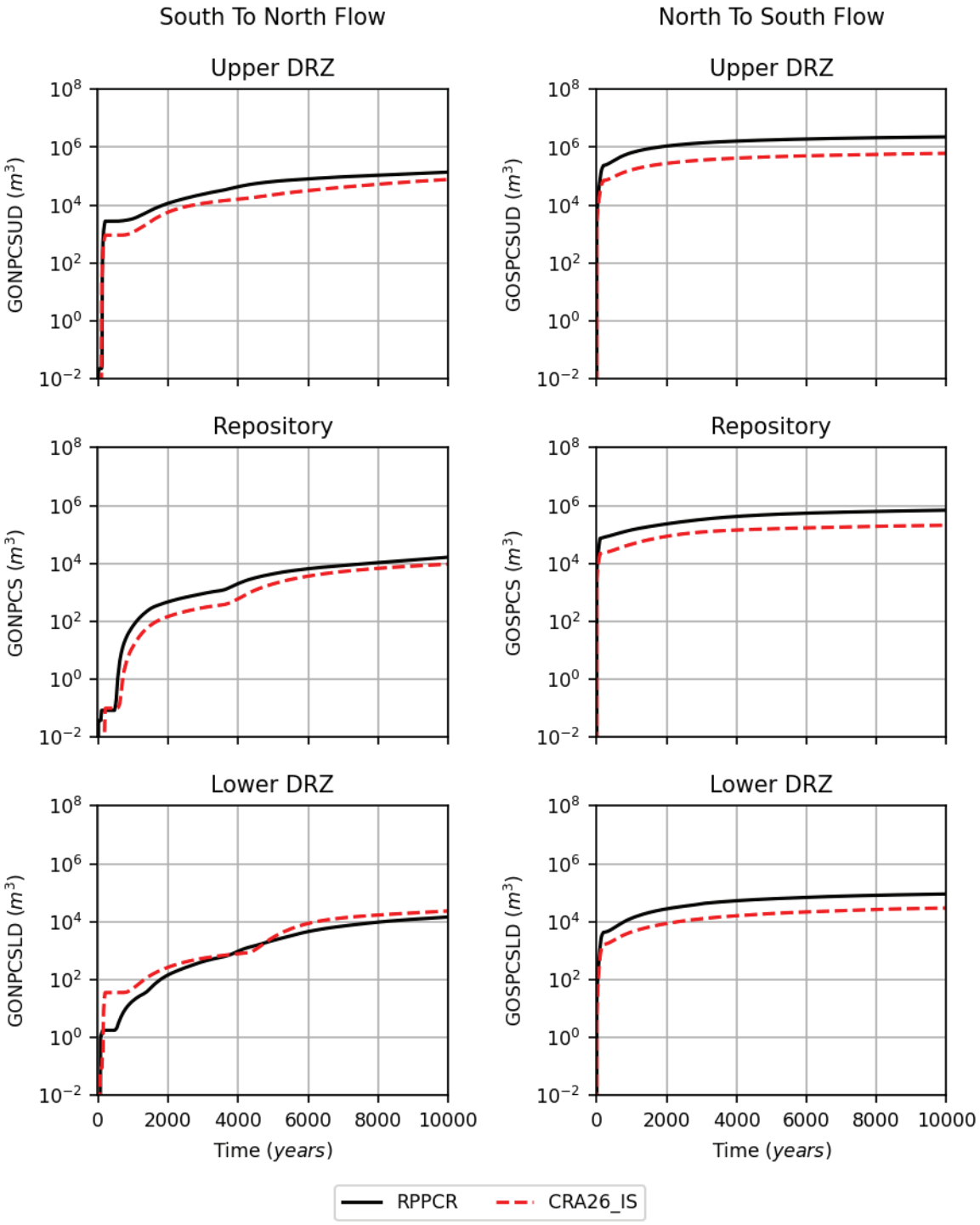

Figure 99. Gas flow means across the West Rest-of-Repository PCS, Replicate 1, Scenario S1-BF

Information Only

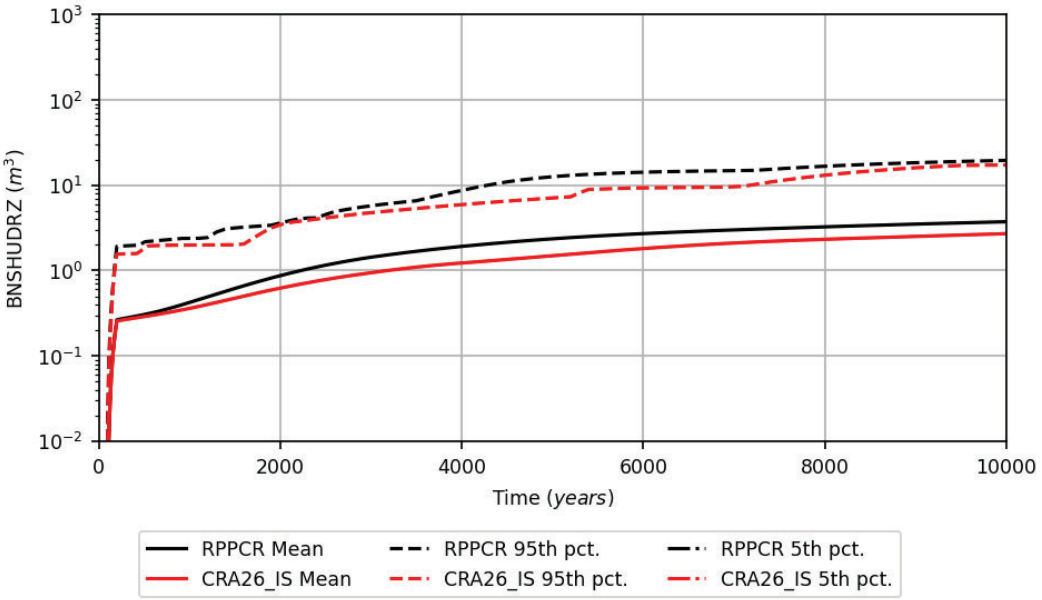

Figure 100. Brine flow means with percentiles up the Shaft, Replicate 1, Scenario S1-BF

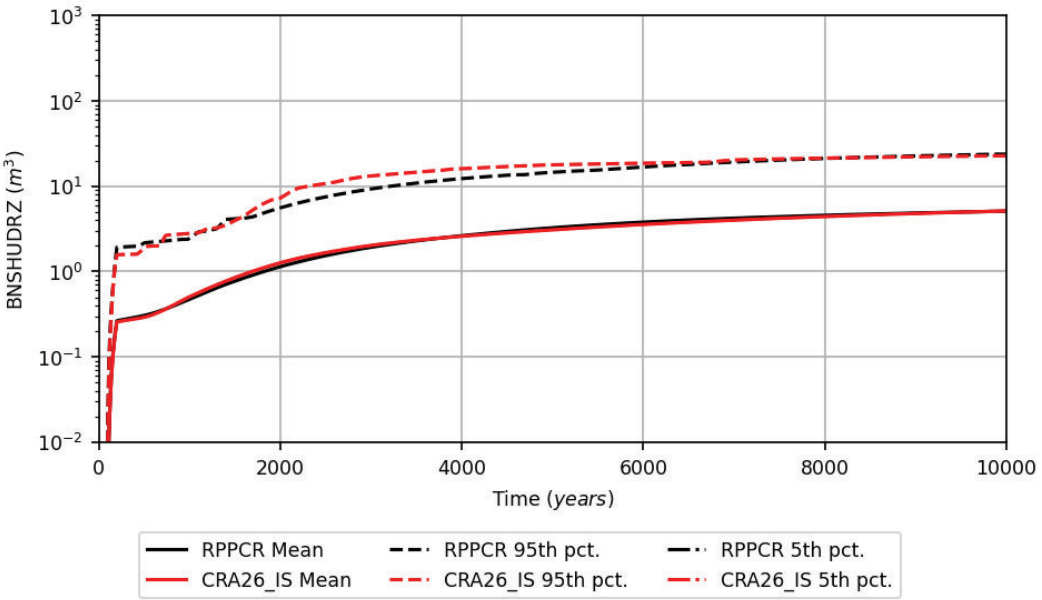

Figure 101. Brine flow means with percentiles up the Shaft, Replicate 1, Scenario S2-BF

Information Only

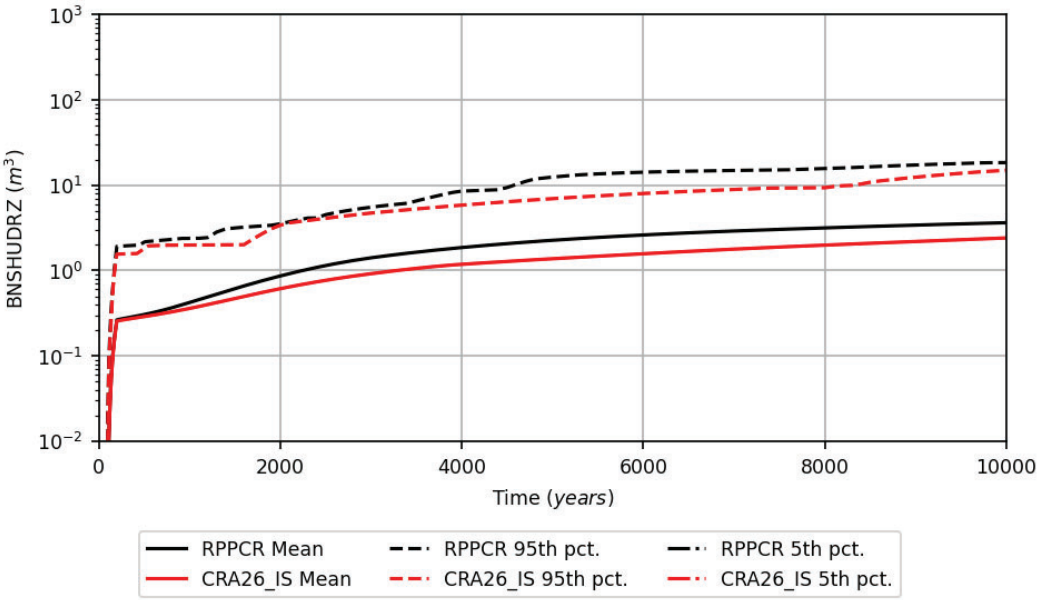

Figure 102. Brine flow means with percentiles up the Shaft, Replicate 1, Scenario S4-BF

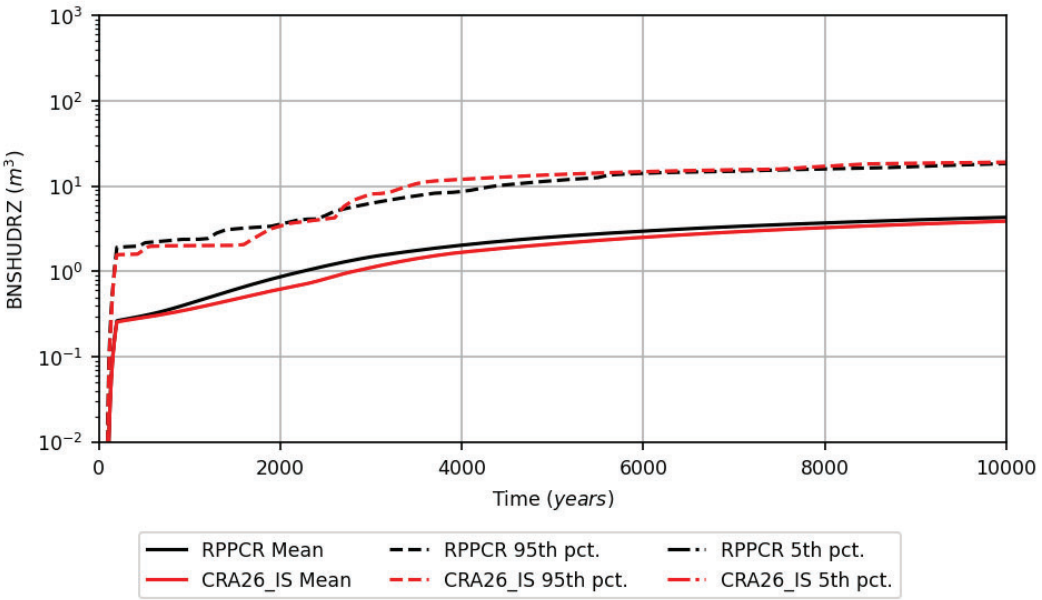

Figure 103. Brine flow means with percentiles up the Shaft, Replicate 1, Scenario S6-BF

Information Only

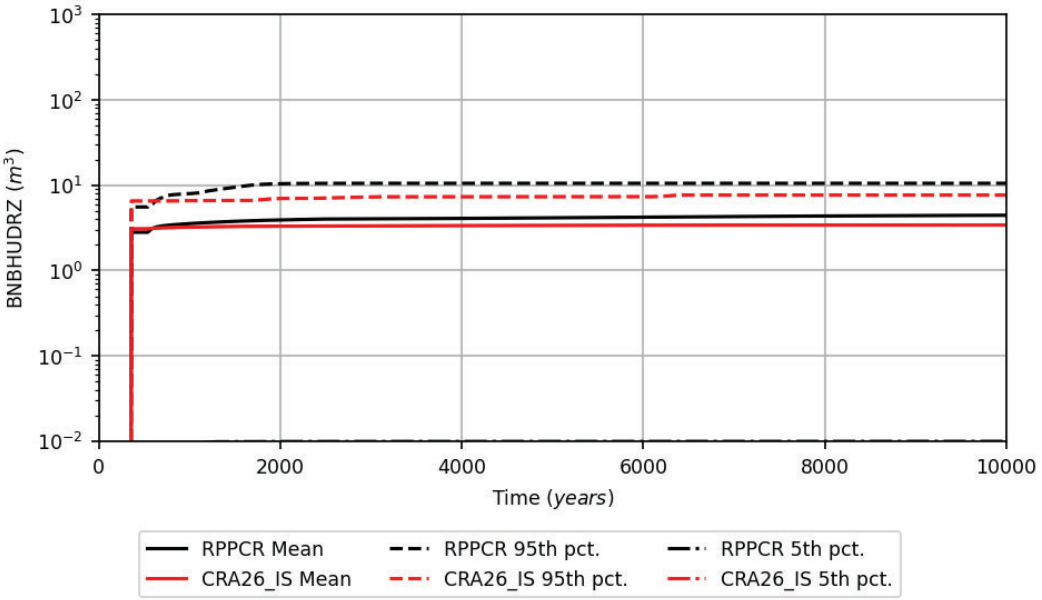

Figure 104. Brine flow means with percentiles up the Borehole, Replicate 1, Scenario S2-BF

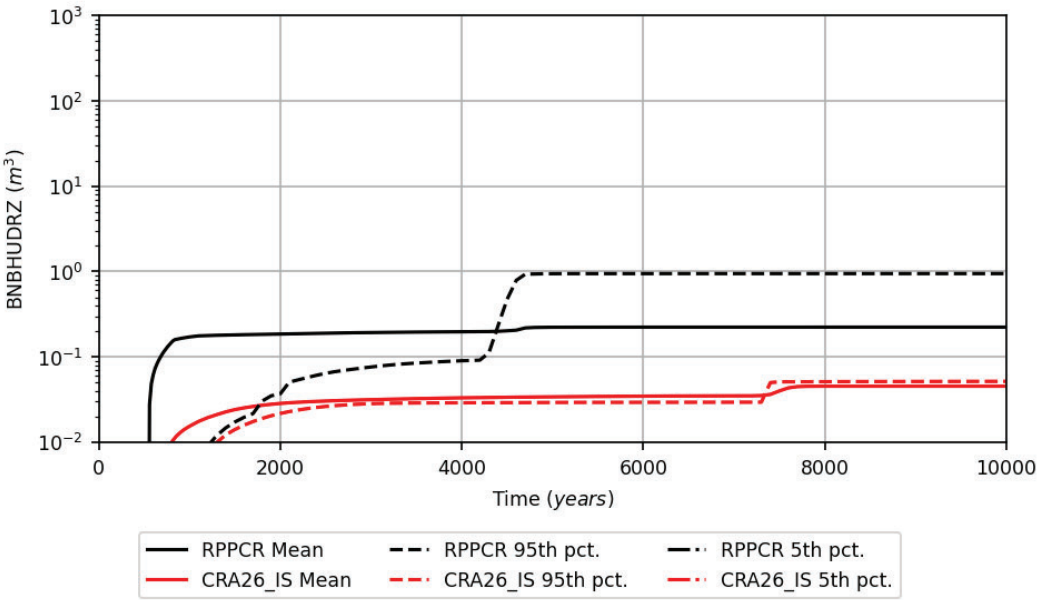

Figure 105. Brine flow means with percentiles up the Borehole, Replicate 1, Scenario S4-BF

Information Only

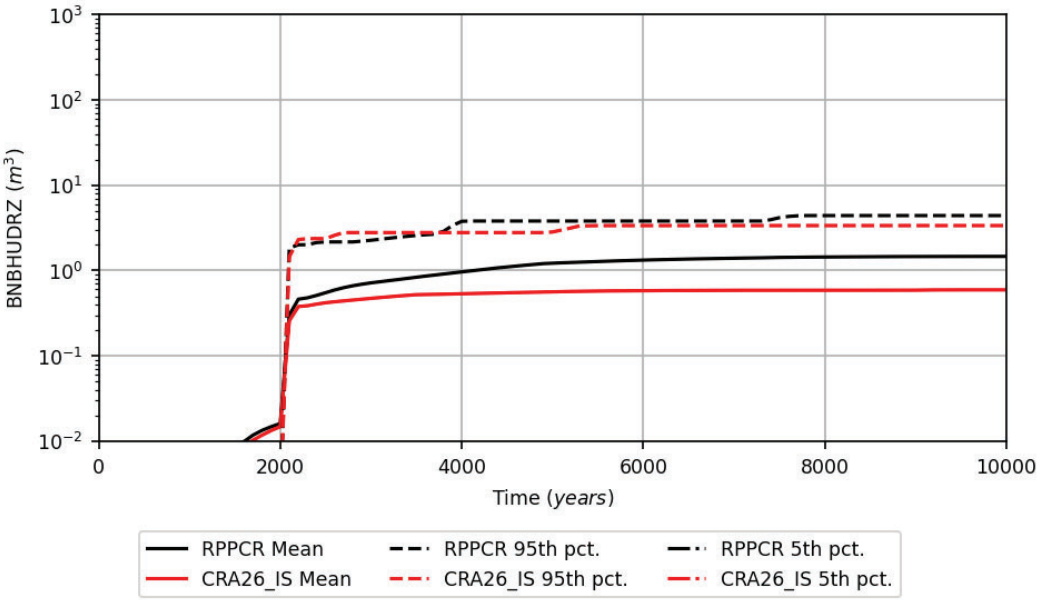

Figure 106. Brine flow means with percentiles up the Borehole, Replicate 1, Scenario S6-BF

Information Only

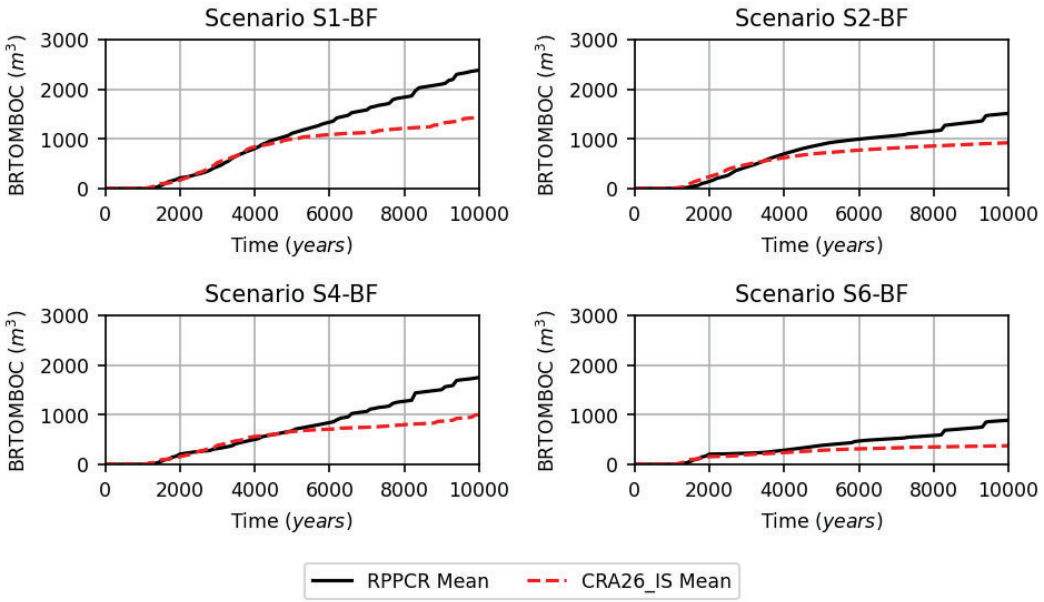

Figure 107. Brine flow means away from the Repository in all anhydrite layers, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

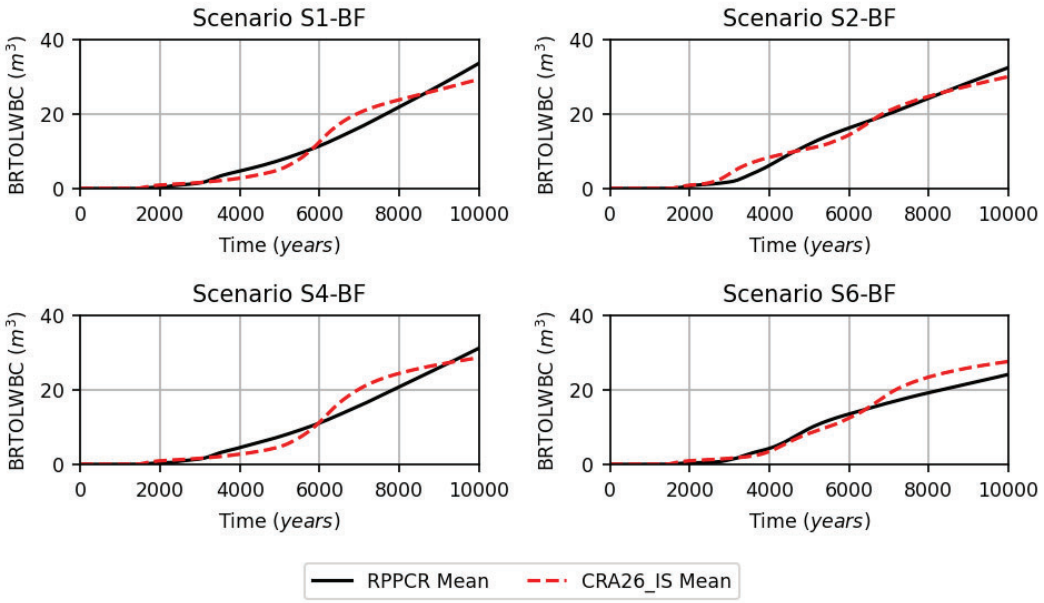

Figure 108. Brine flow means in all anhydrite layers across the land withdrawal boundary, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

Information Only

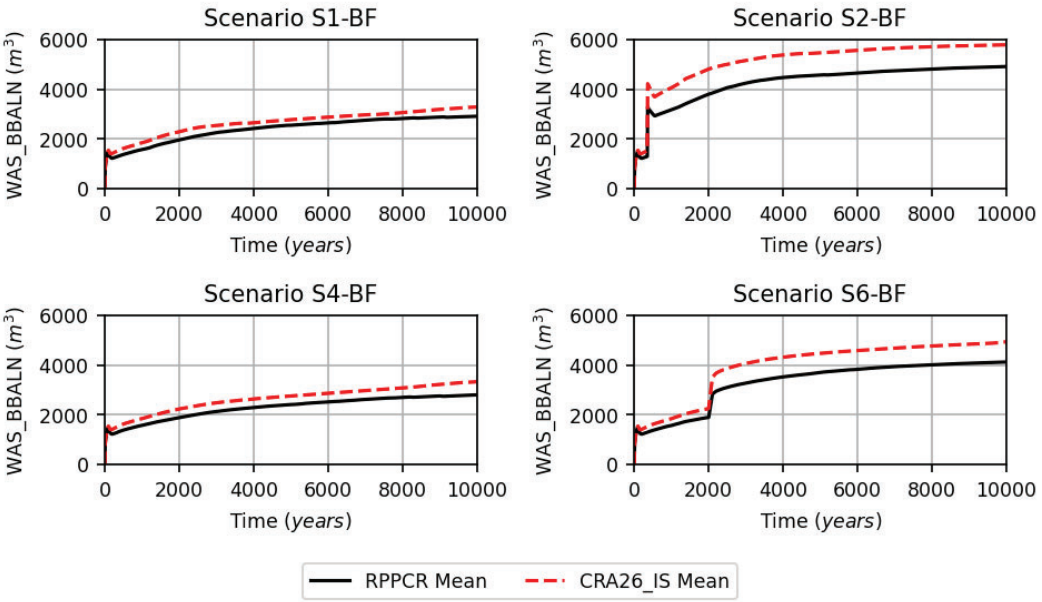

Figure 109. Net brine flow means into the representative waste panel, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

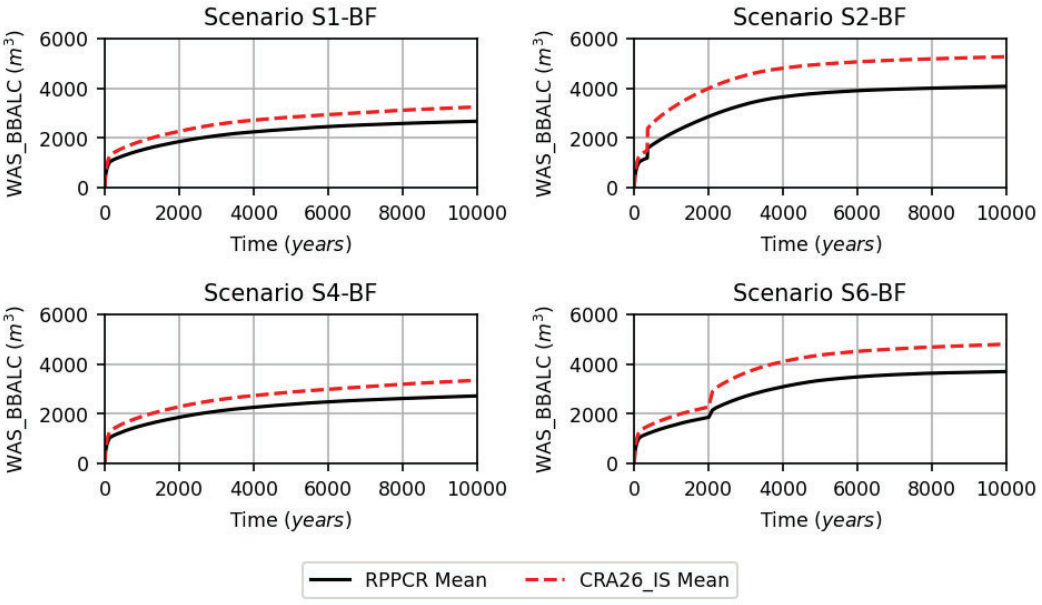

Figure 110. Brine consumption means in the representative waste panel, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

Information Only

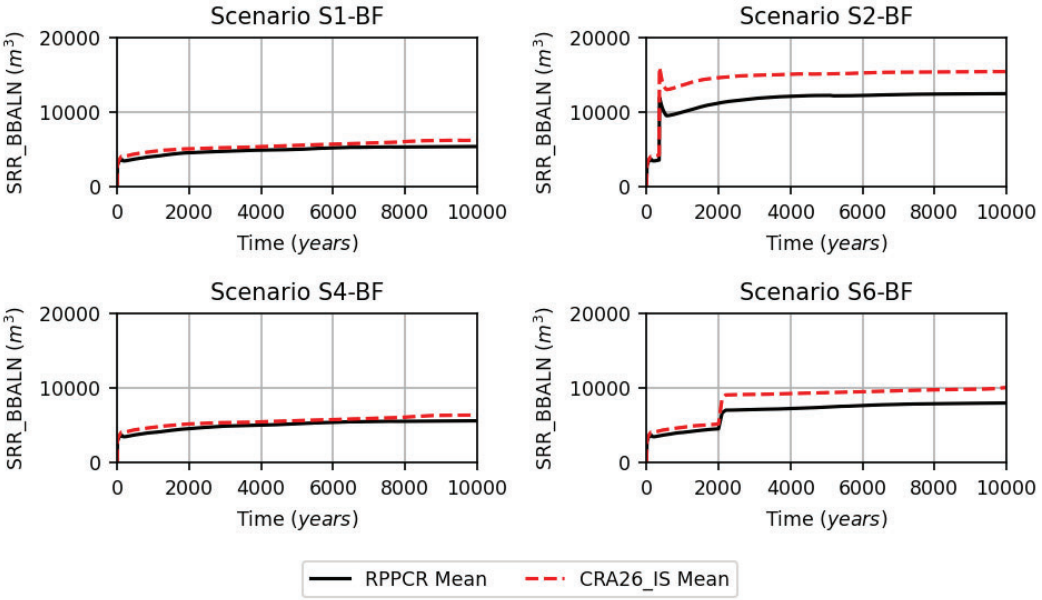

Figure 111. Net brine flow means into the South Rest-of-Repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

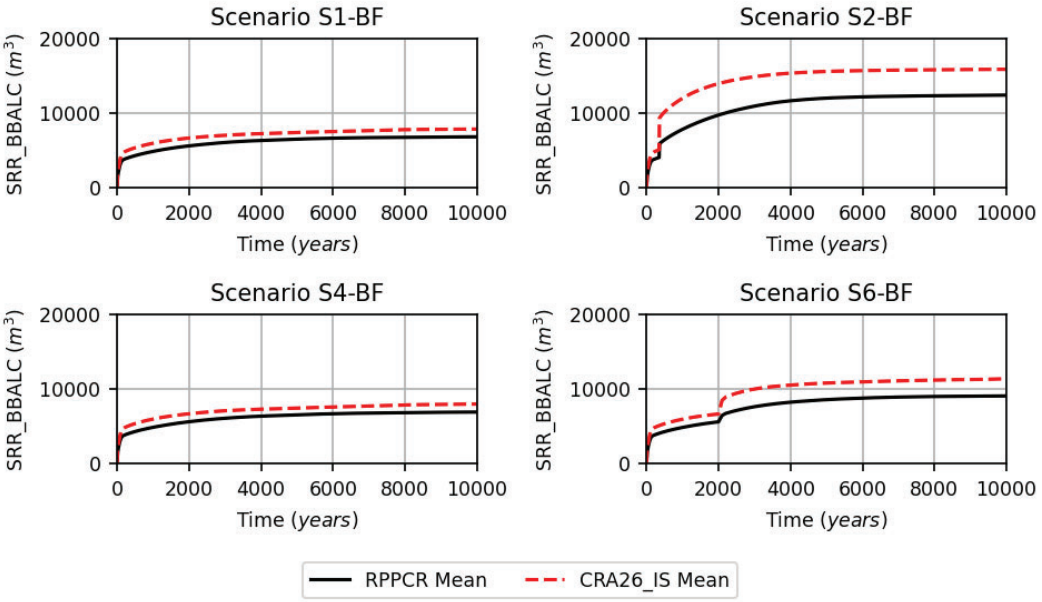

Figure 112. Brine consumption means in the South Rest-of-Repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

Information Only

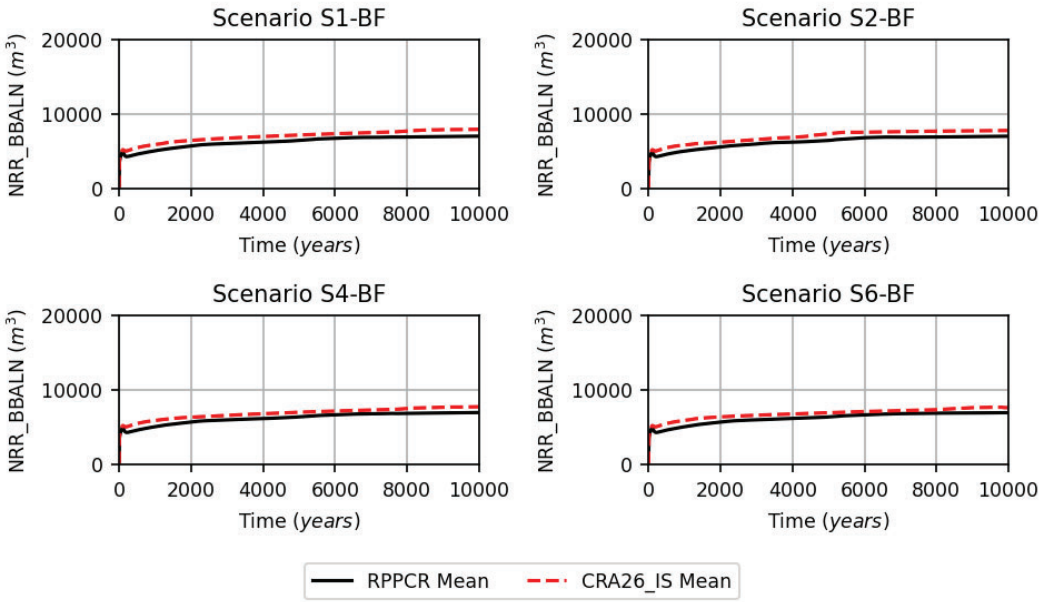

Figure 113. Net brine flow means into the North Rest-of-Repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

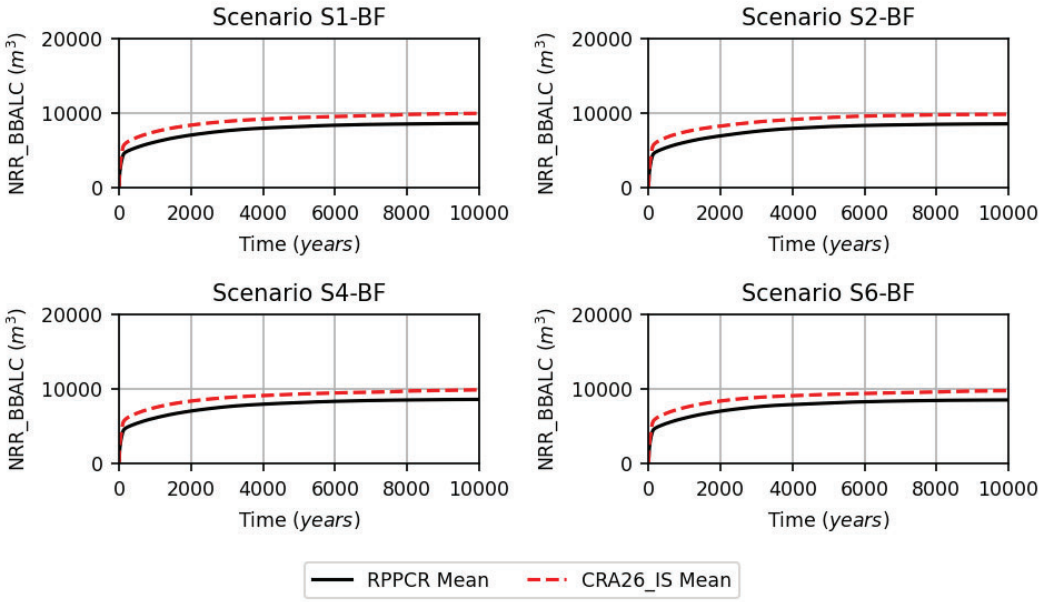

Figure 114. Brine consumption means in the North Rest-of-Repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

Information Only

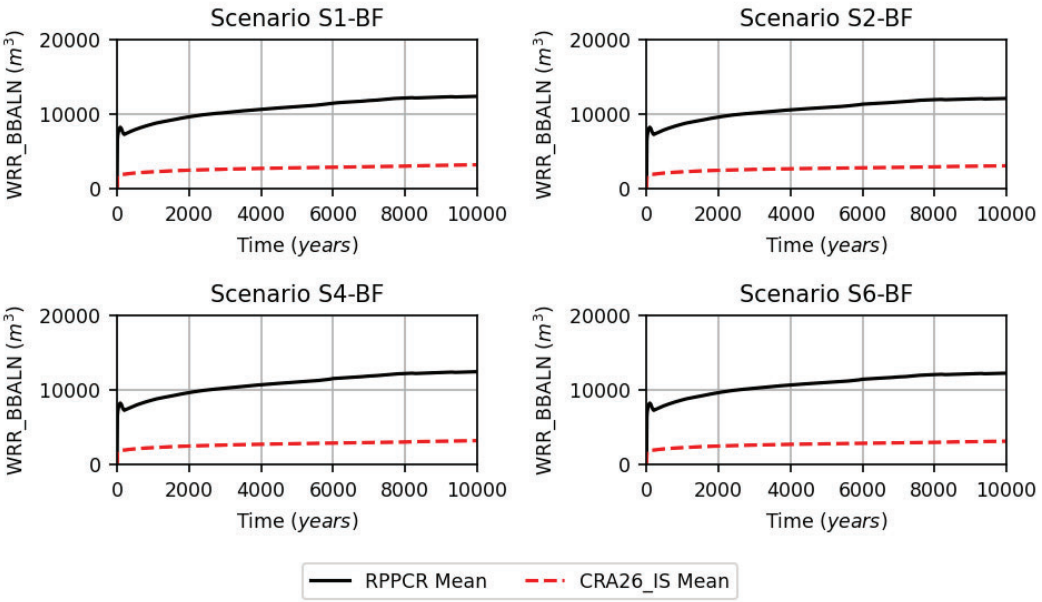

Figure 115. Net brine flow means into the West Rest-of-Repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

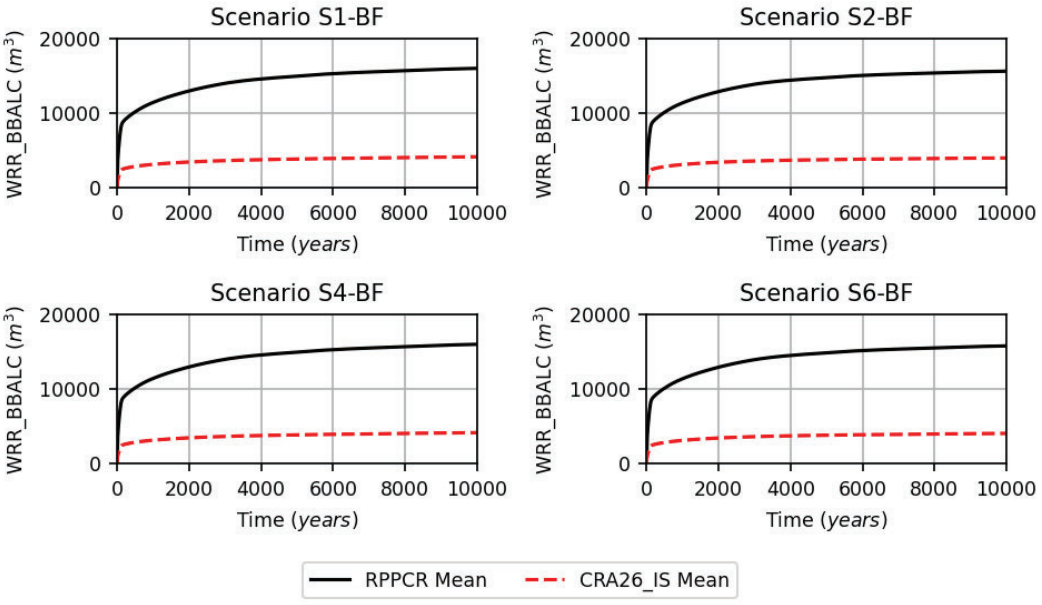

Figure 116. Brine consumption means in the West Rest-of-Repository, Replicate 1, Scenarios S1-BF, S2-BF, S4-BF, and S6-BF

Information Only

6.0 DISCUSSION

Changes incorporated into the CRA26_IS from the RPPCR are delineated in Section 2.0. The CRA26_IS Salado flow model represents the repository in a 12-panel interim state configuration based on as-built excavation footprint dimensions, plans for future excavations, and the planned change for alternative panel closure locations for Panels 1 and 2. Other grid adjustments are incorporated into flared grid cells exterior to the modeled excavations to conservatively reflect distances from the outermost repository excavations to the nearest land withdrawal boundary.

Changes to repository parameters for volumes and areas related to the revised repository dimensions are incorporated along with a revised inventory estimate. The inventory estimate for CRA26_IS is based on a projected waste storage capacity of 157,837.92 m^3 and reduced in comparison to RPPCR and the LWA volume limit. The total quantity of iron is slightly decreased, the total quantity of CPR is slightly increased, and the total quantity of decay heat in the form of alpha-emitting radionuclides is increased for CRA26_IS in comparison to RPPCR. However, the concentration of inventory from a gas generation source term perspective for CRA26_IS is substantially increased by a factor of approximately 1.5 for iron/CPR and by a factor of approximately 2 for decay heat in comparison to RPPCR.

Baseline actinide solubility, solubility uncertainty, and colloid enhancement parameter modifications were incorporated into the CRA26_IS model. Additionally, MgO hydration parameters were incorporated and increased for CRA26_IS in comparison to RPPCR.

Minor capillary pressure modifications were incorporated for CRA26_IS to employ the use of a minimum capillary pressure of 1 atm for the modified van Genuchten-Parker capillary pressure function. The RELP_MOD sampled parameter implements the use of van Genuchten-Parker in half of the realizations where capillary pressure was traditionally allowed to go to zero at one minus the residual gas saturation (CAP_MOD=2). This contrasts with the 2nd modified Brooks-Corey capillary pressure function which is employed in the remaining half of the realizations and effectively implements an order of magnitude higher minimum capillary pressure at brine saturations beyond one minus the residual gas saturation. The capillary pressure modification parameter (CAP_MOD=6) was employed in the marker/anhydrite beds to address conditions that initiate high pressure gas flow at near fully-brine saturated conditions to dampen oscillatory flow behavior with a beneficial impact on numerical stability and the reduction of mass balance errors without any appreciable impact on cumulative brine/gas flow into or out of these material regions.

An assessment of the impact of the model inputs described above was performed with discussion regarding the impacts on the Salado flow solution to follow. First, the mean net brine inflows into the representative waste panel, South Rest-of-Repository, and North Rest-of-Repository are larger for CRA26_IS due to the as-built dimensions and associated grid modifications that increase the area/volume of these regions in comparison to RPPCR. The increased area correlates to an increase in the brine available within the adjacent DRZ which flows into these waste areas. On a per panel basis, the same is true for the West Rest-of-Repository, but the West Rest-of-Repository in CRA26_IS consists of only two panels whereas for RPPCR it consists of nine panels. Thus, the net brine inflow for the West Rest-of-Repository is significantly larger for RPPCR and contributes

Information Only

such that the total net brine flow into the repository is greater for RPPCR in comparison to CRA26_IS. In all reported scenarios and on a volume-normalized basis, the mean brine consumption resulting from chemical reactions within each of the waste areas is greater for CRA26_IS in comparison to RPPCR due to the effects of the increased MgO hydration rate and increased gas generation rates coupled to higher concentrations of iron, CPR, and decay heat in the waste areas. As a result of the consumption of brine outpacing the net inflow of brine into waste areas for CRA26_IS, brine saturations are observed to be significantly decreased over all reported waste areas and scenarios in comparison to RPPCR. Lower brine saturation in the South and West Operations and Experimental areas is correlated to adjacent waste areas experiencing a higher magnitude of brine consumption and lower saturations over time for CRA26_IS.

Primarily due to the decreased size of the West Rest-of-Repository, total gas generation from all sources is lesser for CRA26_IS in comparison to RPPCR. However, when gas generation is normalized to the repository waste volume (REFCON:VREPOS), all sources of gas generation are observed to be proportionally greater for CRA26_IS, particularly in scenarios with a Castile intrusion and associated higher post-intrusion brine saturations. Again, inventory concentrations contributing to gas generation are higher in CRA26_IS such that with available brine, volume normalized gas generation outpaces that seen in RPPCR. The quantity of total gas flow out of the repository areas is less for CRA26_IS as total gas generation is less. Mean brine pressures over all waste areas and scenarios without a Castile intrusion are generally lower for CRA26_IS in comparison to RPPCR due primarily to the reduced brine saturation facilitated by increased brine consumption in relation to net brine inflow. However, for scenarios with a Castile intrusion, the increased brine saturation and associated gas generation for CRA26_IS that is supported by a higher concentration of gas generating inventory constituents leads to marginally higher mean and max pressures over RPPCR. Brine flows away from the repository (up the borehole, shaft, and out through anhydrite layers) are similar between the CRA26_IS and RPPCR and relatively low in volume.

Information Only

7.0 SUMMARY

Due to their primary importance with respect to downstream WIPP PA calculations, the predicted brine pressures and brine saturations within the waste areas of the repository over the representative scenarios are summarized for the CRA26_IS in comparison to the RPPCR. Brine flow away from the repository toward the Culebra through the shaft and an intrusion borehole are examined and concluded to be relatively small and likely insignificant driver for releases.

Mean and median pressures have generally decreased in the CRA26_IS over the RPPCR values for all reported areas and scenarios except for the S2-BF pressures in the representative waste panel, South Rest-of-Repository, and North Rest-of-Repository. The maximum pressure over time for any individual vector is generally increased for CRA26_IS in comparison to RPPCR. Mean and maximum saturations for CRA26_IS are reduced in comparison to RPPCR for all reported areas and scenarios. The lower saturations due to increased relative brine consumption and reduced brine inflow in the West Rest-of-Repository are seen as the major drivers for the reduced pressures in non-Castile intruded scenarios. The similar brine saturations observed after intrusion coupled with elevated inventory concentrations of gas-generating constituents resulting in increased gas generation for CRA26_IS are seen as the major drivers for the increased pressures in comparison to RPPCR for scenarios with Castile intrusions.

The primary effects of changes associated with CRA26_IS are a decrease in brine pressure within all waste areas for undisturbed and intruded scenarios without a Castile intersection, a slight increase in brine pressure for all but the westernmost waste areas for intruded scenarios with a Castile intersection, and a substantial decrease in brine saturation in all waste areas over all scenarios.

Information Only

8.0 REFERENCES

Bollinger, M. 2024. Letter to Ms. L. Veal. Subject: Planned Change Request for the use of Replacement Panels 11 and 12. March 12, 2024. CBFO:ERCD:MG:SV:24-0168. Carlsbad, NM: U.S. DOE, Carlsbad Field Office.

Brunell, S. 2025. Update to CRA-2026 PA Input Parameters Due to Revised WIPP Repository Dimensions. EIMS-0004799007. Carlsbad, NM: Sandia National Laboratories.

Day, B. 2025a. BRAGFLO Grid Development for CRA-2026. EIMS-0004447000. Carlsbad, NM: Sandia National Laboratories.

Day, B. 2025b. Recommendation and Justification for Implementing a Lower Bound on Capillary Pressure in Marker Bed Materials S_MB139, S_ANH_AB, and S_MB138 using the CAP_MOD and PO_MIN Parameters for CRA-2026. EIMS-0004430534. Carlsbad, NM: Sandia National Laboratories.

Domski, P. 2025a. Parameter Memorandum: Uncertainty Analysis of Actinide Solubilities for the 2026 Compliance Recertification Application (CRA-2026). EIMS-0004447122. Carlsbad, NM: Sandia National Laboratories.

Domski, P. 2025b. Th(IV), Np(V), and Am(III) Baseline Solubilities for the 2026 WIPP Compliance Recertification Application Performance Assessment Interim-State Analysis (CRA-2026 IS). EIMS-0004833660. Carlsbad, NM: Sandia National Laboratories.

Hansen, C., S. Brunell, B. Day, S. King, and J. Wilgus. 2025. Analysis Plan for the 2026 WIPP Compliance Recertification Application Performance Assessment. AP-214. Carlsbad, NM: Sandia National Laboratories.

Kaplan, U., Swanson, J., and Kutahyali-Aslani, C. 2025. LANL ACRSP Parameter Recommendations for CRA-2026 Performance Assessment. Revision 1. LCO-ACP-41. Carlsbad, NM: Los Alamos National Laboratory.

Kicker, D. 2025. Analysis Report for Radionuclide Inventory Screening in the 2026 Compliance Recertification Application Performance Assessment: Interim State Repository. Revision 0. EIMS-0004832100. Carlsbad, NM: Sandia National Laboratories.

King, S. 2023. Salado Flow Analysis Report for the Replacement Panels Planned Change Request (RPPCR). Carlsbad, NM: Sandia National Laboratories.

King, S. 2025a. Constructed Cumulative Distributions for Approximation of Truncated Normal Distributions. EIMS-0004799476. Carlsbad, NM: Sandia National Laboratories.

King, S. 2025b. Area for RH waste disposal for the interim state CRA-2026 PA calculation. EIMS-0004801801. Carlsbad, NM: Sandia National Laboratories.

King, S., Brunell, S. and Zeitler, T., 2025. Analysis Report for Normalized Releases in the 2026 Compliance Recertification Application Performance Assessment: Interim State Repository. Carlsbad, NM: Sandia National Laboratories.

Information Only

Knerr, R. 2020. Letter to Ms. Lee Ann B. Veal, U.S. Environmental Protection Agency, subject: "Planned Change Request for Alternative Panel Closure Locations for Panels 1 and 2," Carlsbad, NM: U.S. DOE, Carlsbad Field Office.

Long, J. 2025. Computational Code Execution and File Management for the 2026 Compliance Recertification Application Performance Assessment (CRA-2026 PA). Carlsbad, NM: Sandia National Laboratories.

Mariner, P. 2025. CRA-2026 IS updates to the WIPP humic colloids models for An(III) and An(IV). EIMS-0004838142. Carlsbad, NM: Sandia National Laboratories.

Nemer, M. 2025. MgO Hydration Rates for the CRA-2026 Under AP-208. EIMS-0004445255. Albuquerque, NM: Sandia National Laboratories.

Powers, D.W., S.J. Lambert, S.E. Shaffer, I.R. Hill, and W.D. Weart, eds. 1978. Geological Characterization Report, Waste Isolation Pilot Plant (WIPP) Site, Southeastern New Mexico. Albuquerque, NM: Sandia National Laboratories. SAND78-1596.

U.S. Environmental Protection Agency (U.S. EPA). 1998. 40 CFR Part 194: Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance with the Disposal Regulations: Certification Decision. Federal Register, vol. 63 (May 18, 1998): 27354 – 27406.

U.S. Environmental Protection Agency (U.S. EPA). 2025. Letter from Abigale Tardif to Mark Bollinger, Subject: EPA's Review and Approval of DOE's RPPCR for Waste Panels 11 and 12 at WIPP. July 31, 2025. Washington, DC: U.S. EPA.

Van Soest, G. 2025. Interim State Performance Assessment Inventory Report – 2024. Revision 0. INV-IPA-24. Carlsbad, NM: Los Alamos National Laboratory.

Ward, A. 2025. Performance Assessment Inventory for Analysis of a 12-Panel Repository Configuration. Letter to Bill McInroy. March 18, 2025. CBFO:ERCD:AW:RS:25-0197. Carlsbad, NM: Department of Energy Carlsbad Field Office.

WIPP Performance Assessment. 2021. Design Document and User's Manual for LHS Version 3.00. Carlsbad, NM: Sandia National Laboratories.

WIPP PA. 2025. Design Document and User's Manual for BRAGFLO Version 8.00. EIMS-0004430695. Carlsbad, NM: Sandia National Laboratories.

Vignes, C., J. Bean, B. Reedlunn. 2023. Improved Modeling of Waste Isolation Pilot Plant Disposal Room Porosity. Albuquerque, NM: Sandia National Laboratories. SAND2023-04826.

Information Only

9.0 APPENDIX A – SENSITIVITY ANALYSIS TABLES

The STEPWISE ranked regression analysis will find all input variables that have a significant correlation (α_{in} = 0.05) with the output variable. To accommodate the number of replicates, scenarios, and output variables, the Stepwise Ranked Regression analysis tables presented here have been truncated to the 5 most impactful input variables. All output variables from BRAGFLO are taken at time 10,000 years.

9.1 Waste Panel Pressure

Table 17. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S1-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.71	0.81
2	DRZ_1:PRMX_LOG	0.75	0.21
3	WAS_AREA:PROBDEG	0.79	0.20
4	DRZ_PCS:PRMX_LOG	0.80	-0.12
5	S_MB139:PRMX_LOG	0.82	0.14

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 18. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.60	0.74
2	DRZ_1:PRMX_LOG	0.64	0.21
3	GLOBAL:GDEPFAC	0.67	0.17
4	DRZ_PCS:PRMX_LOG	0.69	-0.14
5	S_MB139:PRMX_LOG	0.71	0.15

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 19. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S1-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.66	0.82
2	WAS_AREA:PROBDEG	0.69	0.18
3	DRZ_1:PRMX_LOG	0.71	0.15
4	PCS_T1:SAT_RBRN	0.73	0.12
5	GLOBAL:GDEPFAC	0.74	0.11

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 20. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.51	0.71
2	S_MB139:PRMX_LOG	0.57	0.25
3	DRZ_1:PRMX_LOG	0.61	0.19
4	WAS_AREA:BIOGENFC	0.63	0.14
5	DRZ_PCS:PRMX_LOG	0.65	-0.14

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 21. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S1-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.74	0.87
2	WAS_AREA:PROBDEG	0.78	0.23
3	DRZ_PCS:PRMX_LOG	0.81	-0.17
4	S_MB139:SAT_RBRN	0.83	0.16
5	DRZ_1:PRMX_LOG	0.85	0.12

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 22. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.67	0.83
2	DRZ_PCS:PRMX_LOG	0.74	-0.27
3	S_MB139:SAT_RBRN	0.77	0.19
4	S_MB139:PRMX_LOG	0.79	0.14
5	PCS_T2:POR2PERM	0.80	-0.1

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 23. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S2-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.41	0.62
2	BH_SAND:PRMX_LOG	0.56	-0.41
3	WAS_AREA:PROBDEG	0.64	0.29
4	STEEL:CORRMCO2	0.68	-0.21
5	GLOBAL:GDEPFAC	0.70	0.13

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 24. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.24	0.48
2	BH_SAND:PRMX_LOG	0.42	-0.44
3	WAS_AREA:PROBDEG	0.54	0.36
4	STEEL:CORRMCO2	0.59	-0.22
5	WAS_AREA:GRATMICH	0.63	0.22

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 25. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S2-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.35	0.61
2	BH_SAND:PRMX_LOG	0.53	-0.39
3	WAS_AREA:PROBDEG	0.58	0.21
4	S_HALITE:COMP_RCK	0.62	-0.18
5	S_HALITE:PRESSURE	0.64	0.16

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 26. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.24	0.51
2	BH_SAND:PRMX_LOG	0.42	-0.40
3	WAS_AREA:PROBDEG	0.48	0.20
4	STEEL:CORRMCO2	0.51	-0.18
5	WAS_AREA:BIOGENFC	0.54	0.18

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 27. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S2-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.52	0.71
2	BH_SAND:PRMX_LOG	0.61	-0.31
3	WAS_AREA:PROBDEG	0.68	0.30
4	STEEL:CORRMCO2	0.72	-0.22
5	BOREHOLE:DOMEGA	0.75	-0.15

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 28. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.36	0.59
2	BH_SAND:PRMX_LOG	0.50	-0.43
3	WAS_AREA:PROBDEG	0.60	0.30
4	STEEL:CORRMCO2	0.63	-0.18
5	WAS_AREA:GRATMICH	0.66	0.16

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 29. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S4-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.65	0.77
2	WAS_AREA:PROBDEG	0.69	0.20
3	S_MB139:PRMX_LOG	0.72	0.21
4	S_HALITE:PRMX_LOG	0.76	0.17
5	DRZ_1:PRMX_LOG	0.79	0.17

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 30. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S4-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.57	0.73
2	S_HALITE:PRMX_LOG	0.61	0.19
3	DRZ_1:PRMX_LOG	0.64	0.20
4	S_MB139:PRMX_LOG	0.68	0.18
5	WAS_AREA:PROBDEG	0.70	0.19

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 31. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S4-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.59	0.78
2	WAS_AREA:PROBDEG	0.65	0.23
3	BH_SAND:PRMX_LOG	0.68	-0.18
4	S_HALITE:COMP_RCK	0.71	-0.18
5	DRZ_1:PRMX_LOG	0.74	0.16

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 32. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S4-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.46	0.67
2	S_MB139:PRMX_LOG	0.53	0.27
3	DRZ_1:PRMX_LOG	0.58	0.23
4	S_HALITE:PRMX_LOG	0.62	0.21
5	BH_SAND:PRMX_LOG	0.65	-0.18

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 33. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S4-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.74	0.85
2	S_MB139:SAT_RBRN	0.77	0.19
3	WAS_AREA:PROBDEG	0.80	0.18
4	BOREHOLE:DOMEGA	0.81	-0.13
5	S_MB139:PRMX_LOG	0.83	0.12

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 34. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S4-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.70	0.84
2	S_MB139:SAT_RBRN	0.74	0.20
3	DRZ_PCS:PRMX_LOG	0.78	-0.21
4	S_MB139:PRMX_LOG	0.80	0.15
5	S_HALITE:PRESSURE	0.82	0.11

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 35. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S6-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.36	0.56
2	WAS_AREA:PROBDEG	0.46	0.33
3	DRZ_1:PRMX_LOG	0.51	0.25
4	BH_SAND:PRMX_LOG	0.56	-0.21
5	S_MB139:PRMX_LOG	0.59	0.17

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 36. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 1, Scenario S6-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.21	0.42
2	DRZ_1:PRMX_LOG	0.33	0.34
3	WAS_AREA:PROBDEG	0.43	0.32
4	BH_SAND:PRMX_LOG	0.50	-0.24
5	WAS_AREA:BIOGENFC	0.53	0.18

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 37. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S6-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.35	0.60
2	WAS_AREA:PROBDEG	0.42	0.25
3	DRZ_1:PRMX_LOG	0.47	0.23
4	BH_SAND:PRMX_LOG	0.52	-0.21
5	STEEL:CORRMCO2	0.54	-0.18

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 38. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 2, Scenario S6-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.22	0.49
2	DRZ_1:PRMX_LOG	0.34	0.34
3	WAS_AREA:BIOGENFC	0.39	0.21
4	STEEL:CORRMCO2	0.45	-0.23
5	WAS_AREA:GRATMICI	0.49	0.17

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 39. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S6-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.51	0.71
2	WAS_AREA:PROBDEG	0.56	0.28
3	CASTILER:PRESSURE	0.61	0.22
4	STEEL:CORRMCO2	0.64	-0.17
5	BH_SAND:PRMX_LOG	0.66	-0.18

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 40. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Pressure (WAS_PRES), Replicate 3, Scenario S6-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.30	0.58
2	DRZ_1:PRMX_LOG	0.38	0.32
3	CASTILER:PRESSURE	0.43	0.26
4	WAS_AREA:PROBDEG	0.48	0.30
5	BH_SAND:PRMX_LOG	0.52	-0.24

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

9.2 Waste Panel Brine Saturation

Table 41. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S1-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.39	0.65
2	S_MB139:PRMX_LOG	0.48	0.28
3	S_HALITE:POROSITY	0.53	0.22
4	SHFTU:SAT_RGAS	0.55	0.17
5	S_HALITE:PRMX_LOG	0.58	0.14

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 42. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.29	0.56
2	S_MB139:PRMX_LOG	0.39	0.31
3	SOLMOD4:SOLVAR	0.43	-0.19
4	S_HALITE:PRMX_LOG	0.46	0.18
5	S_HALITE:POROSITY	0.50	0.17

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 43. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S1-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.26	0.50
2	S_HALITE:POROSITY	0.32	0.24
3	S_MB139:PRMX_LOG	0.37	0.23
4	S_MB139:RELP_MOD	0.40	-0.19
5	-	-	-

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 44. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.22	0.46
2	S_MB139:PRMX_LOG	0.32	0.32
3	S_MB139:RELP_MOD	0.38	-0.25
4	S_HALITE:POROSITY	0.41	0.18
5	S_HALITE:PRMX_LOG	0.43	0.16

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 45. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S1-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.23	0.51
2	S_MB139:PRMX_LOG	0.34	0.33
3	S_HALITE:POROSITY	0.41	0.28
4	S_MB139:SAT_RBRN	0.46	0.21
5	GLOBAL:GDEPFAC	0.49	-0.20

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 46. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.21	0.48
2	S_MB139:PRMX_LOG	0.31	0.30
3	S_HALITE:POROSITY	0.36	0.23
4	WAS_AREA:SAT_RGAS	0.41	-0.21
5	GLOBAL:GDEPFAC	0.45	-0.21

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 47. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S2-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.17	0.39
2	DRZ_1:PRMX_LOG	0.31	0.37
3	WAS_AREA:SAT_RBRN	0.42	-0.34
4	STEEL:CORRMCO2	0.47	-0.24
5	GLOBAL:GDEPFAC	0.52	-0.22

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 48. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.17	0.39
2	DRZ_1:PRMX_LOG	0.28	0.33
3	GLOBAL:GDEPFAC	0.33	-0.24
4	WAS_AREA:SAT_RBRN	0.38	-0.23
5	BH_SAND:PRMX_LOG	0.42	0.20

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 49. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S2-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	WAS_AREA:SAT_RBRN	0.11	-0.32
2	STEEL:CORRMCO2	0.20	-0.32
3	DRZ_1:PRMX_LOG	0.27	0.27
4	BH_SAND:PRMX_LOG	0.34	0.27
5	DRZ_PCS:PRMX_LOG	0.40	0.24

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 50. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.13	0.40
2	DRZ_1:PRMX_LOG	0.25	0.33
3	STEEL:CORRMCO2	0.32	-0.27
4	DRZ_PCS:PRMX_LOG	0.38	0.23
5	WAS_AREA:SAT_RBRN	0.44	-0.22

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 51. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S2-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.14	0.40
2	S_HALITE:POROSITY	0.27	0.34
3	CASTILER:PRESSURE	0.36	0.30
4	WAS_AREA:SAT_RGAS	0.41	-0.22
5	DRZ_PCS:PRMX_LOG	0.46	0.21

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 52. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.18	0.44
2	DRZ_1:PRMX_LOG	0.32	0.37
3	WAS_AREA:SAT_RBRN	0.38	-0.27
4	GLOBAL:GDEPFAC	0.44	-0.24
5	CASTILER:PRESSURE	0.48	0.21

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 53. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S4-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.37	0.62
2	S_MB139:PRMX_LOG	0.49	0.34
3	S_HALITE:POROSITY	0.56	0.29
4	PCS_T2:POR2PERM	0.58	0.14
5	BH_SAND:PRMX_LOG	0.60	0.14

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 54. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S4-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.33	0.59
2	S_MB139:PRMX_LOG	0.43	0.33
3	S_HALITE:POROSITY	0.49	0.25
4	S_HALITE:PRMX_LOG	0.54	0.22
5	PCS_T2:POR2PERM	0.56	0.18

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 55. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S4-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.29	0.52
2	S_HALITE:POROSITY	0.38	0.31
3	S_MB139:PRMX_LOG	0.44	0.24
4	S_MB139:RELP_MOD	0.47	-0.19
5	BH_SAND:PRMX_LOG	0.50	0.17

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 56. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S4-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.25	0.50
2	S_MB139:PRMX_LOG	0.36	0.33
3	S_MB139:RELP_MOD	0.40	-0.23
4	S_HALITE:PRMX_LOG	0.45	0.21
5	S_HALITE:POROSITY	0.48	0.19

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 57. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S4-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.26	0.54
2	S_HALITE:POROSITY	0.41	0.39
3	S_MB139:PRMX_LOG	0.51	0.32
4	S_MB139:SAT_RBRN	0.54	0.17
5	BH_SAND:PRMX_LOG	0.57	0.16

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 58. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S4-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.25	0.53
2	S_MB139:PRMX_LOG	0.34	0.31
3	S_HALITE:POROSITY	0.41	0.25
4	WAS_AREA:SAT_RGAS	0.46	-0.22
5	S_MB139:SAT_RBRN	0.49	0.16

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 59. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S6-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.23	0.49
2	BH_SAND:PRMX_LOG	0.33	0.34
3	S_MB139:PRMX_LOG	0.39	0.23
4	GLOBAL:GDEPFAC	0.45	-0.23
5	PCS_T2:POR2PERM	0.50	0.22

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 60. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 1, Scenario S6-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.18	0.44
2	GLOBAL:GDEPFAC	0.26	-0.32
3	S_MB139:PRMX_LOG	0.35	0.28
4	BH_SAND:PRMX_LOG	0.40	0.22
5	S_HALITE:PRMX_LOG	0.44	0.20

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 61. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S6-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	BH_SAND:PRMX_LOG	0.13	0.37
2	DRZ_1:PRMX_LOG	0.26	0.35
3	WAS_AREA:SAT_RBRN	0.31	-0.23
4	WAS_AREA:BIOGENFC	0.36	0.22
5	WAS_AREA:SAT_RGAS	0.39	-0.18

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 62. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 2, Scenario S6-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.12	0.38
2	WAS_AREA:BIOGENFC	0.21	0.27
3	GLOBAL:GDEPFAC	0.27	-0.21
4	WAS_AREA:PROBDEG	0.33	0.26
5	WAS_AREA:SAT_RBRN	0.39	-0.24

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 63. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S6-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.19	0.44
2	GLOBAL:GDEPFAC	0.23	-0.22
3	BH_SAND:PRMX_LOG	0.27	0.20
4	S_MB139:PRMX_LOG	0.30	0.19
5	PCS_T1:PRMX_LOG	0.33	0.17

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 64. Truncated Stepwise Ranked Regression Analysis for Waste Panel Brine Saturation (WAS_SATB), Replicate 3, Scenario S6-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	DRZ_1:PRMX_LOG	0.11	0.32
2	S_MB139:PRMX_LOG	0.15	0.20
3	WAS_AREA:BRUCITES	0.18	-0.19
4	-	-	-
5	-	-	-

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

9.3 Total Cumulative Gas Generation

Table 65. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S1-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.72	0.81
2	DRZ_1:PRMX_LOG	0.82	0.32
3	WAS_AREA:PROBDEG	0.86	0.18
4	S_MB139:PRMX_LOG	0.88	0.16
5	S_HALITE:PRMX_LOG	0.90	0.11

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 66. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.57	0.72
2	DRZ_1:PRMX_LOG	0.73	0.42
3	S_MB139:PRMX_LOG	0.76	0.17
4	WAS_AREA:PROBDEG	0.78	0.13
5	S_HALITE:PRMX_LOG	0.80	0.12

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 67. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S1-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.66	0.82
2	DRZ_1:PRMX_LOG	0.75	0.30
3	WAS_AREA:PROBDEG	0.79	0.18
4	WAS_AREA:BIOGENFC	0.81	0.12
5	PCS_T1:SAT_RBRN	0.82	0.11

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 68. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.49	0.68
2	DRZ_1:PRMX_LOG	0.66	0.42
3	S_MB139:PRMX_LOG	0.71	0.22
4	GLOBAL:GDEPFAC	0.73	0.14
5	WAS_AREA:GRATMICI	0.75	0.13

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 69. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S1-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.76	0.88
2	DRZ_1:PRMX_LOG	0.82	0.26
3	S_MB139:SAT_RBRN	0.83	0.13
4	WAS_AREA:PROBDEG	0.85	0.17
5	GLOBAL:GDEPFAC	0.87	0.13

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 70. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.69	0.85
2	DRZ_1:PRMX_LOG	0.79	0.32
3	S_MB139:SAT_RBRN	0.82	0.16
4	S_MB139:PRMX_LOG	0.83	0.13
5	BH_SAND:PRMX_LOG	0.84	0.10

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 71. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S2-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.67	0.78
2	DRZ_1:PRMX_LOG	0.74	0.25
3	WAS_AREA:PROBDEG	0.81	0.27
4	WAS_AREA:BIOGENFC	0.83	0.14
5	WAS_AREA:GRATMICH	0.85	0.14

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 72. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.53	0.69
2	WAS_AREA:PROBDEG	0.60	0.27
3	DRZ_1:PRMX_LOG	0.67	0.25
4	WAS_AREA:BIOGENFC	0.73	0.25
5	WAS_AREA:GRATMICH	0.78	0.23

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 73. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S2-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.59	0.80
2	WAS_AREA:PROBDEG	0.67	0.26
3	DRZ_1:PRMX_LOG	0.71	0.20
4	WAS_AREA:BIOGENFC	0.75	0.19
5	DRZ_PCS:PRMX_LOG	0.77	0.15

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 74. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.47	0.72
2	WAS_AREA:PROBDEG	0.57	0.28
3	WAS_AREA:BIOGENFC	0.64	0.27
4	WAS_AREA:GRATMICI	0.68	0.19
5	DRZ_PCS:PRMX_LOG	0.70	0.16

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 75. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S2-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.71	0.84
2	WAS_AREA:PROBDEG	0.74	0.24
3	DRZ_1:PRMX_LOG	0.77	0.16
4	GLOBAL:GDEPFAC	0.79	0.15
5	CASTILER:PRESSURE	0.81	0.15

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 76. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.59	0.76
2	WAS_AREA:PROBDEG	0.64	0.28
3	WAS_AREA:GRATMICH	0.70	0.25
4	WAS_AREA:BIOGENFC	0.73	0.18
5	DRZ_1:PRMX_LOG	0.75	0.14

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 77. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S4-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.72	0.81
2	DRZ_1:PRMX_LOG	0.82	0.33
3	WAS_AREA:PROBDEG	0.86	0.18
4	S_MB139:PRMX_LOG	0.88	0.16
5	S_HALITE:PRMX_LOG	0.90	0.11

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 78. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S4-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.57	0.72
2	DRZ_1:PRMX_LOG	0.73	0.41
3	S_MB139:PRMX_LOG	0.76	0.15
4	WAS_AREA:PROBDEG	0.78	0.14
5	S_HALITE:PRMX_LOG	0.80	0.12

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 79. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S4-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.66	0.82
2	DRZ_1:PRMX_LOG	0.75	0.31
3	WAS_AREA:PROBDEG	0.79	0.19
4	WAS_AREA:BIOGENFC	0.81	0.12
5	S_HALITE:PRMX_LOG	0.82	0.11

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 80. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S4-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.49	0.68
2	DRZ_1:PRMX_LOG	0.66	0.42
3	S_MB139:PRMX_LOG	0.70	0.22
4	WAS_AREA:GRATMICI	0.73	0.14
5	GLOBAL:GDEPFAC	0.75	0.14

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 81. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S4-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.75	0.88
2	DRZ_1:PRMX_LOG	0.81	0.26
3	S_MB139:SAT_RBRN	0.83	0.14
4	WAS_AREA:PROBDEG	0.85	0.17
5	GLOBAL:GDEPFAC	0.87	0.13

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 82. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S4-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.69	0.85
2	DRZ_1:PRMX_LOG	0.8	0.33
3	S_MB139:SAT_RBRN	0.83	0.16
4	S_MB139:PRMX_LOG	0.84	0.12
5	BH_SAND:PRMX_LOG	0.85	0.10

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 83. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S6-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.54	0.69
2	DRZ_1:PRMX_LOG	0.70	0.40
3	WAS_AREA:PROBDEG	0.79	0.30
4	WAS_AREA:BIOGENFC	0.80	0.12
5	WAS_AREA:GRATMICH	0.81	0.12

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 84. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 1, Scenario S6-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.39	0.58
2	DRZ_1:PRMX_LOG	0.64	0.50
3	WAS_AREA:PROBDEG	0.72	0.27
4	WAS_AREA:BIOGENFC	0.74	0.16
5	WAS_AREA:GRATMICH	0.76	0.13

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 85. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S6-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.50	0.71
2	DRZ_1:PRMX_LOG	0.63	0.37
3	WAS_AREA:PROBDEG	0.67	0.20
4	WAS_AREA:BIOGENFC	0.71	0.18
5	PCS_T1:SAT_RBRN	0.73	0.14

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 86. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 2, Scenario S6-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.35	0.59
2	DRZ_1:PRMX_LOG	0.56	0.46
3	WAS_AREA:BIOGENFC	0.62	0.23
4	WAS_AREA:GRATMICI	0.66	0.18
5	STEEL:CORRMCO2	0.68	-0.16

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 87. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S6-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.62	0.81
2	DRZ_1:PRMX_LOG	0.72	0.31
3	WAS_AREA:GRATMICH	0.74	0.13
4	CASTILER:PRESSURE	0.76	0.16
5	WAS_AREA:PROBDEG	0.78	0.17

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 88. Truncated Stepwise Ranked Regression Analysis for Total Cumulative Gas Generation (ALL_HTTC), Replicate 3, Scenario S6-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.43	0.69
2	DRZ_1:PRMX_LOG	0.61	0.44
3	WAS_AREA:GRATMICH	0.65	0.24
4	S_HALITE:PRESSURE	0.68	-0.17
5	CASTILER:PRESSURE	0.71	0.19

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

9.4 Brine Flow into the Repository

Table 89. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S1-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.75	0.85
2	DRZ_1:PRMX_LOG	0.91	0.41
3	S_MB139:PRMX_LOG	0.92	0.11
4	S_HALITE:PRMX_LOG	0.94	0.13
5	S_MB139:RELP_MOD	0.94	-0.09

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 90. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.79	0.87
2	DRZ_1:PRMX_LOG	0.93	0.39
3	S_HALITE:PRMX_LOG	0.94	0.13
4	S_MB139:PRMX_LOG	0.95	0.08
5	S_MB139:RELP_MOD	0.95	-0.06

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 91. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S1-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.74	0.84
2	DRZ_1:PRMX_LOG	0.87	0.37
3	S_HALITE:COMP_RCK	0.89	-0.12
4	S_MB139:PRMX_LOG	0.90	0.10
5	PCS_T1:SAT_RBRN	0.90	0.08

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 92. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.76	0.85
2	DRZ_1:PRMX_LOG	0.89	0.37
3	S_HALITE:PRMX_LOG	0.90	0.11
4	S_MB139:PRMX_LOG	0.91	0.08
5	CASTILER:PRMX_LOG	0.91	0.08

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 93. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S1-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.78	0.91
2	DRZ_1:PRMX_LOG	0.90	0.34
3	S_MB139:SAT_RBRN	0.92	0.12
4	S_HALITE:PRMX_LOG	0.92	0.07
5	CASTILER:PRESSURE	0.93	0.07

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 94. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S1-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.80	0.92
2	DRZ_1:PRMX_LOG	0.92	0.34
3	S_MB139:SAT_RBRN	0.93	0.10
4	CASTILER:PRESSURE	0.94	0.07
5	WAS_AREA:BRUCITEC	0.94	0.06

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 95. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S2-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.77	0.86
2	DRZ_1:PRMX_LOG	0.94	0.41
3	S_MB139:RELP_MOD	0.94	-0.07
4	S_HALITE:PRMX_LOG	0.94	0.07
5	S_HALITE:PRESSURE	0.95	-0.06

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 96. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.74	0.85
2	DRZ_1:PRMX_LOG	0.92	0.43
3	S_MB139:RELP_MOD	0.93	-0.09
4	S_HALITE:PRMX_LOG	0.93	0.07
5	(Composite):OXSTAT	0.94	0.06

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 97. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S2-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.75	0.86
2	DRZ_1:PRMX_LOG	0.92	0.41
3	CASTILER:PRESSURE	0.93	0.10
4	S_HALITE:PRESSURE	0.94	-0.08
5	S_MB139:PRMX_LOG	0.94	0.05

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 98. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.74	0.85
2	DRZ_1:PRMX_LOG	0.92	0.42
3	CASTILER:PRESSURE	0.93	0.11
4	S_HALITE:PRESSURE	0.94	-0.08
5	SOLMOD3:SOLVAR	0.94	-0.07

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 99. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S2-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.76	0.90
2	DRZ_1:PRMX_LOG	0.92	0.39
3	CASTILER:PRESSURE	0.93	0.10
4	S_MB139:SAT_RBRN	0.93	0.09
5	S_HALITE:PRESSURE	0.94	-0.08

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 100. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S2-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.72	0.88
2	DRZ_1:PRMX_LOG	0.91	0.43
3	S_HALITE:PRESSURE	0.92	-0.10
4	CASTILER:PRESSURE	0.92	0.09
5	S_MB139:SAT_RBRN	0.93	0.07

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 101. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S4-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.75	0.85
2	DRZ_1:PRMX_LOG	0.91	0.41
3	S_MB139:PRMX_LOG	0.92	0.12
4	S_HALITE:PRMX_LOG	0.94	0.13
5	S_MB139:RELP_MOD	0.94	-0.09

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 102. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S4-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.78	0.87
2	DRZ_1:PRMX_LOG	0.93	0.39
3	S_HALITE:PRMX_LOG	0.94	0.13
4	S_MB139:PRMX_LOG	0.95	0.09
5	S_MB139:RELP_MOD	0.95	-0.06

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 103. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S4-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.73	0.84
2	DRZ_1:PRMX_LOG	0.87	0.37
3	S_HALITE:COMP_RCK	0.88	-0.12
4	S_MB139:PRMX_LOG	0.89	0.10
5	PCS_T1:SAT_RBRN	0.90	0.08

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 104. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S4-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.75	0.85
2	DRZ_1:PRMX_LOG	0.88	0.37
3	S_HALITE:PRMX_LOG	0.90	0.12
4	S_MB139:PRMX_LOG	0.91	0.09
5	PCS_T1:SAT_RBRN	0.91	0.07

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 105. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S4-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.78	0.91
2	DRZ_1:PRMX_LOG	0.90	0.34
3	S_MB139:SAT_RBRN	0.91	0.12
4	S_MB139:PRMX_LOG	0.92	0.09
5	CASTILER:PRESSURE	0.93	0.07

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 106. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S4-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.79	0.92
2	DRZ_1:PRMX_LOG	0.92	0.34
3	S_MB139:SAT_RBRN	0.93	0.11
4	CASTILER:PRESSURE	0.93	0.07
5	S_HALITE:PRMX_LOG	0.94	0.06

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 107. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S6-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.62	0.76
2	DRZ_1:PRMX_LOG	0.89	0.52
3	S_MB139:RELP_MOD	0.90	-0.09
4	S_HALITE:COMP_RCK	0.90	-0.09
5	S_MB139:SAT_RBRN	0.91	0.08

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Table 108. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 1, Scenario S6-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.54	0.71
2	DRZ_1:PRMX_LOG	0.88	0.58
3	WAS_AREA:SAT_RBRN	0.88	-0.08
4	S_MB139:RELP_MOD	0.89	-0.09
5	PCS_T1:PORE_DIS	0.90	0.09

Notes:

a Steps in stepwise regression analysis.

b Variables listed in order of selection.

c Cumulative R^2 value with entry of each variable into regression model.

d Standardized Rank Regression Coefficient

Information Only

Table 109. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S6-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.56	0.73
2	DRZ_1:PRMX_LOG	0.86	0.54
3	PCS_T1:SAT_RBRN	0.87	0.09
4	PCS_T2:POROSITY	0.87	-0.09
5	CASTILER:PRESSURE	0.88	0.07

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 110. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 2, Scenario S6-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.51	0.69
2	DRZ_1:PRMX_LOG	0.85	0.58
3	CASTILER:PRESSURE	0.86	0.10
4	PCS_T1:SAT_RBRN	0.87	0.09
5	PCS_T2:POROSITY	0.88	-0.08

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

Table 111. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S6-BF of RPPCR

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.62	0.83
2	DRZ_1:PRMX_LOG	0.88	0.49
3	CASTILER:PRESSURE	0.89	0.13
4	S_MB139:SAT_RBRN	0.90	0.11
5	WAS_AREA:BRUCITEC	0.91	0.07

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Table 112. Truncated Stepwise Ranked Regression Analysis for Brine Flow into the Repository (BRNREPIC), Replicate 3, Scenario S6-BF of CRA26_IS

Step[a]	Variable[b]	R^2 [c]	SRRC[d]
1	S_HALITE:POROSITY	0.51	0.75
2	DRZ_1:PRMX_LOG	0.84	0.56
3	CASTILER:PRESSURE	0.86	0.12
4	WAS_AREA:BRUCITES	0.87	-0.12
5	S_HALITE:PRESSURE	0.88	-0.10

Notes:
a Steps in stepwise regression analysis.
b Variables listed in order of selection.
c Cumulative R^2 value with entry of each variable into regression model.
d Standardized Rank Regression Coefficient

Information Only

10.0 APPENDIX B – ADDITIONAL PLOTS

Additional plots of simulation results are provided without discussion in this appendix.

10.1 Pressure

10.1.1 Scenario S1-BF

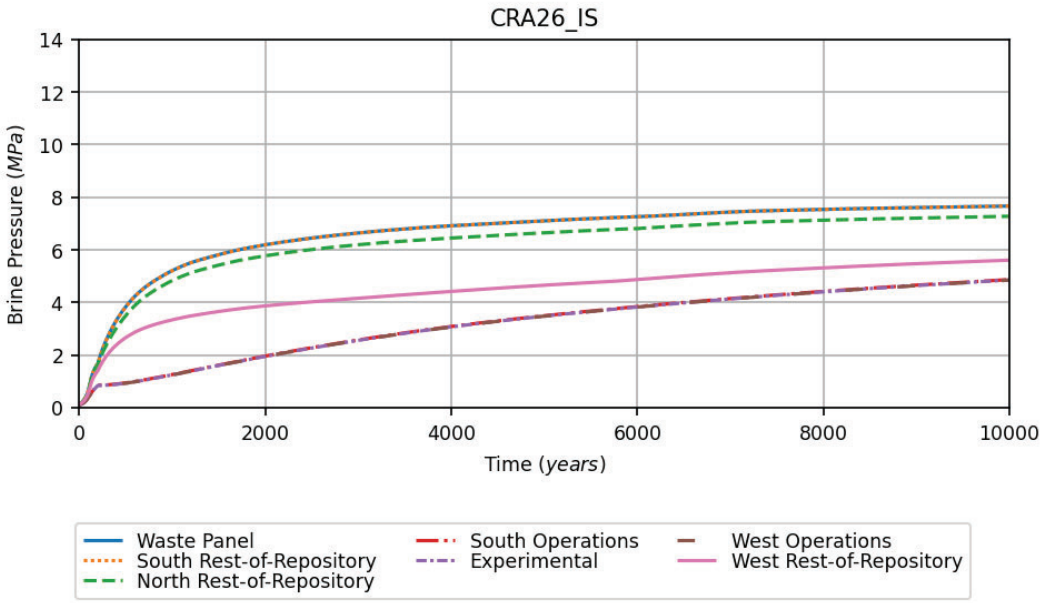

Figure 117. Pressure means for repository areas, Replicate 1, Scenario S1-BF

Information Only

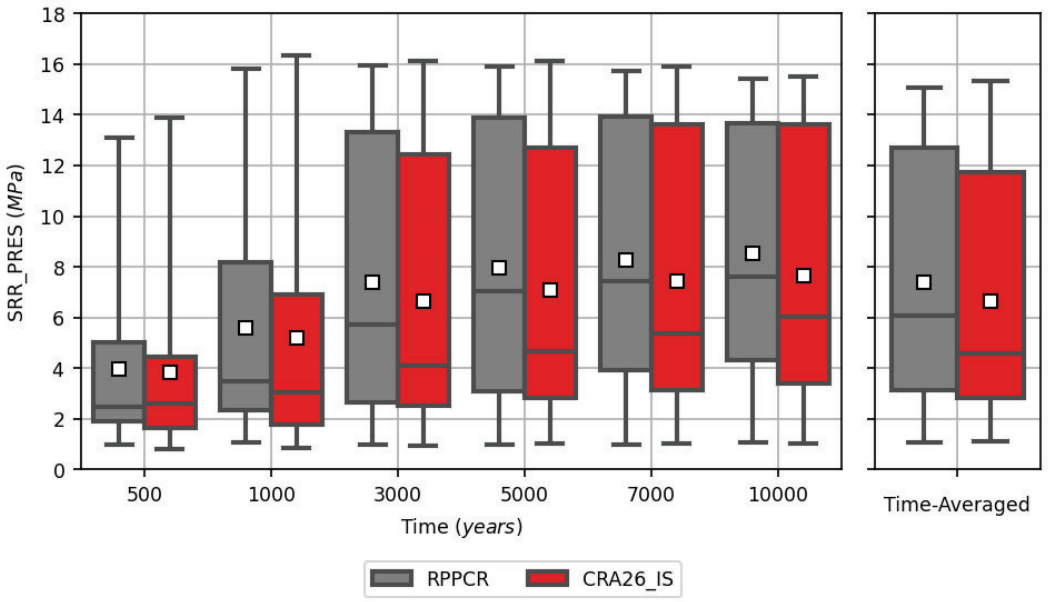

Figure 118. Pressure distributions for the South Rest-of-Repository, Replicate 1, Scenario S1-BF

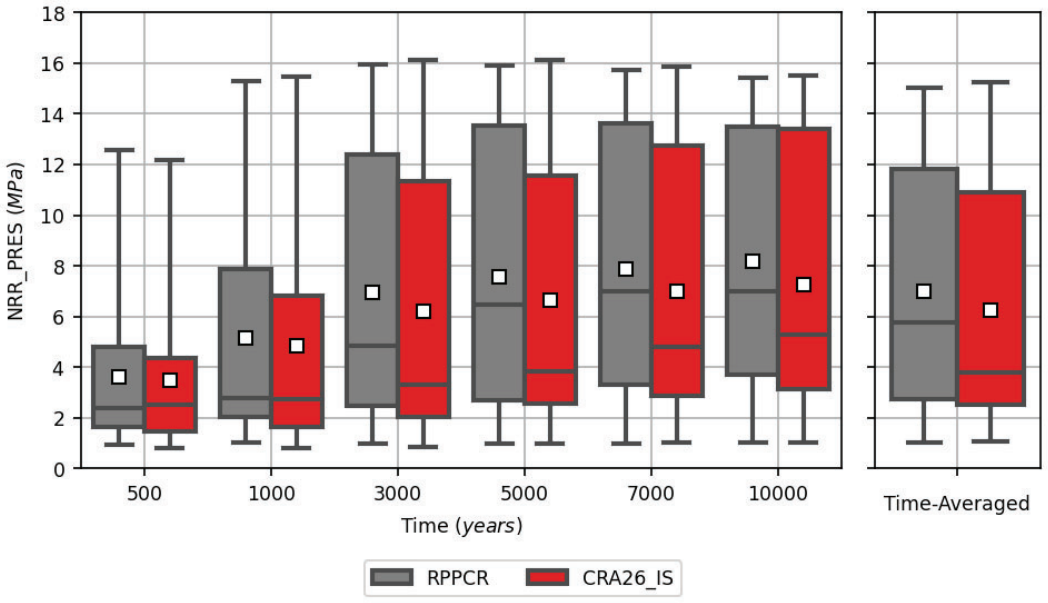

Figure 119. Pressure distributions for the North Rest-of-Repository, Replicate 1, Scenario S1-BF

Information Only

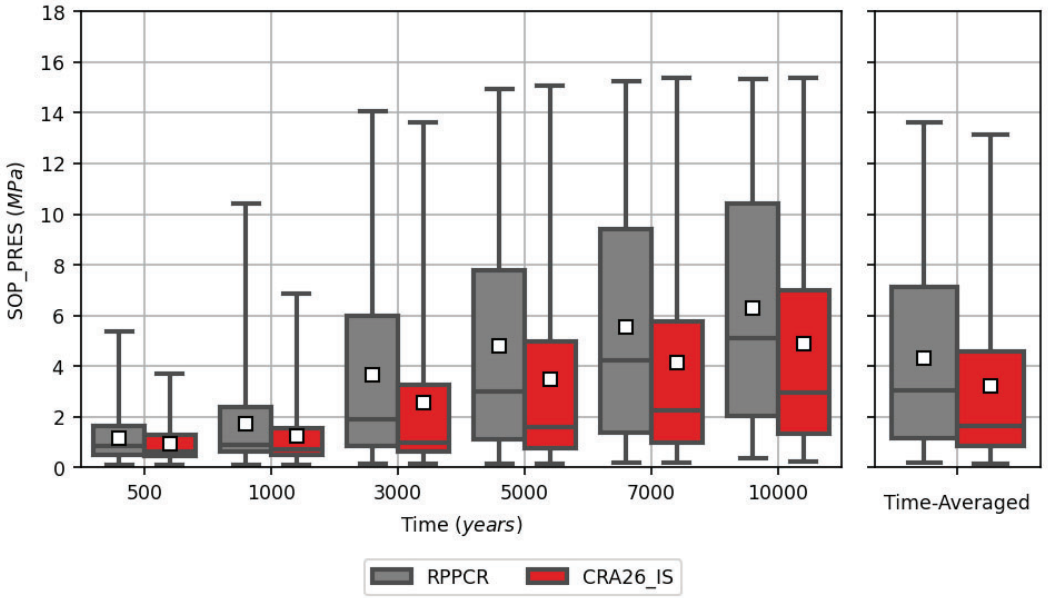

Figure 120. Pressure distributions for the South Operations Area, Replicate 1, Scenario S1-BF

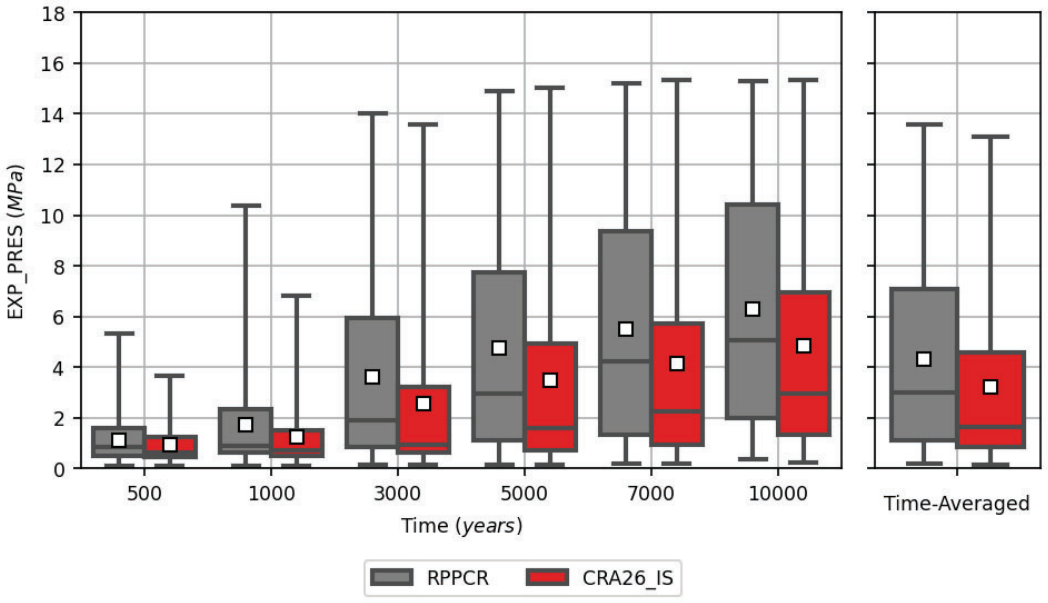

Figure 121. Pressure distributions for the Experimental Area, Replicate 1, Scenario S1-BF

Information Only

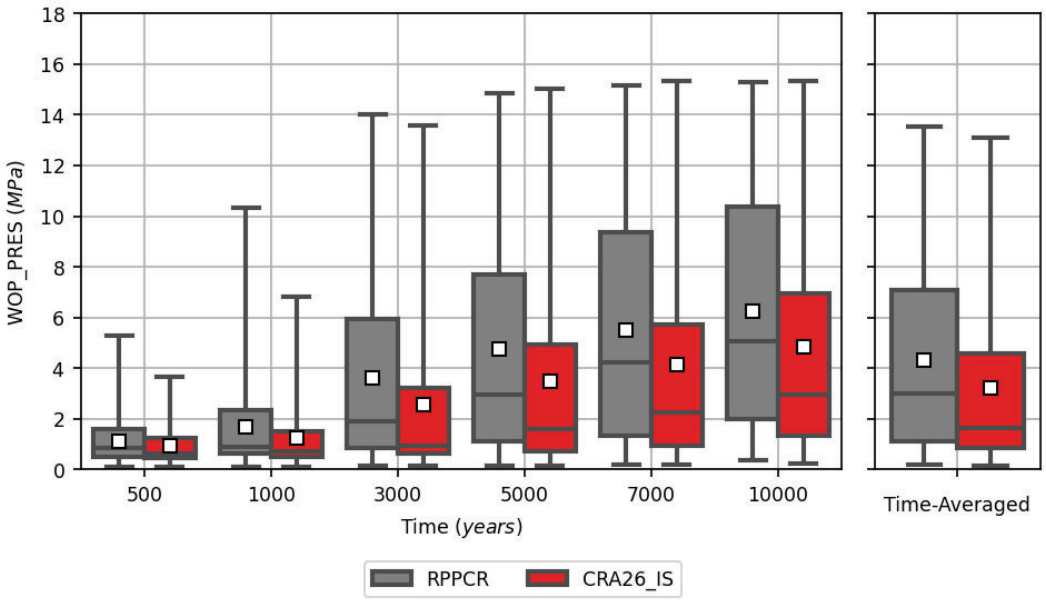

Figure 122. Pressure distributions for the West Operations Area, Replicate 1, Scenario S1-BF

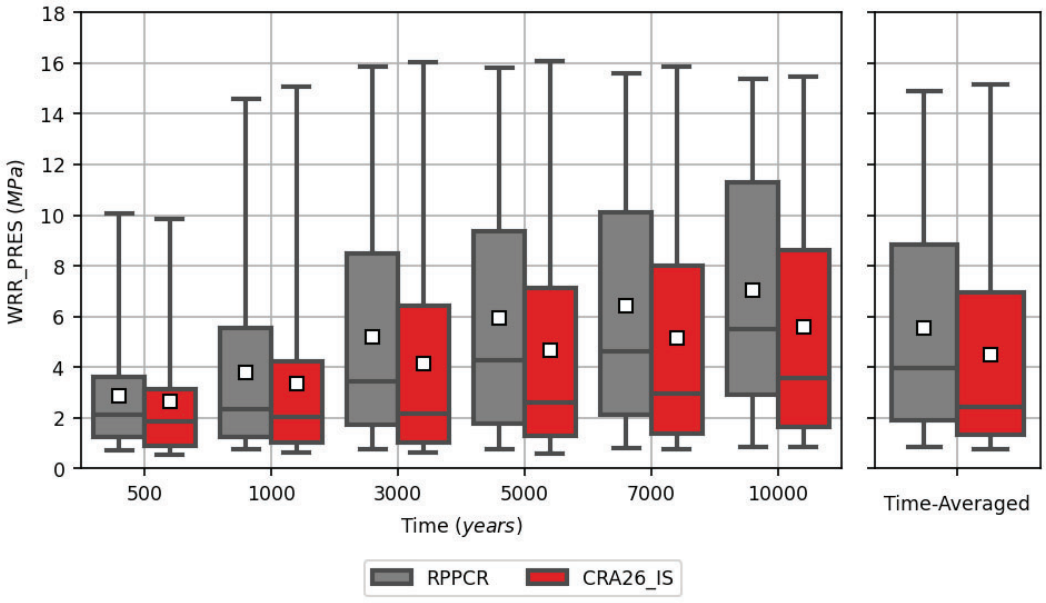

Figure 123. Pressure distributions for the West Rest-of-Repository, Replicate 1, Scenario S1-BF

Information Only

10.1.2Scenario S2-BF

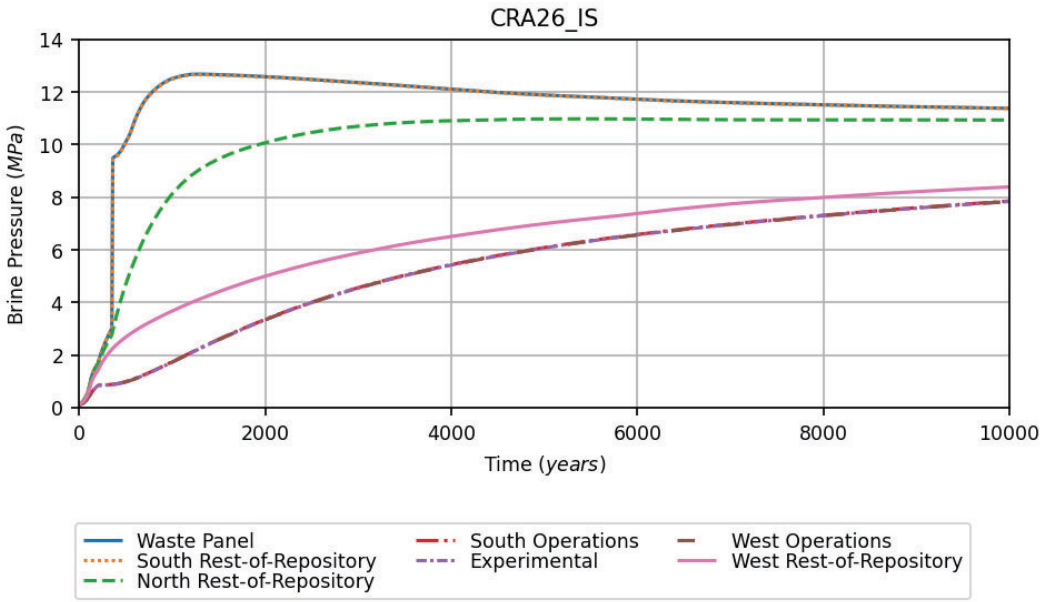

Figure 124. Pressure means for repository areas, Replicate 1, Scenario S2-BF

Information Only

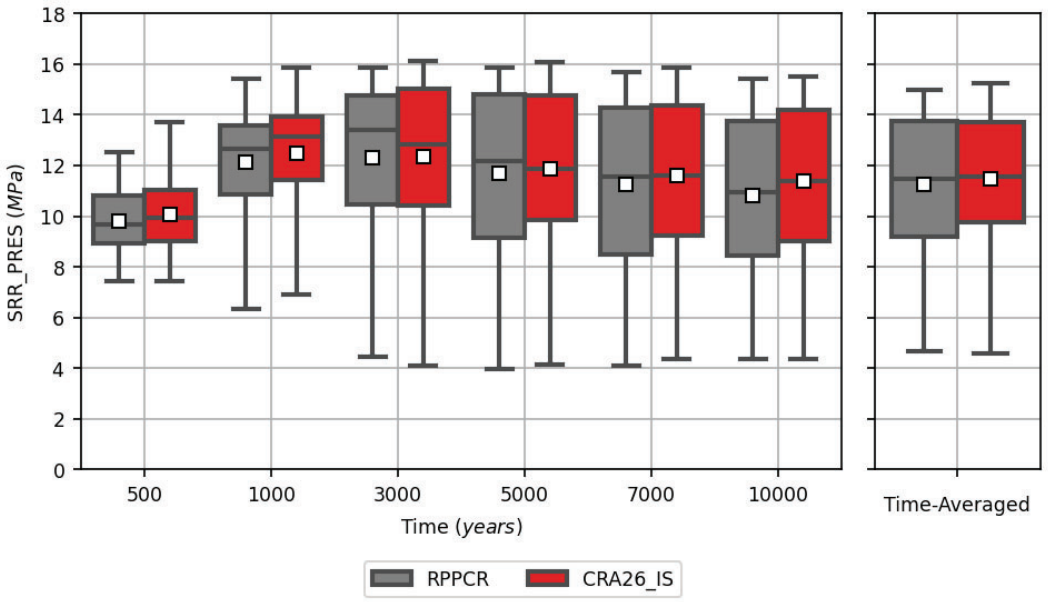

Figure 125. Pressure distributions for the South Rest-of-Repository, Replicate 1, Scenario S2-BF

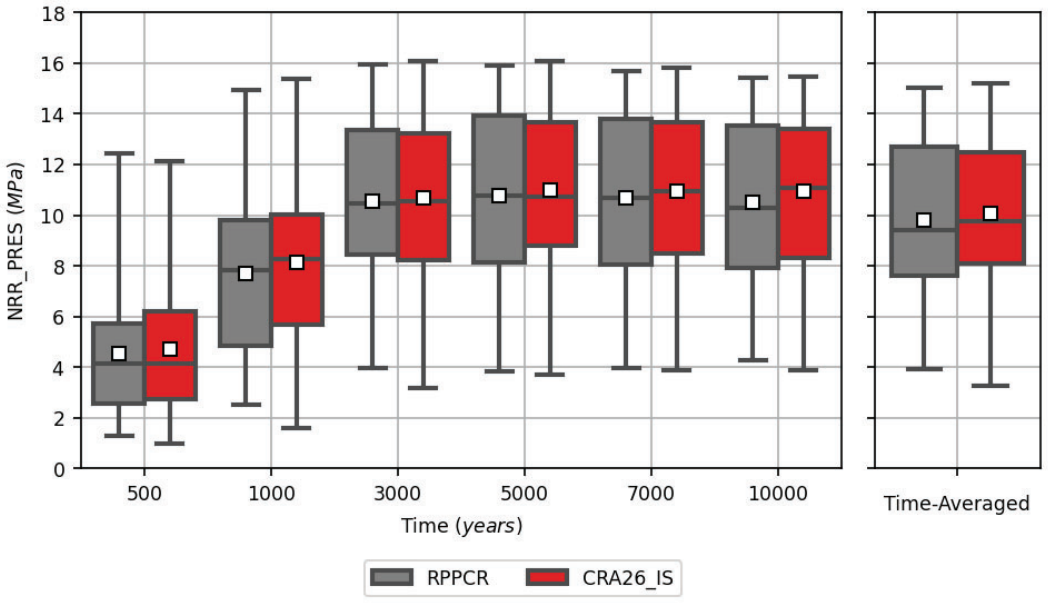

Figure 126. Pressure distributions for the North Rest-of-Repository, Replicate 1, Scenario S2-BF

Information Only

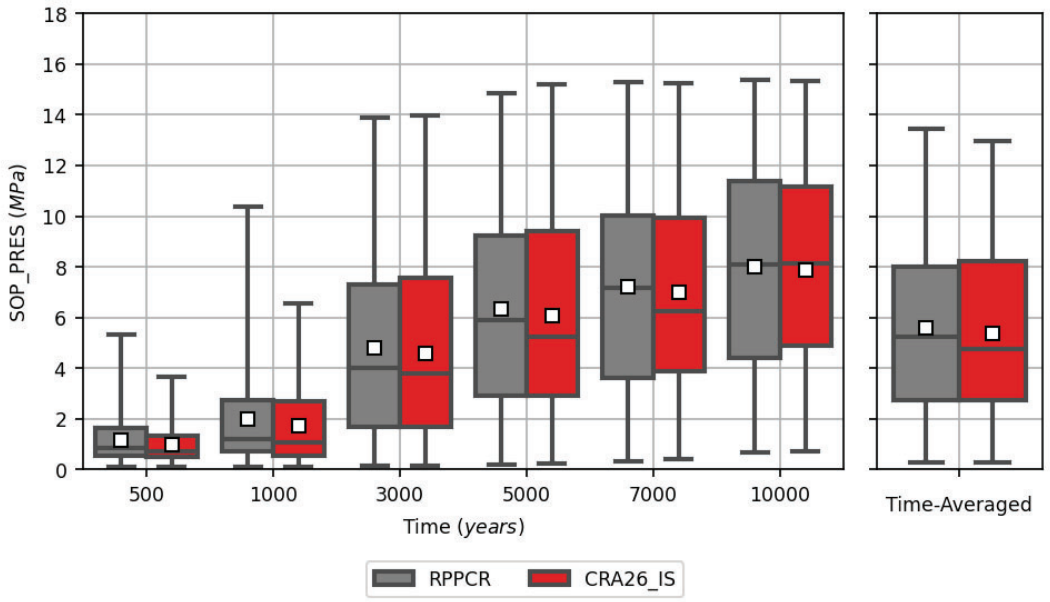

Figure 127. Pressure distributions for the South Operations Area, Replicate 1, Scenario S2-BF

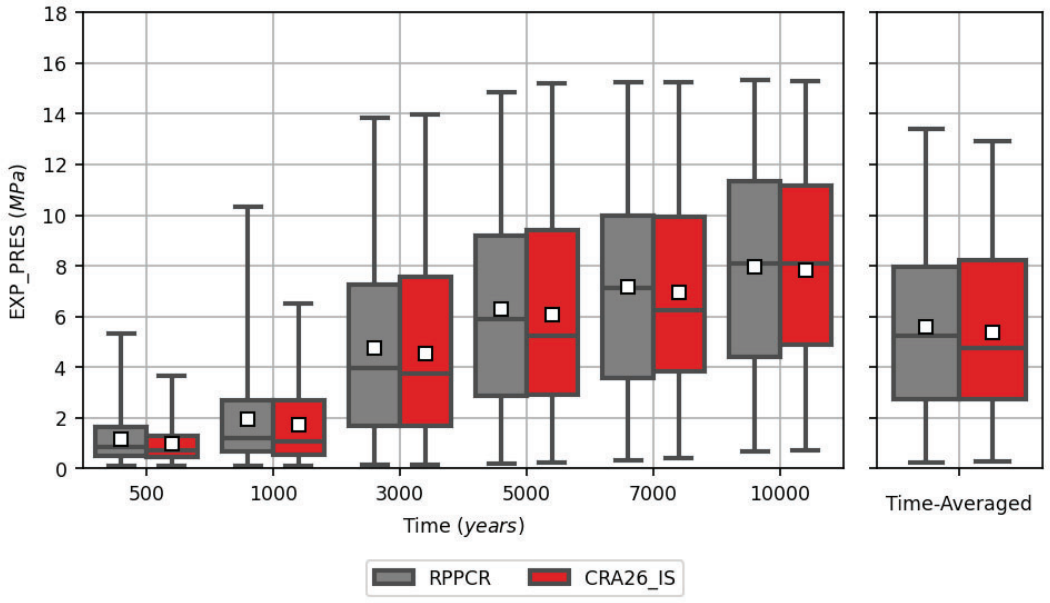

Figure 128. Pressure distributions for the Experimental Area, Replicate 1, Scenario S2-BF

Information Only

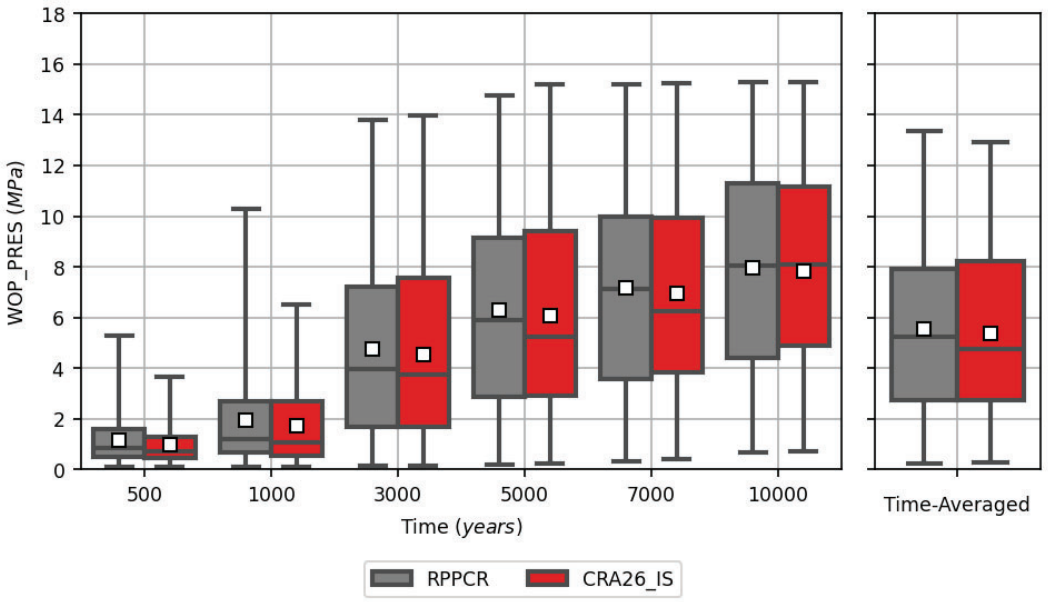

Figure 129. Pressure distributions for the West Operations Area, Replicate 1, Scenario S2-BF

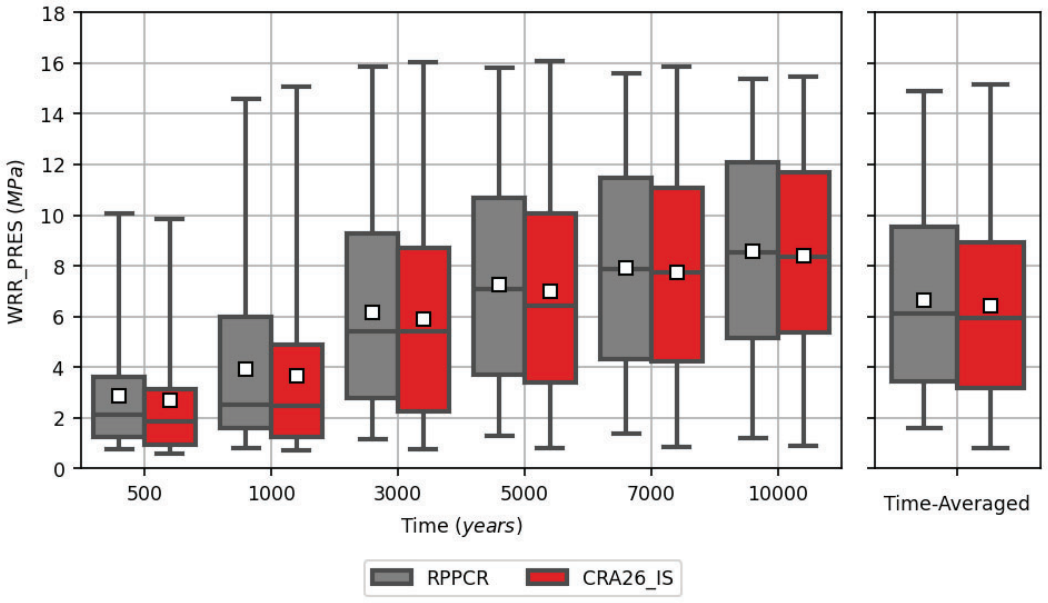

Figure 130. Pressure distributions for the West Rest-of-Repository, Replicate 1, Scenario S2-BF

Information Only

10.1.3Scenario S3-BF

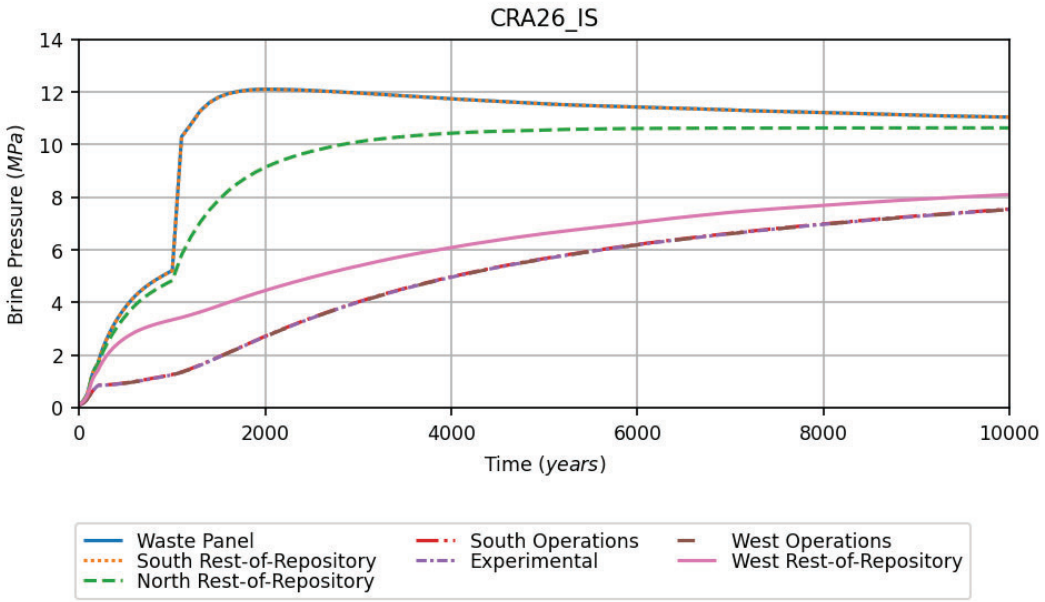

Figure 131. Pressure means for repository areas, Replicate 1, Scenario S3-BF

Information Only

10.1.4Scenario S4-BF

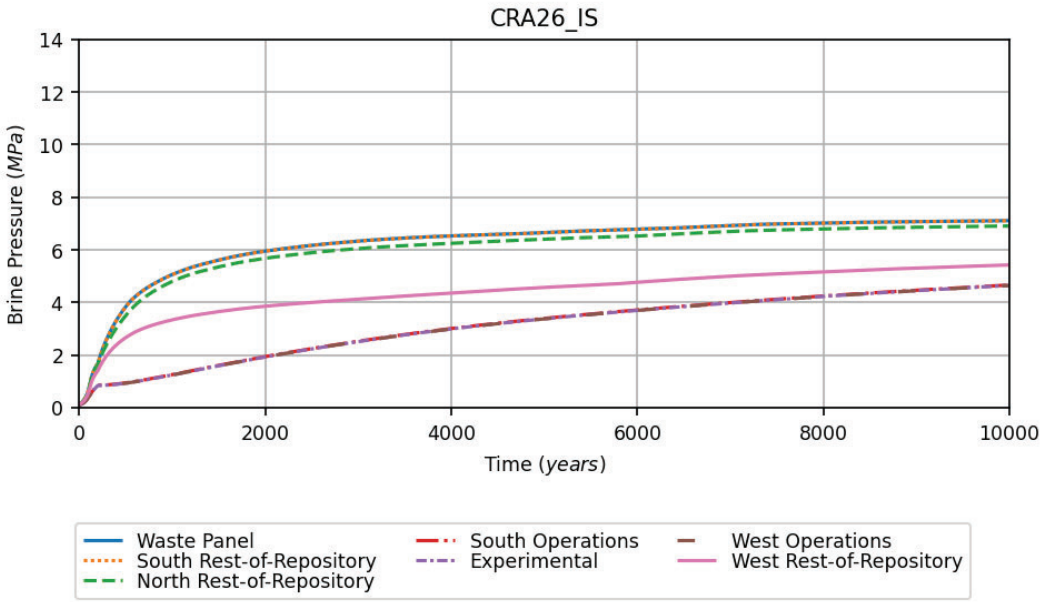

Figure 132. Pressure means for repository areas, Replicate 1, Scenario S4-BF

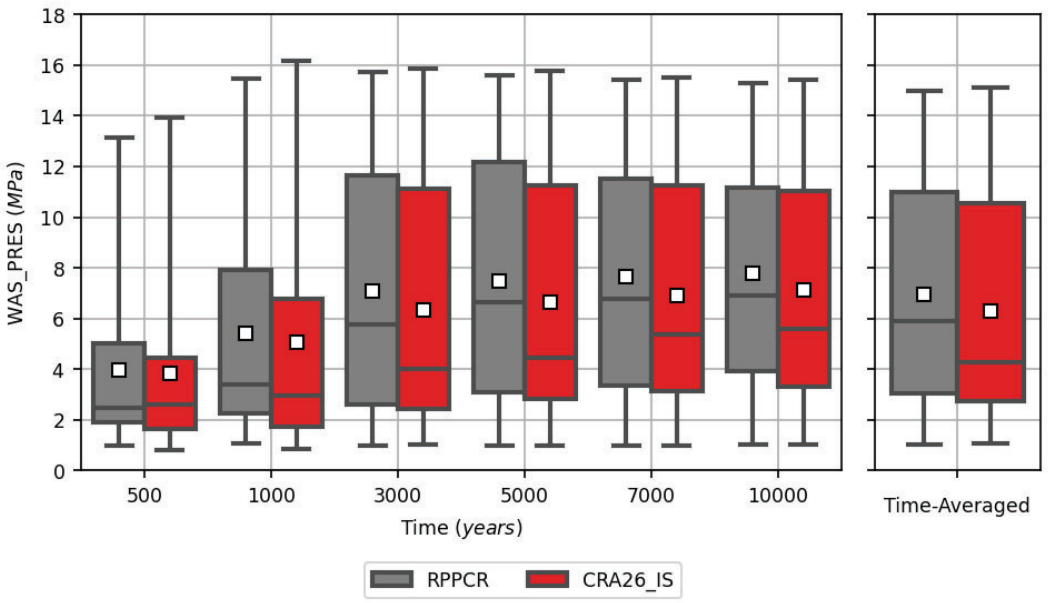

Figure 133. Pressure distributions for the Waste Panel, Replicate 1, Scenario S4-BF

Information Only

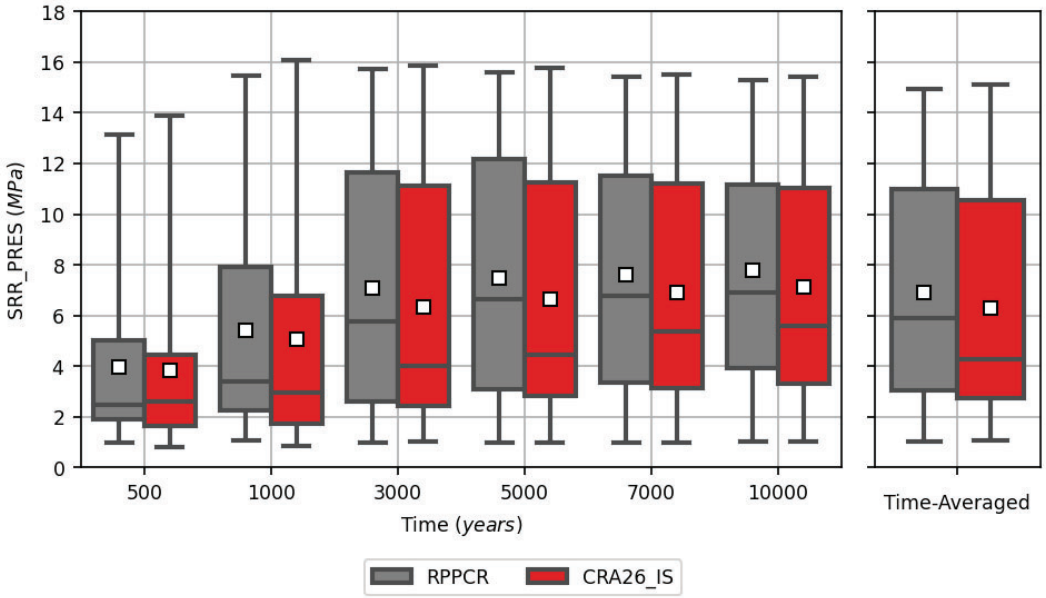

Figure 134. Pressure distributions for the South Rest-of-Repository, Replicate 1, Scenario S4-BF

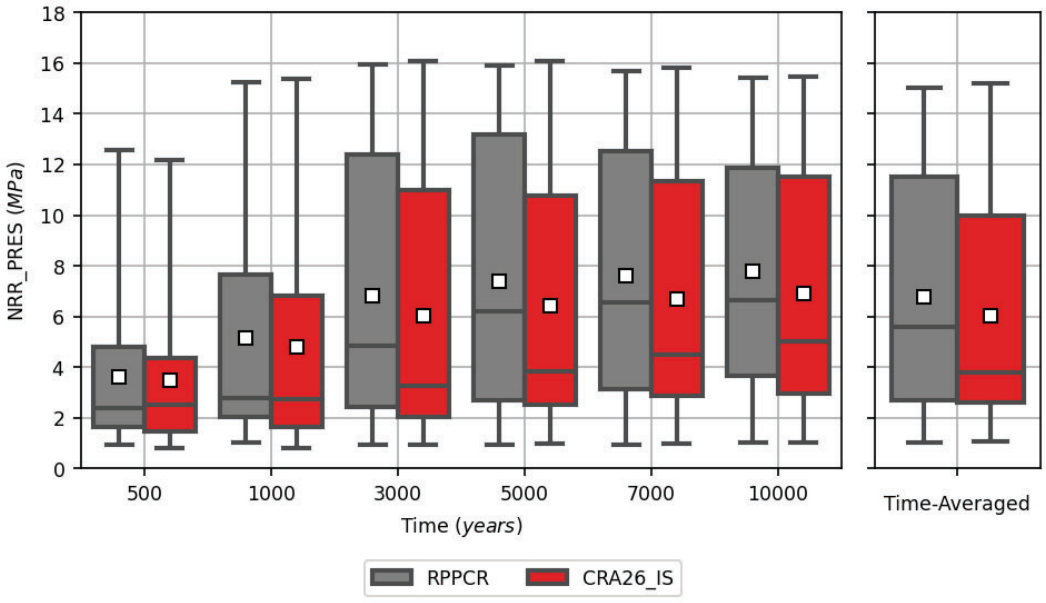

Figure 135. Pressure distributions for the North Rest-of-Repository, Replicate 1, Scenario S4-BF

Information Only

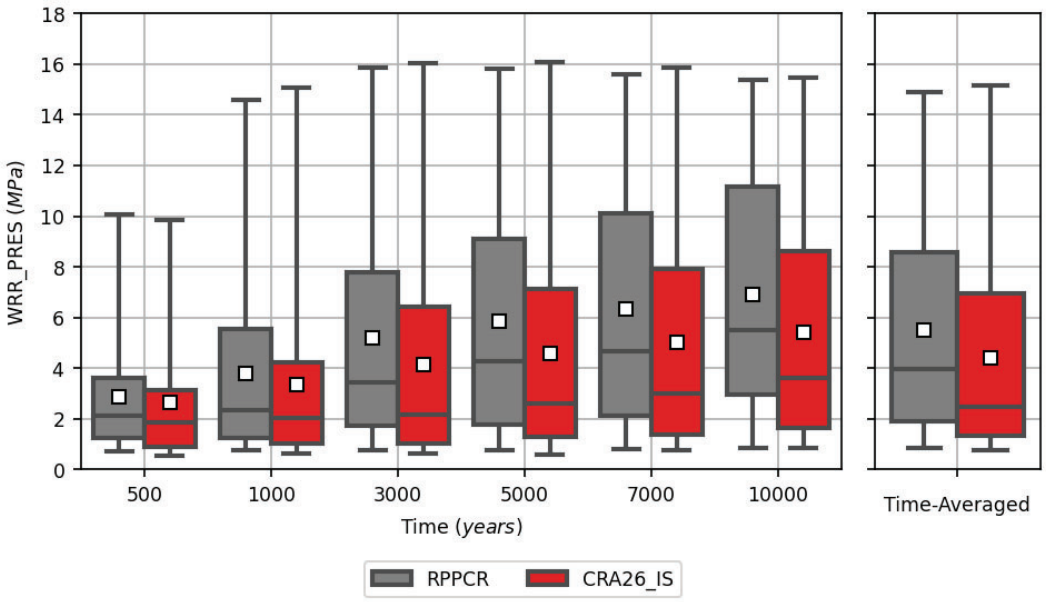

Figure 136. Pressure distributions for the West Rest-of-Repository, Replicate 1, Scenario S4-BF

Information Only

10.1.5Scenario S5-BF

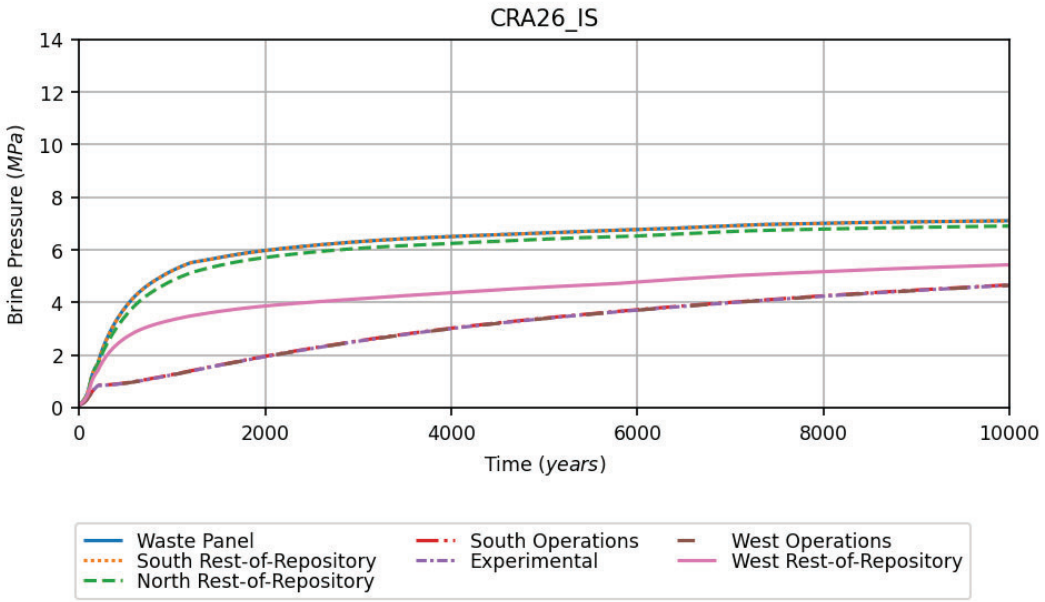

Figure 137. Pressure means for repository areas, Replicate 1, Scenario S5-BF

Information Only

10.1.6Scenario S6-BF

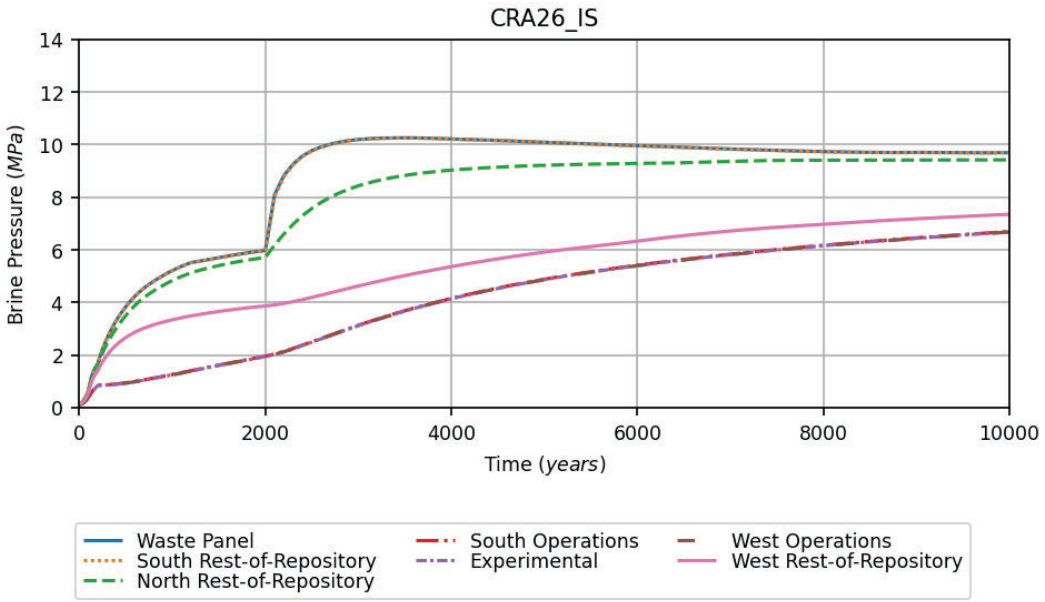

Figure 138. Pressure means for repository areas, Replicate 1, Scenario S6-BF

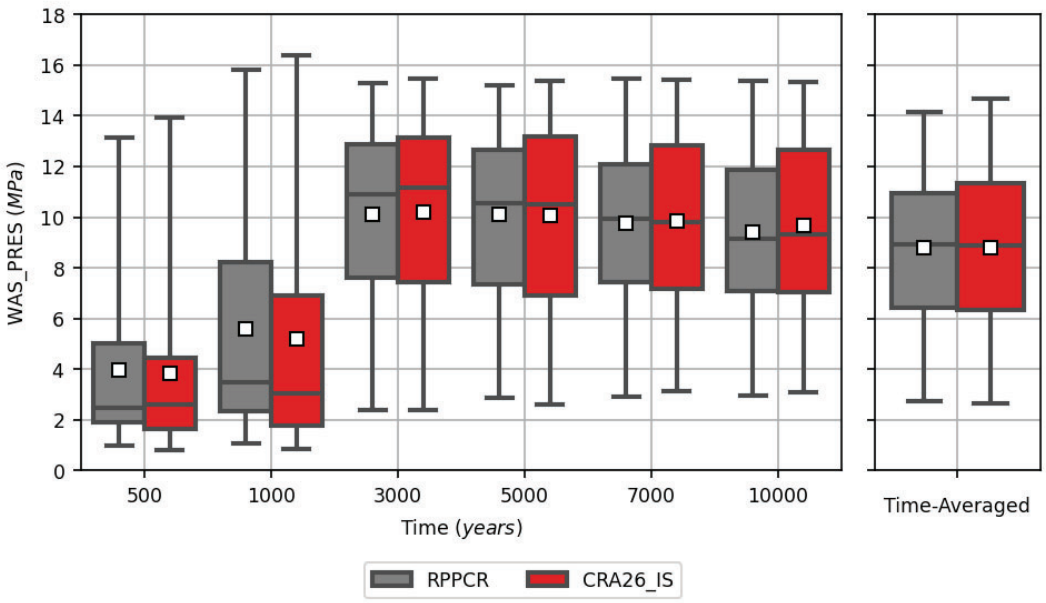

Figure 139. Pressure distributions for the Waste Panel, Replicate 1, Scenario S6-BF

Information Only

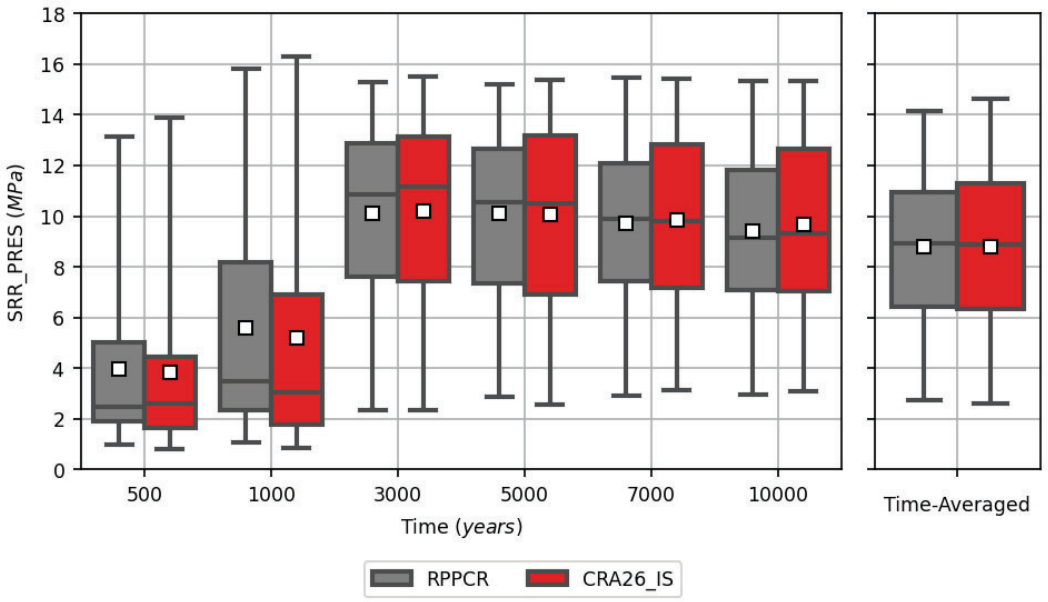

Figure 140. Pressure distributions for the South Rest-of-Repository, Replicate 1, Scenario S6-BF

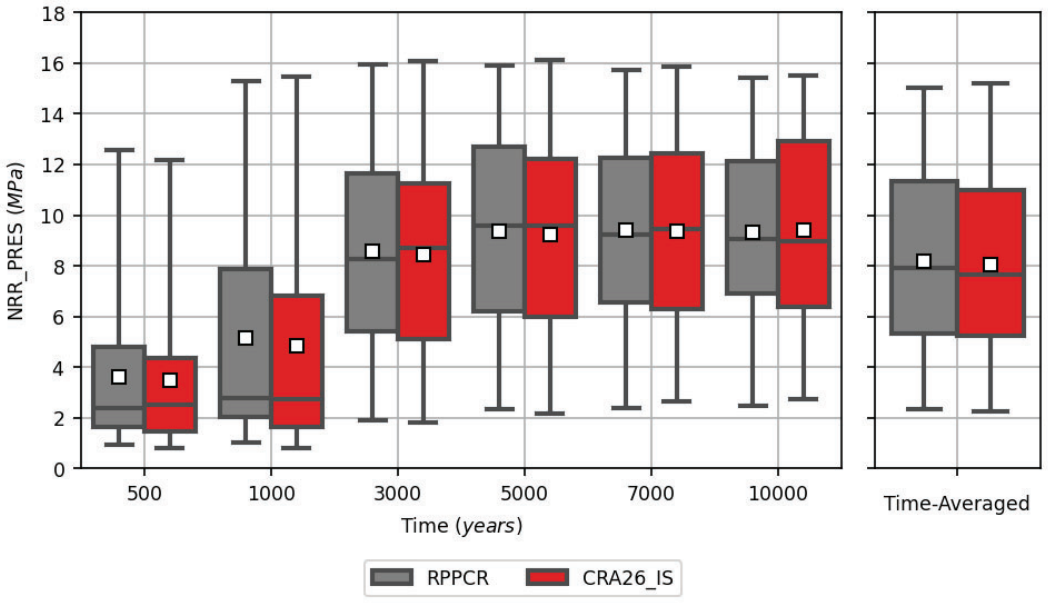

Figure 141. Pressure distributions for the North Rest-of-Repository, Replicate 1, Scenario S6-BF

Information Only

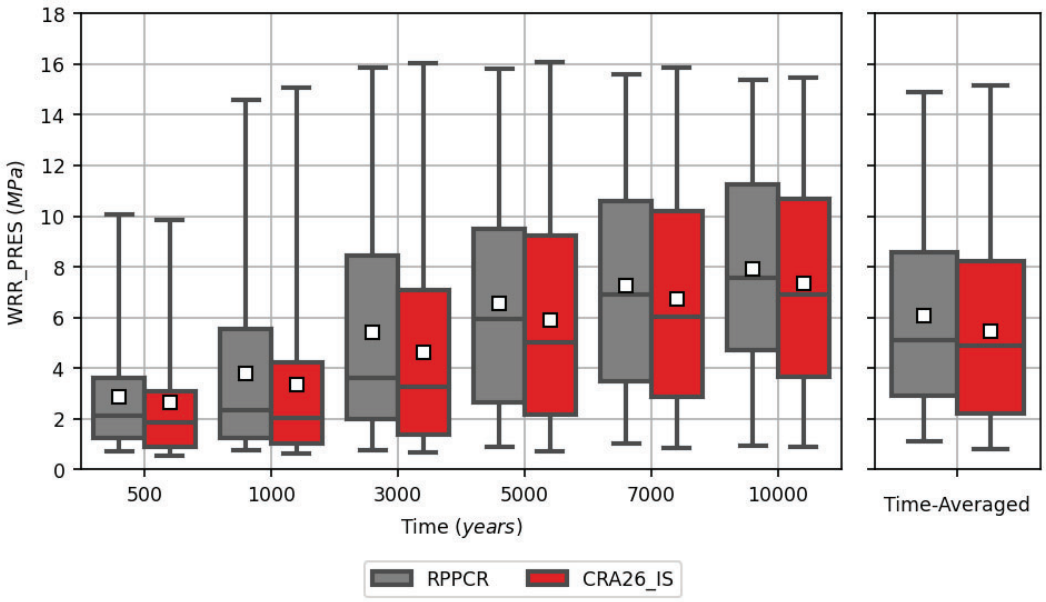

Figure 142. Pressure distributions for the West Rest-of-Repository, Replicate 1, Scenario S6-BF

Information Only

10.2 Brine Saturation

10.2.1 Scenario S1-BF

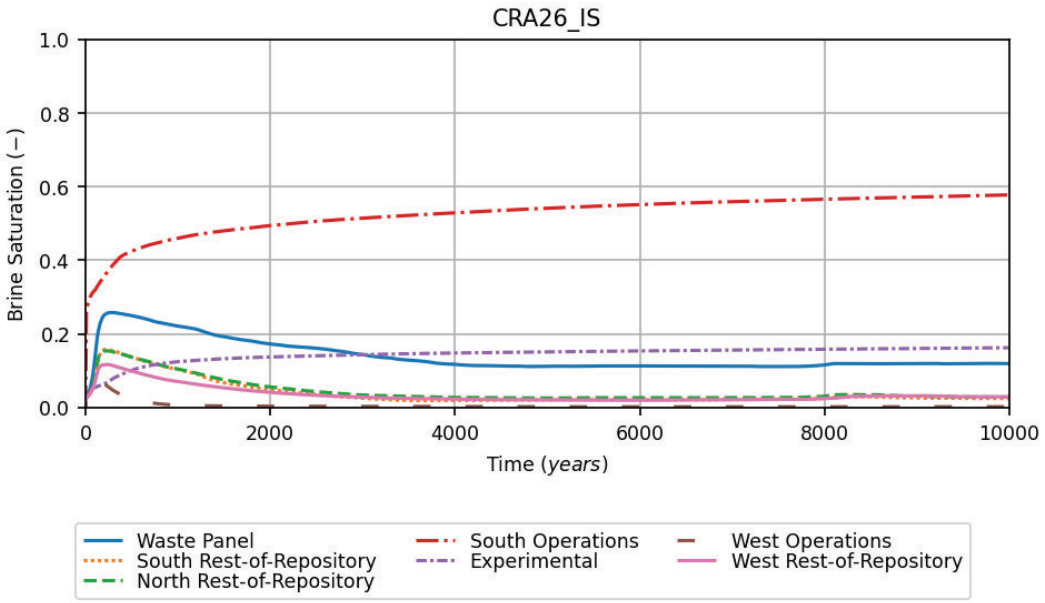

Figure 143. Brine saturation means for repository areas, Replicate 1, Scenario S1-BF

Information Only

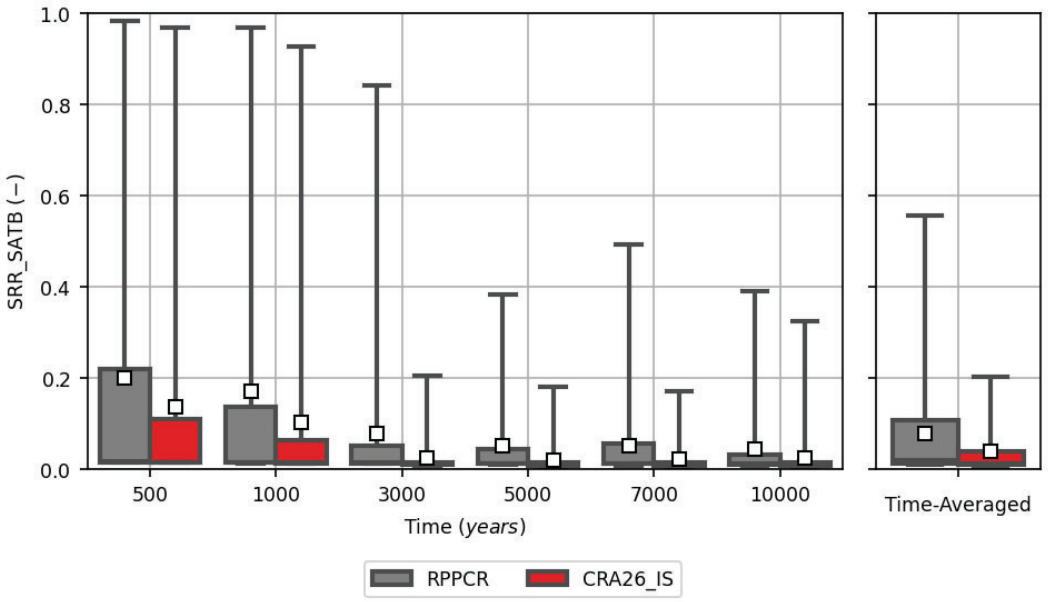

Figure 144. Brine saturation distributions for the South Rest-of-Repository, Replicate 1, Scenario S1-BF

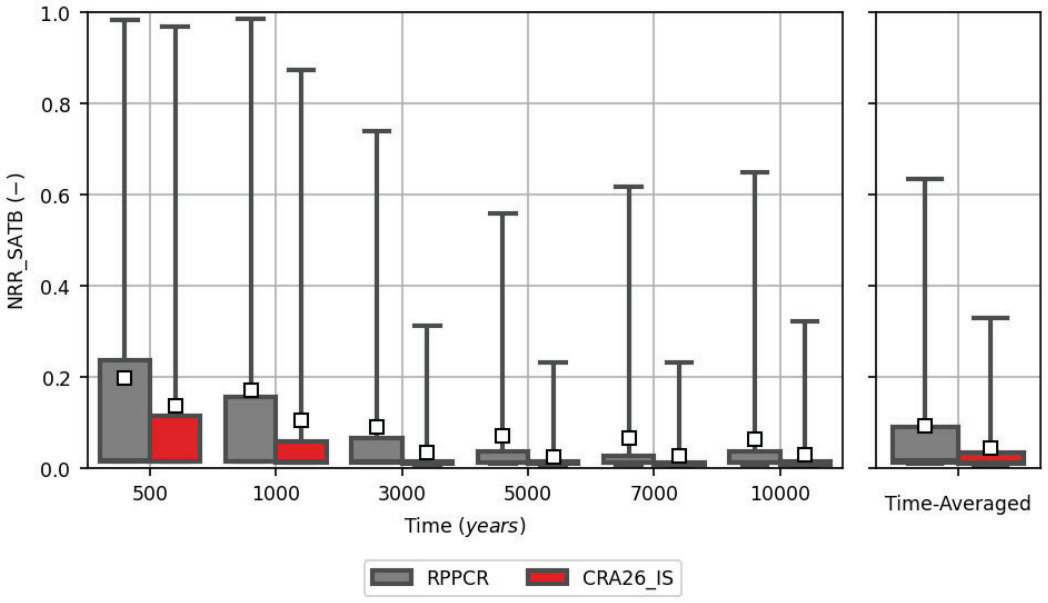

Figure 145. Brine saturation distributions for the North Rest-of-Repository, Replicate 1, Scenario S1-BF

Information Only

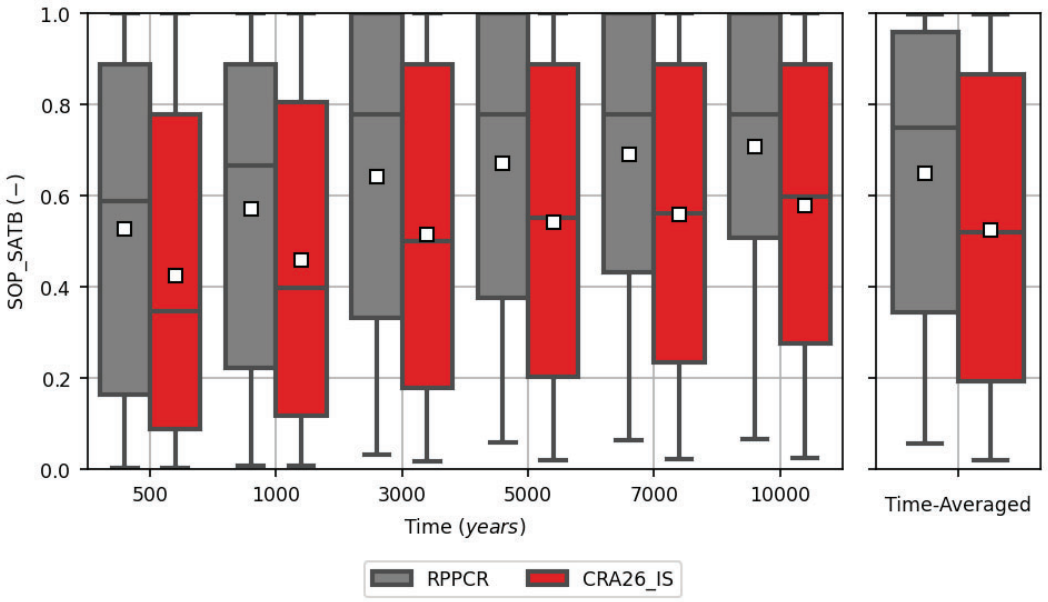

Figure 146. Brine saturation distributions for the South Operations Area, Replicate 1, Scenario S1-BF

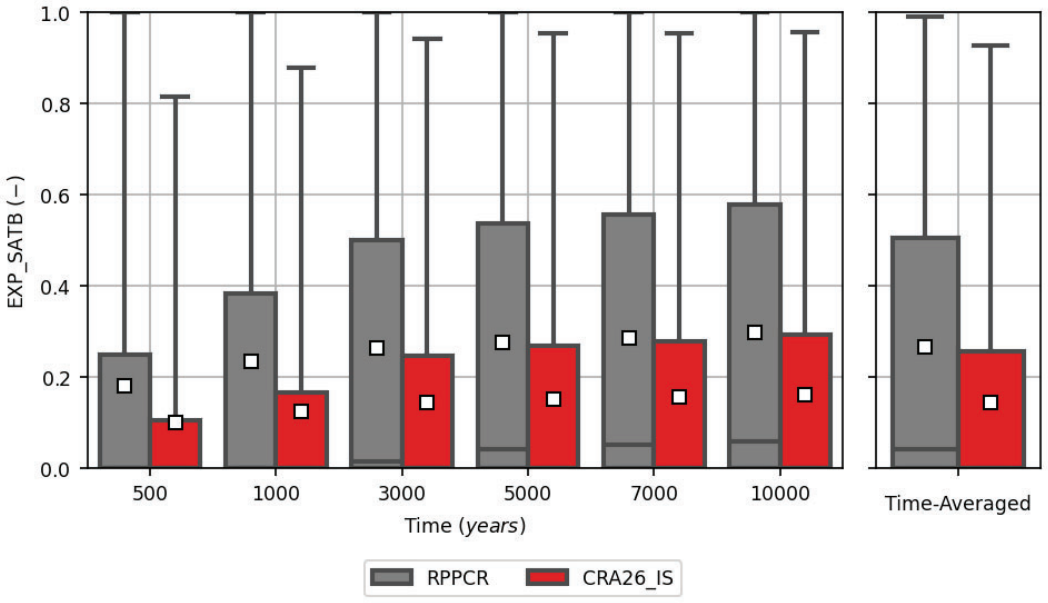

Figure 147. Brine saturation distributions for the Experimental Area, Replicate 1, Scenario S1-BF

Information Only

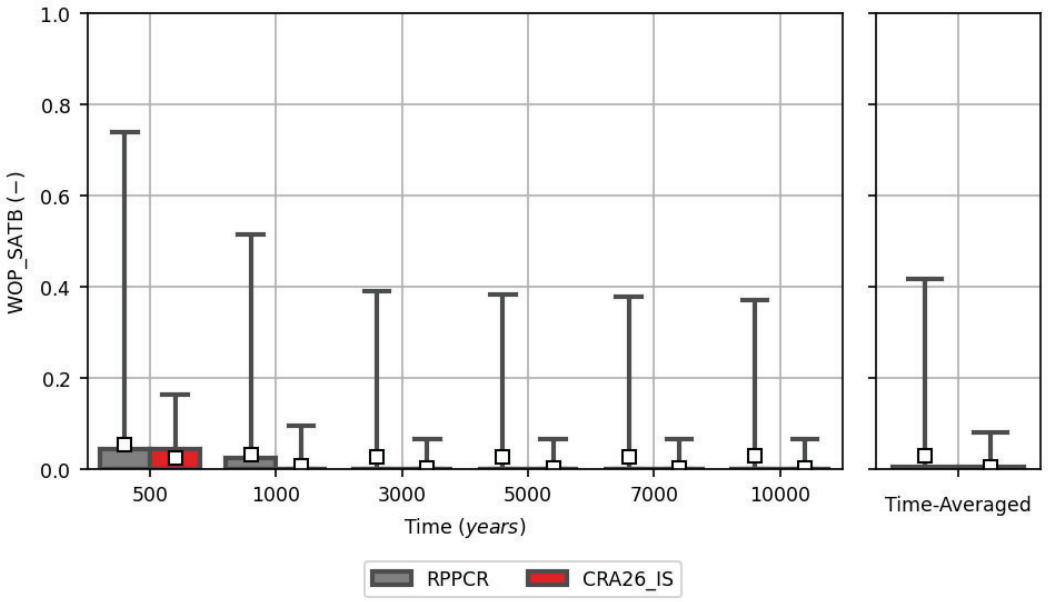

Figure 148. Brine saturation distributions for the West Operations Area, Replicate 1, Scenario S1-BF

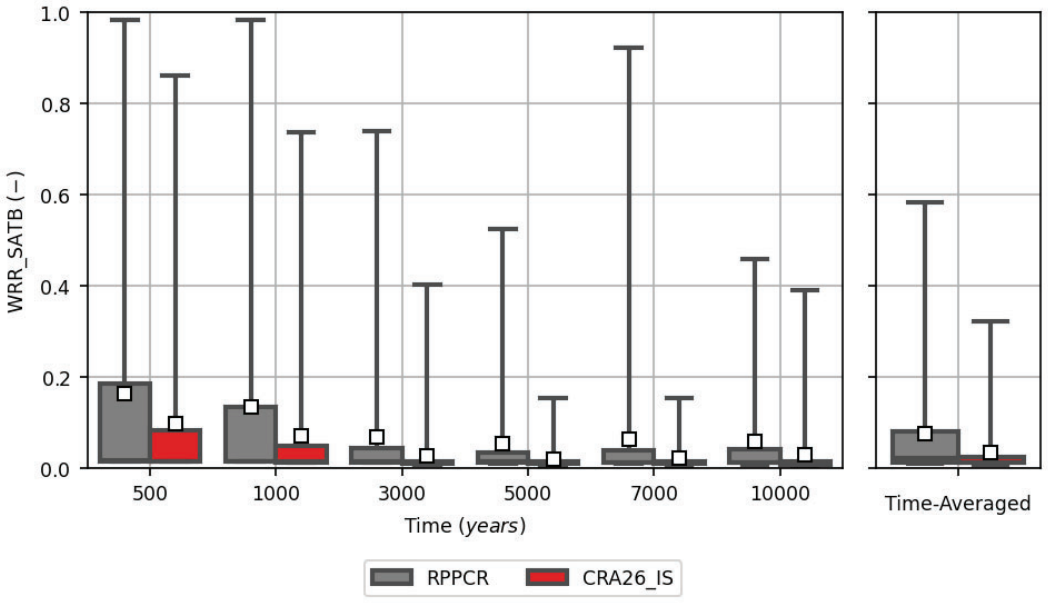

Figure 149. Brine saturation distributions for the West Rest-of-Repository, Replicate 1, Scenario S1-BF

Information Only

10.2.2Scenario S2-BF

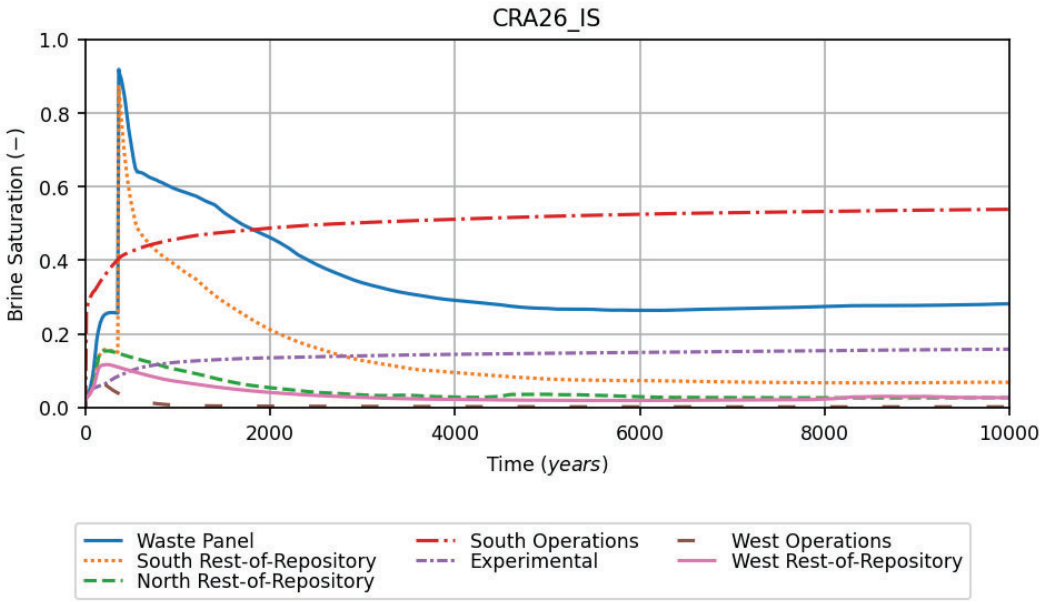

Figure 150. Brine saturation means for repository areas, Replicate 1, Scenario S2-BF

Information Only

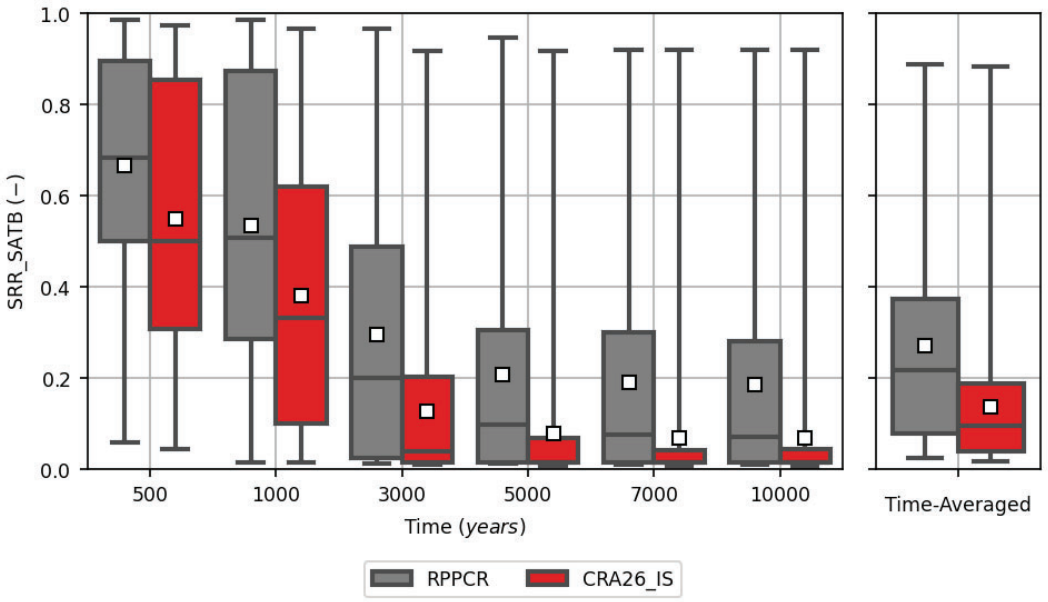

Figure 151. Brine saturation distributions for the South Rest-of-Repository, Replicate 1, Scenario S2-BF

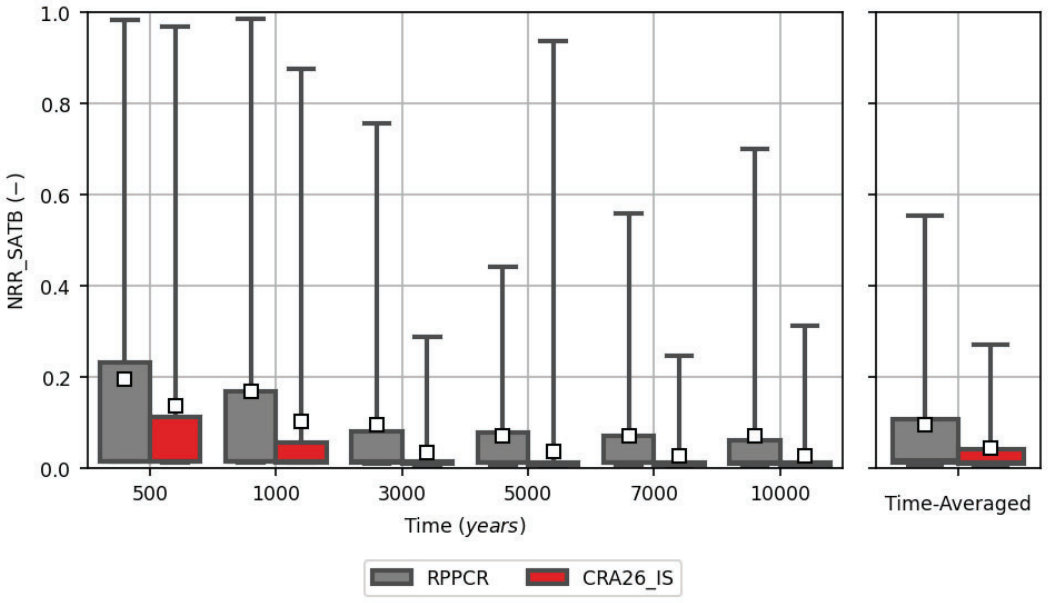

Figure 152. Brine saturation distributions for the North Rest-of-Repository, Replicate 1, Scenario S2-BF

Information Only

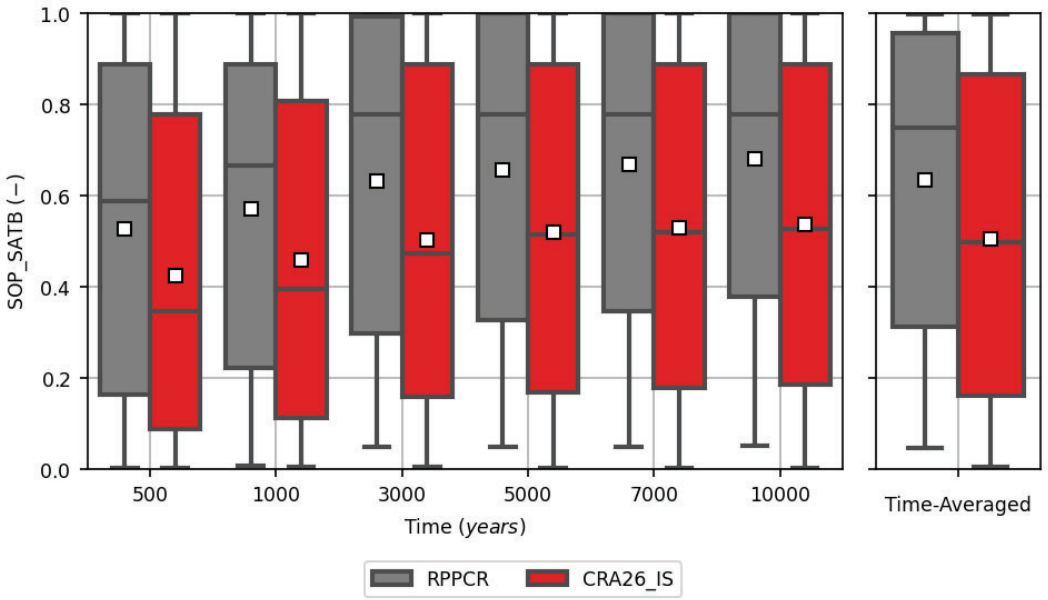

Figure 153. Brine saturation distributions for the South Operations Area, Replicate 1, Scenario S2-BF

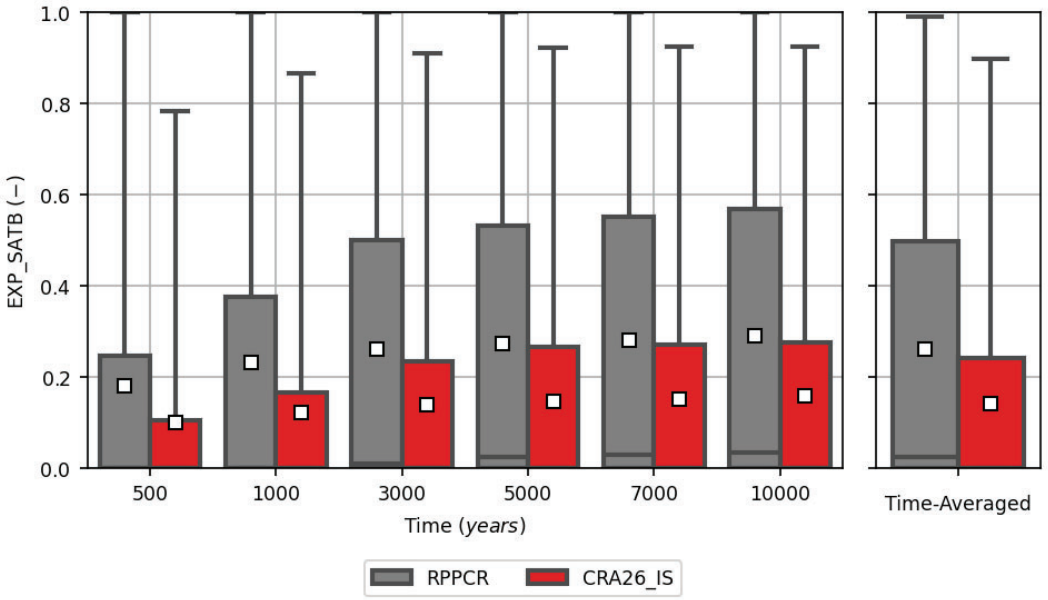

Figure 154. Brine saturation distributions for the Experimental Area, Replicate 1, Scenario S2-BF

Information Only

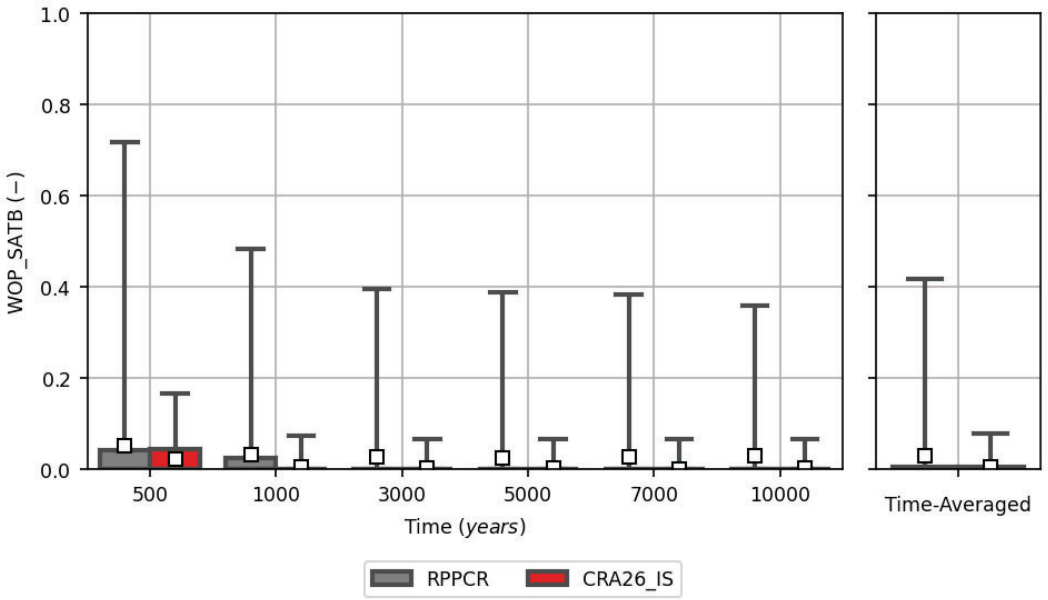

Figure 155. Brine saturation distributions for the West Operations Area, Replicate 1, Scenario S2-BF

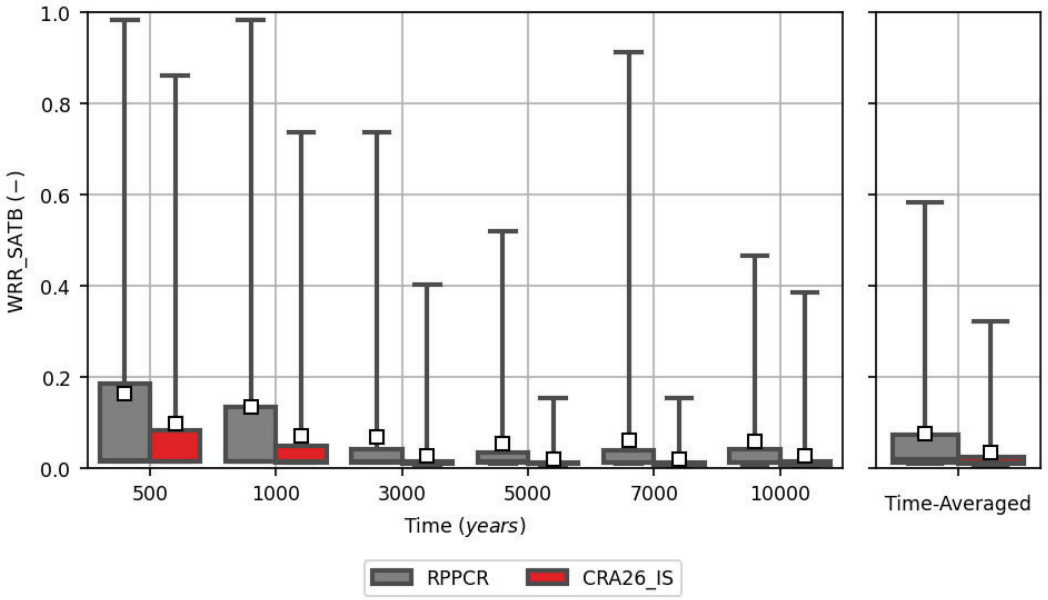

Figure 156. Brine saturation distributions for the West Rest-of-Repository, Replicate 1, Scenario S2-BF

Information Only

10.2.3Scenario S3-BF

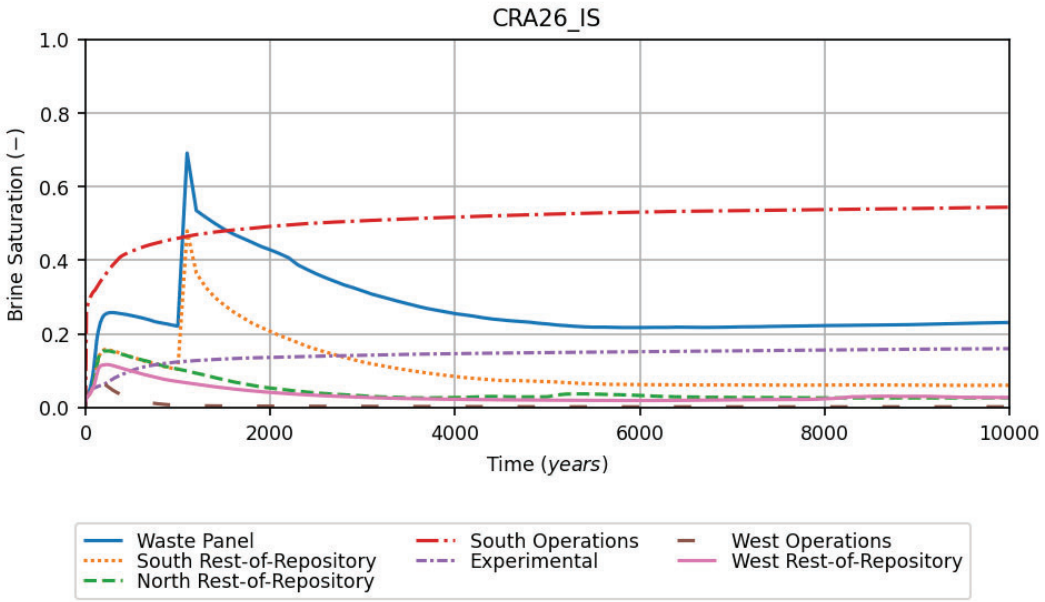

Figure 157. Brine saturation means for repository areas, Replicate 1, Scenario S3-BF

Information Only

10.2.4Scenario S4-BF

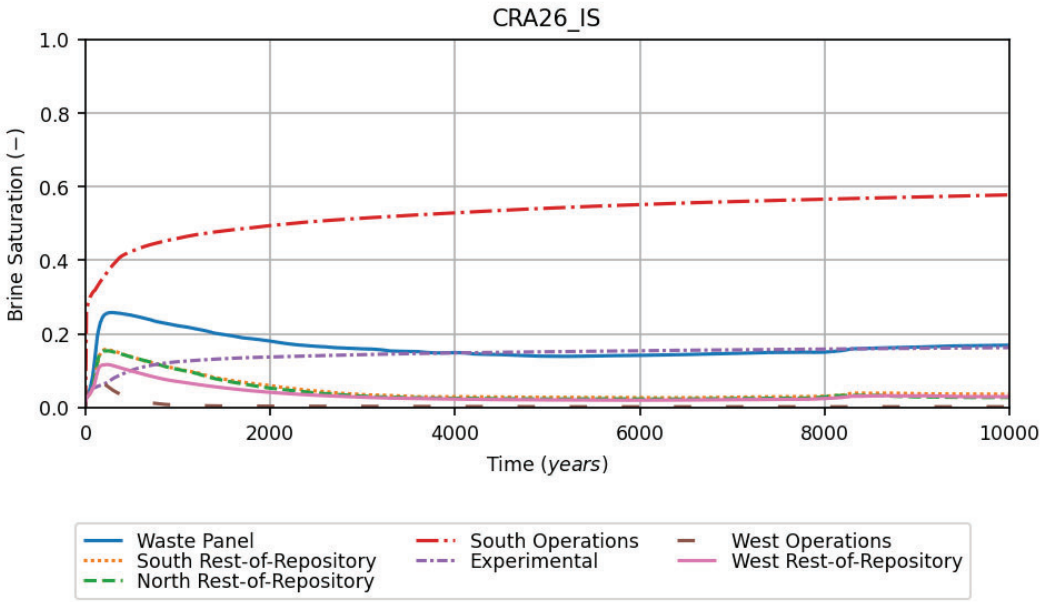

Figure 158. Brine saturation means for repository areas, Replicate 1, Scenario S4-BF

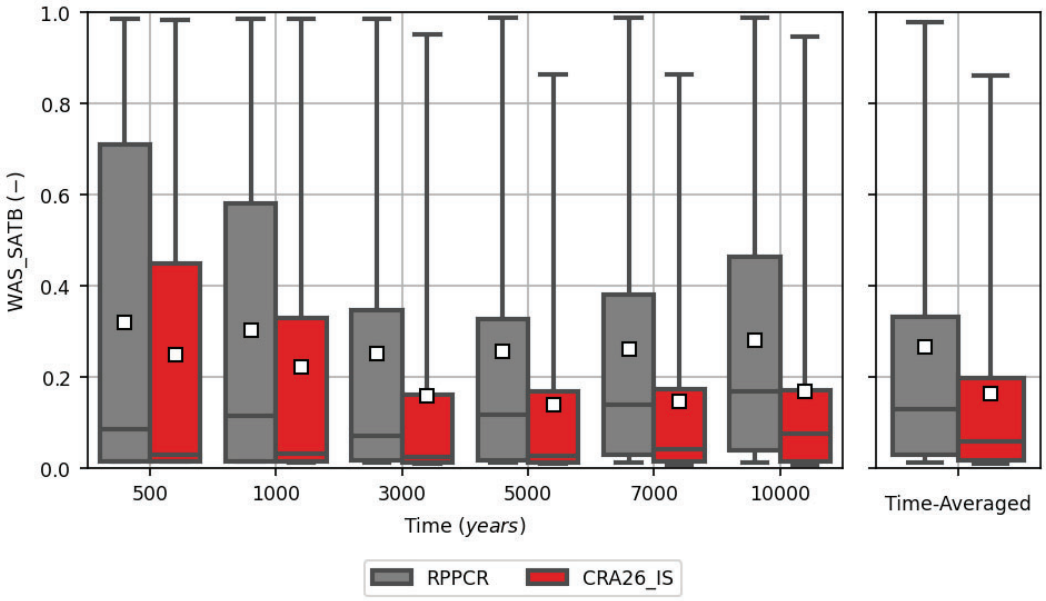

Figure 159. Brine saturation distributions for the Waste Panel, Replicate 1, Scenario S4-BF

Information Only

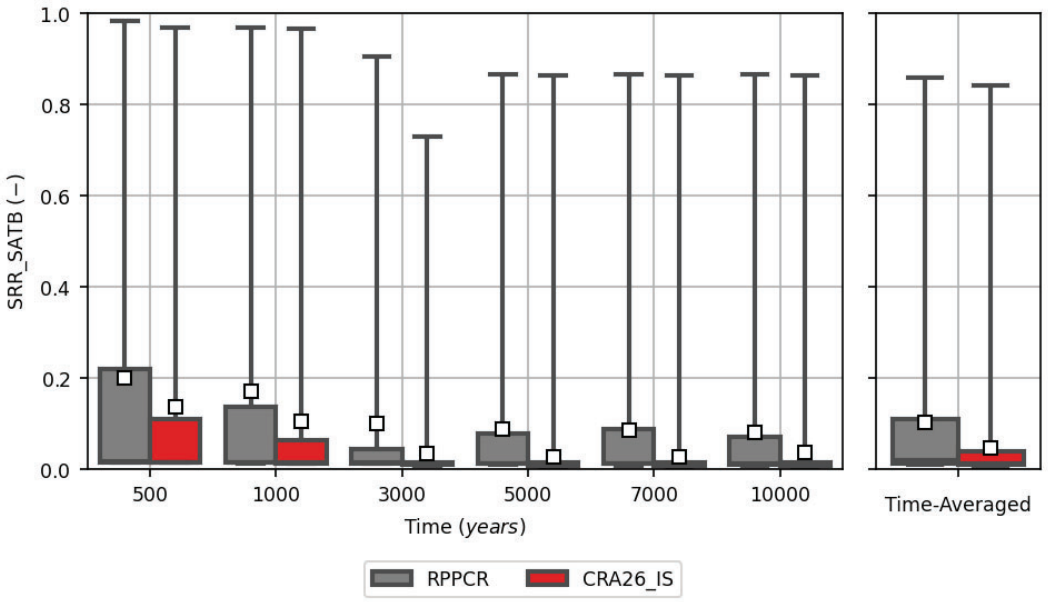

Figure 160. Brine saturation distributions for the South Rest-of-Repository, Replicate 1, Scenario S4-BF

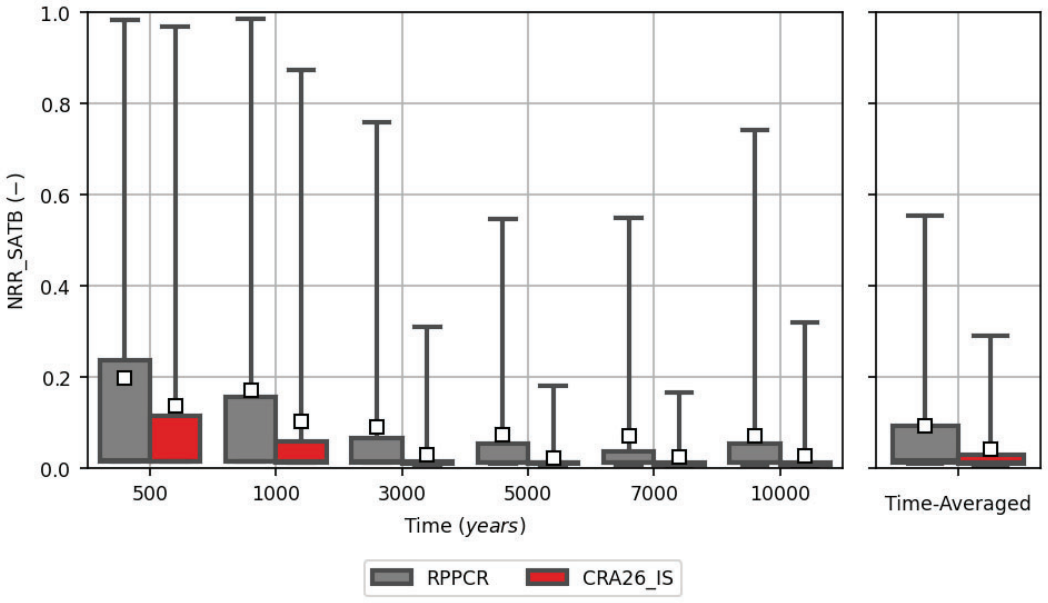

Figure 161. Brine saturation distributions for the North Rest-of-Repository, Replicate 1, Scenario S4-BF

Information Only

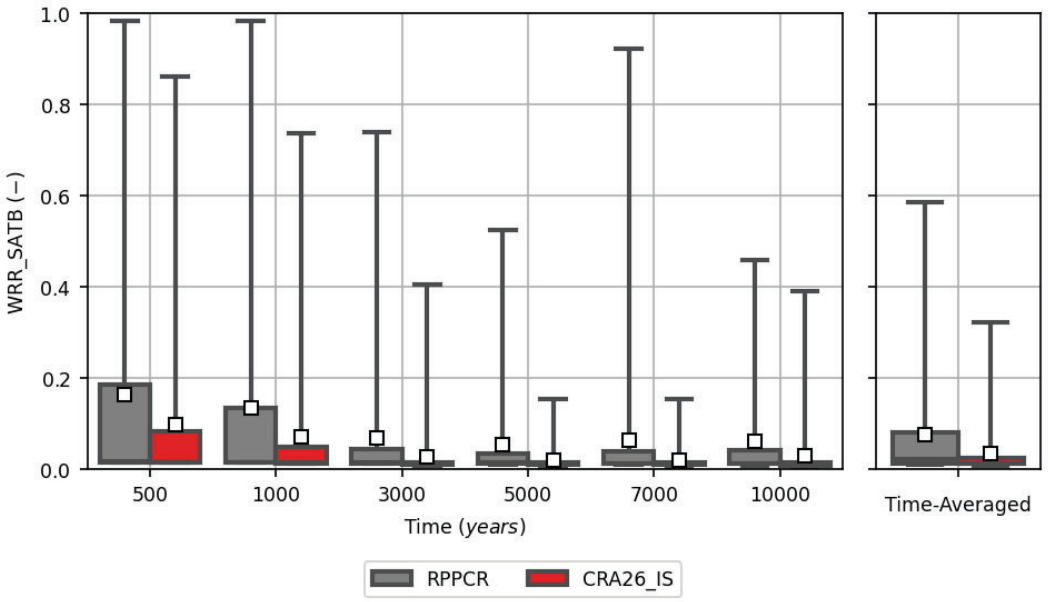

Figure 162. Brine saturation distributions for the West Rest-of-Repository, Replicate 1, Scenario S4-BF

Information Only

10.2.5Scenario S5-BF

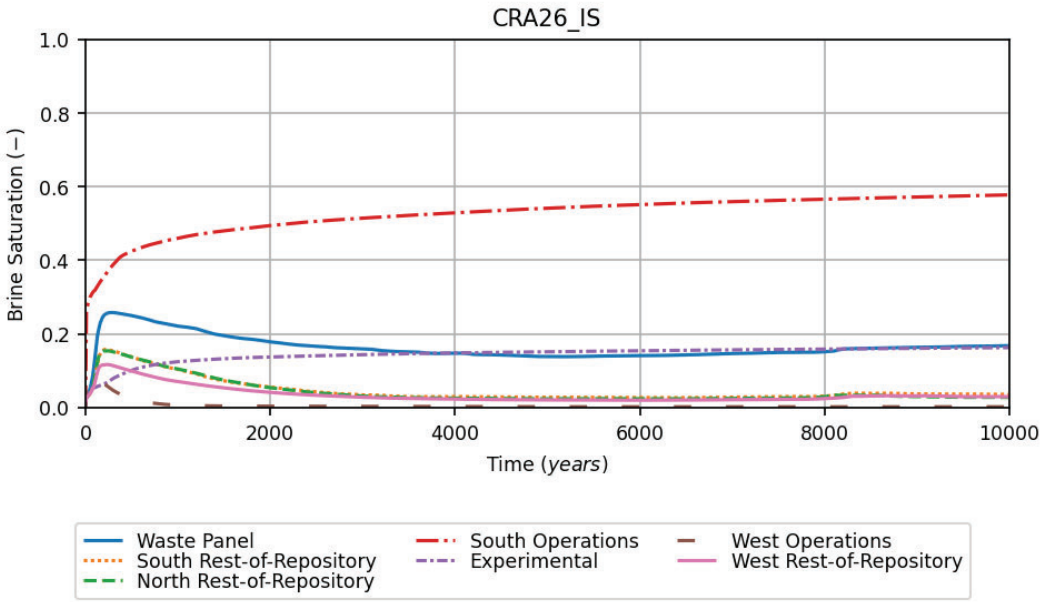

Figure 163. Brine saturation means for repository areas, Replicate 1, Scenario S5-BF

Information Only

10.2.6Scenario S6-BF

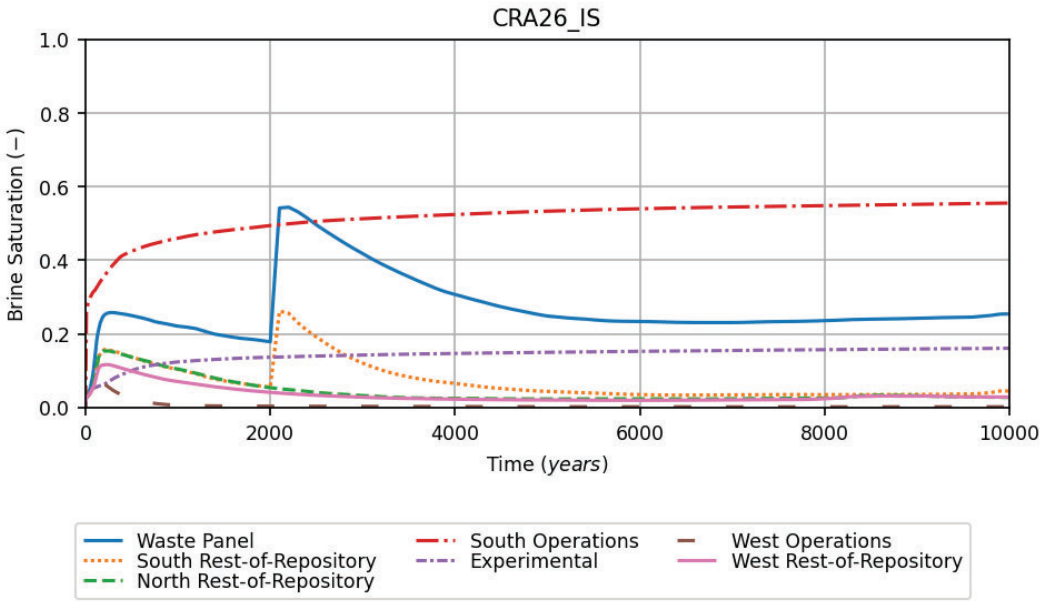

Figure 164. Brine saturation means for repository areas, Replicate 1, Scenario S6-BF

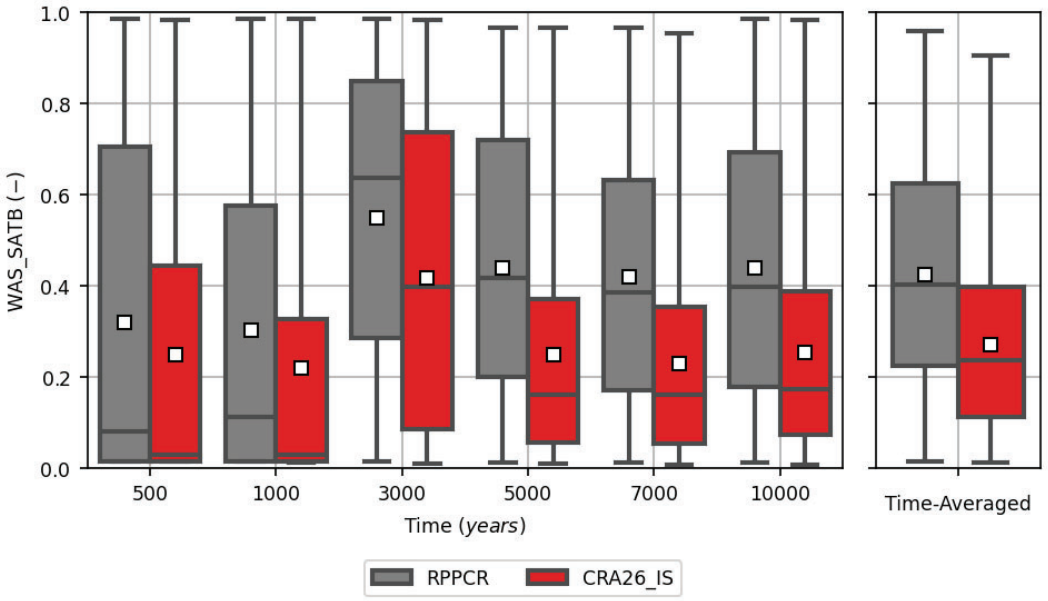

Figure 165. Brine saturation distributions for the Waste Panel, Replicate 1, Scenario S6-BF

Information Only

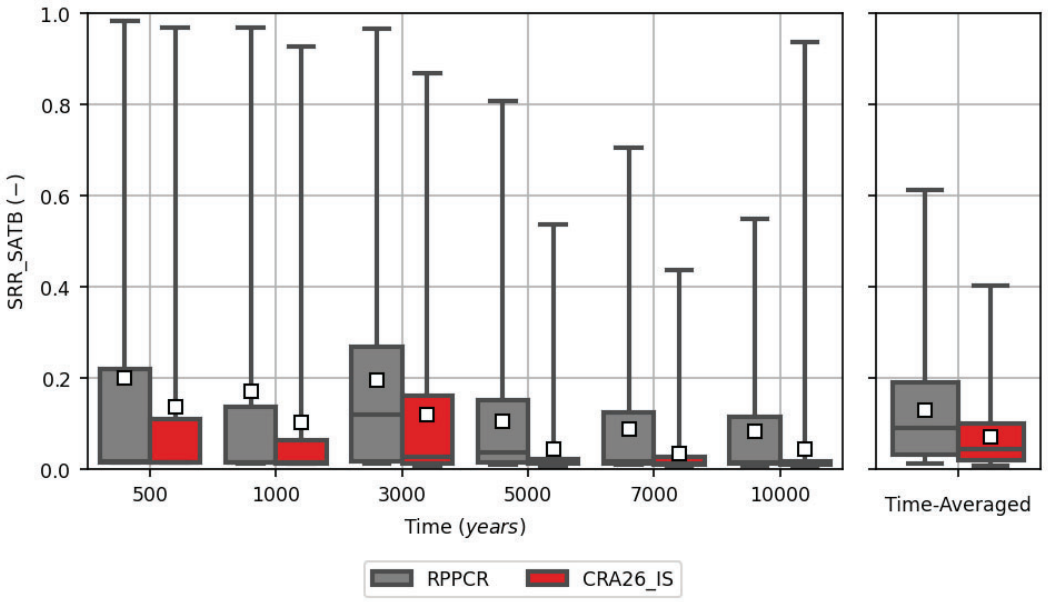

Figure 166. Brine saturation distributions for the South Rest-of-Repository, Replicate 1, Scenario S6-BF

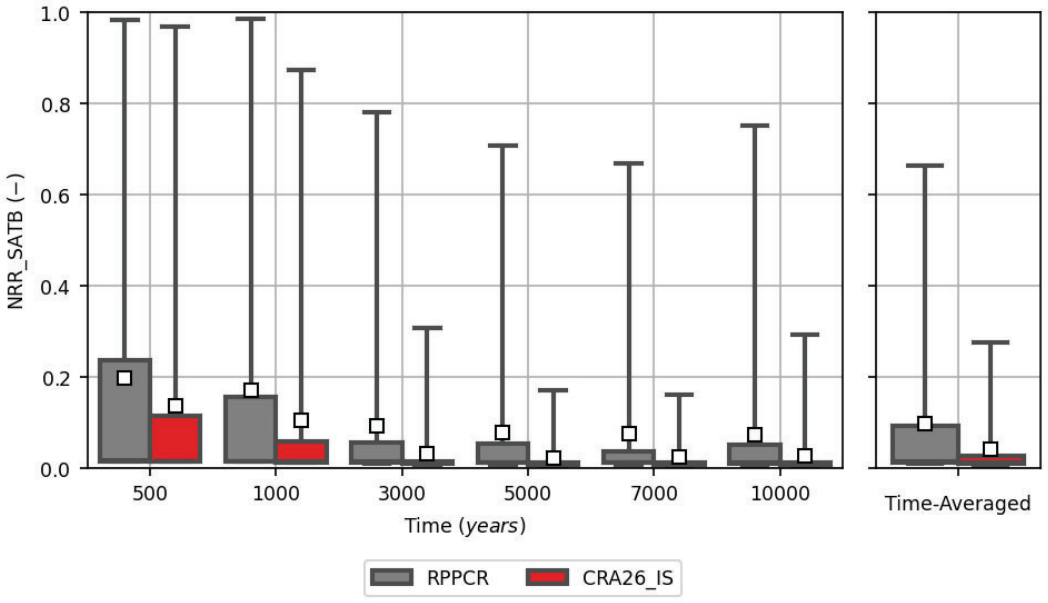

Figure 167. Brine saturation distributions for the North Rest-of-Repository, Replicate 1, Scenario S6-BF

Information Only

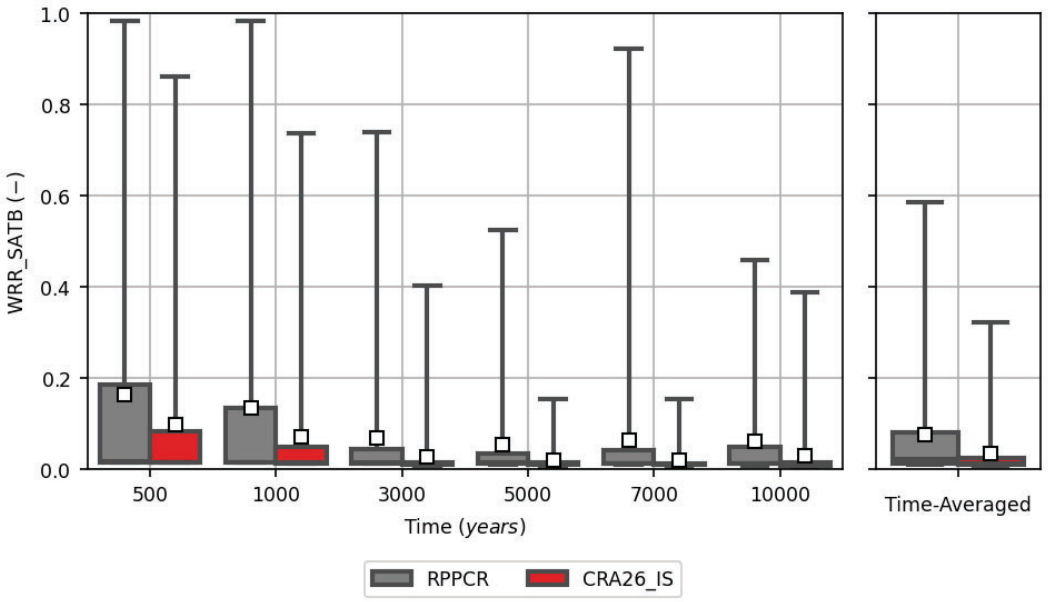

Figure 168. Brine saturation distributions for the West Rest-of-Repository, Replicate 1, Scenario S6-BF

Information Only

11.0 APPENDIX C – REPLICATE COMPARISON

In the appendix select replicate 2 and replicate 3 results are compared to the results of replicate 1 from the CRA26_IS.

Information Only

11.1 Waste Panel Pressure

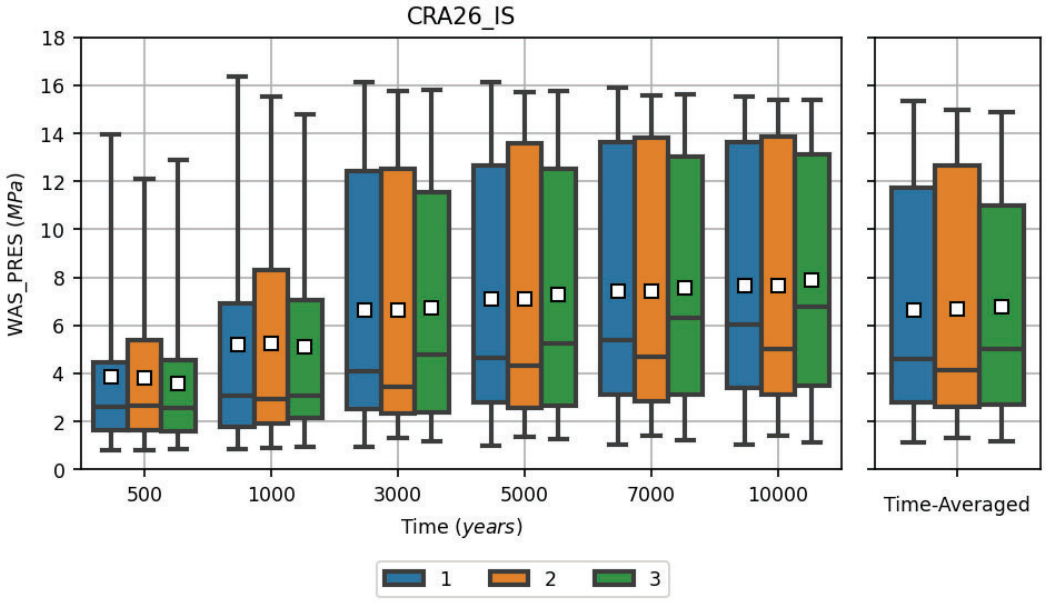

Figure 169. Pressure distribution comparison for the Waste Panel, Replicates 1-3, Scenario S1-BF

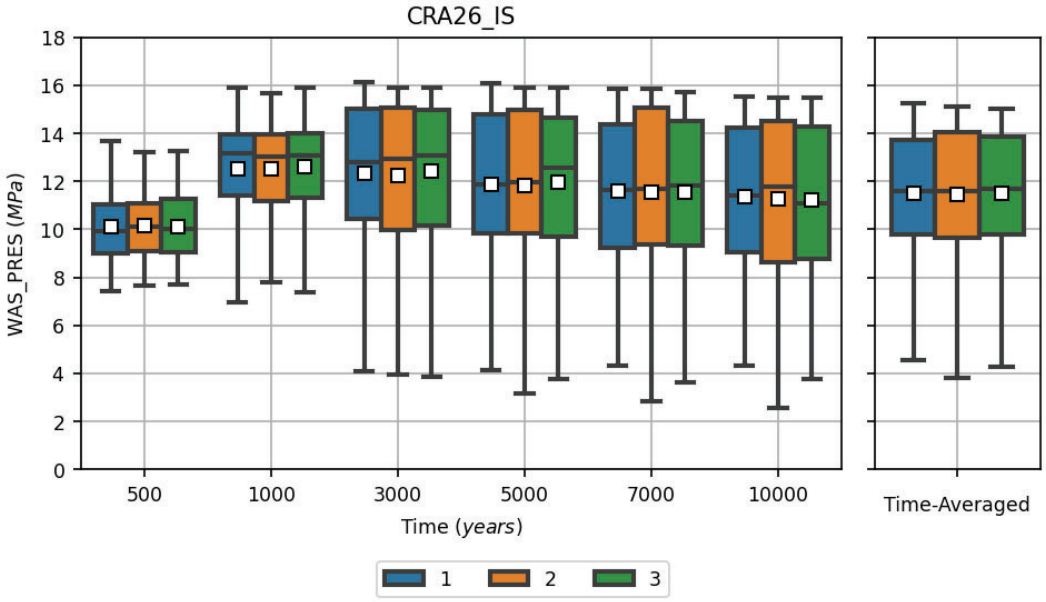

Figure 170. Pressure distribution comparison for the Waste Panel, Replicates 1-3, Scenario S2-BF

Information Only

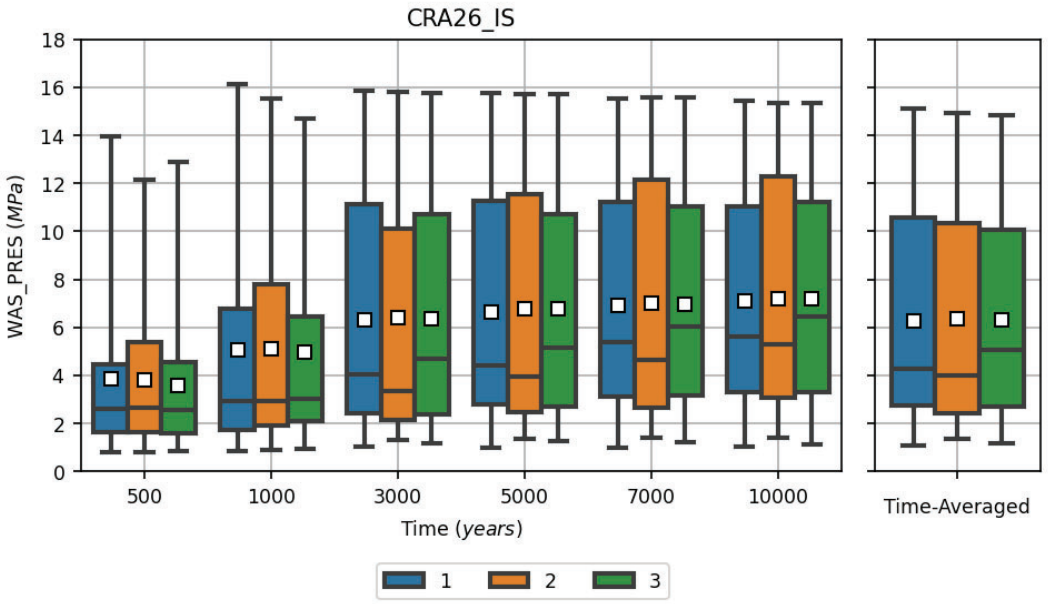

Figure 171. Pressure distribution comparison for the Waste Panel, Replicates 1-3, Scenario S4-BF

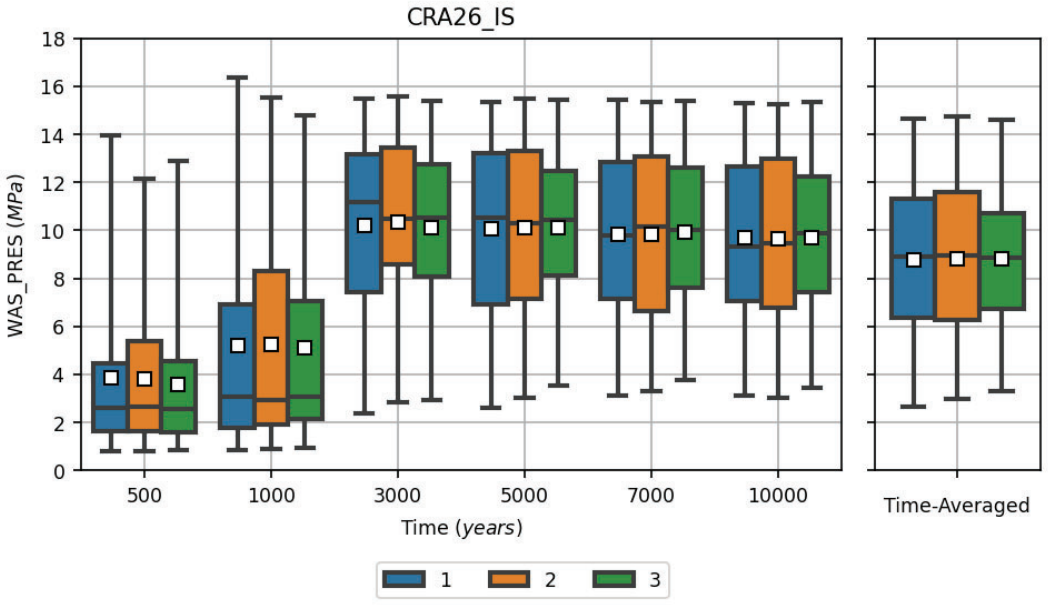

Figure 172. Pressure distribution comparison for the Waste Panel, Replicates 1-3, Scenario S6-BF

Information Only

11.2 Waste Panel Brine Saturation

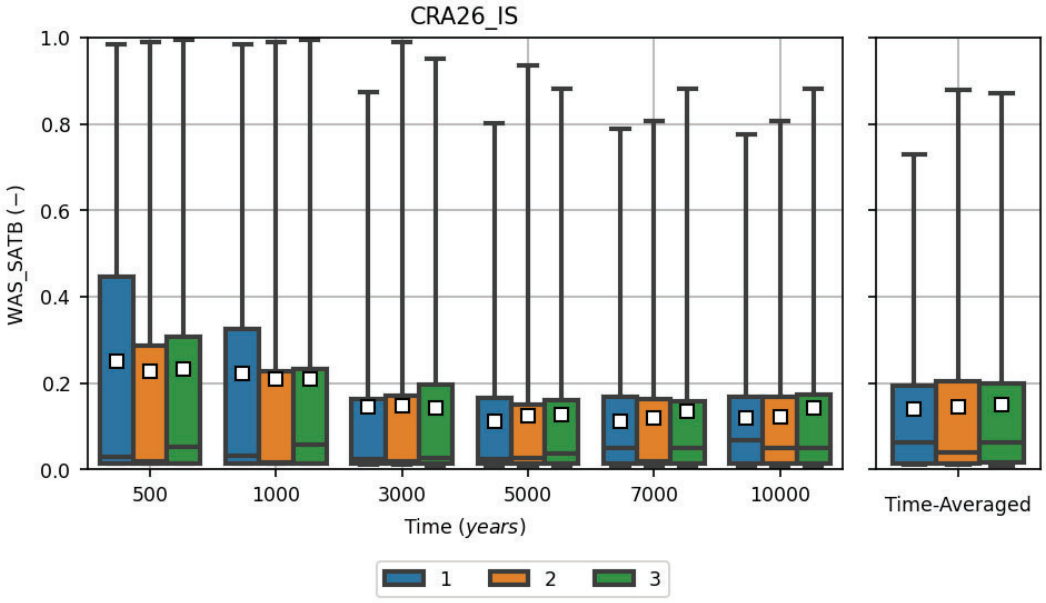

Figure 173. Brine saturation distribution comparison for the Waste Panel, Replicates 1-3, Scenario S1-BF

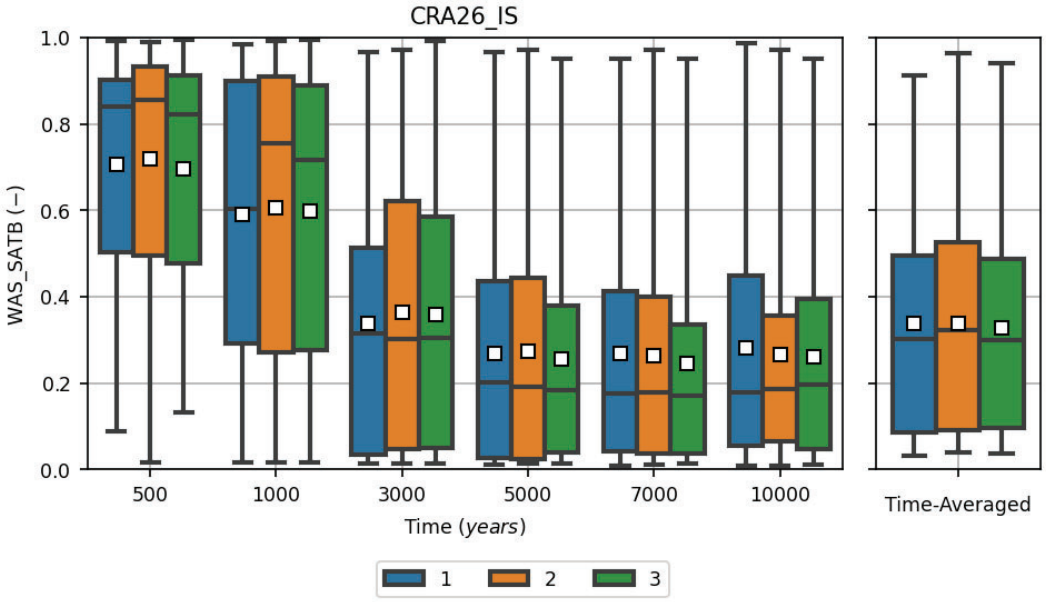

Figure 174. Brine saturation distribution comparison for the Waste Panel, Replicates 1-3, Scenario S2-BF

Information Only

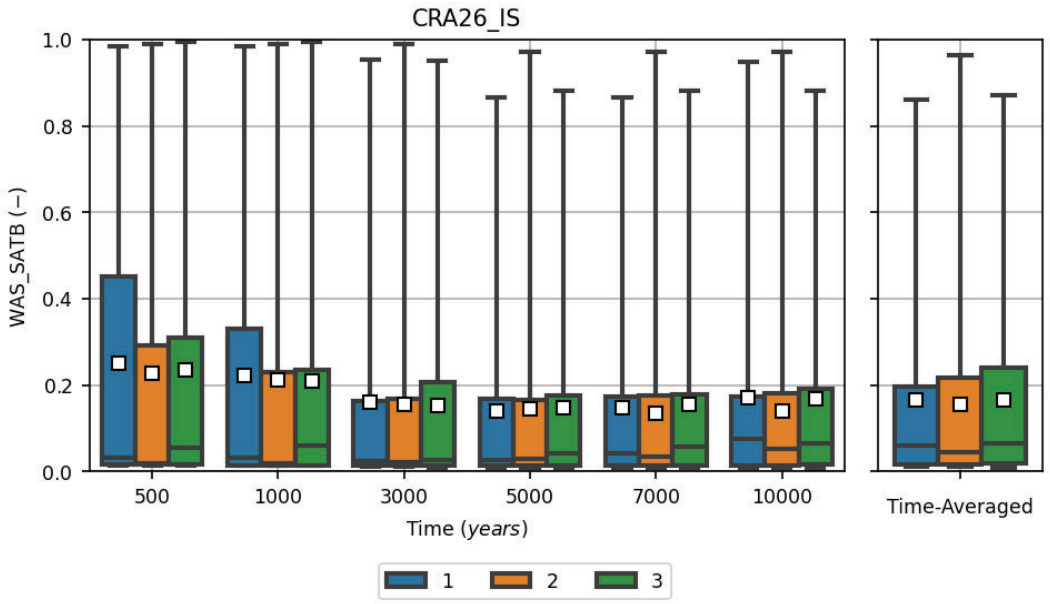

Figure 175. Brine saturation distribution comparison for the Waste Panel, Replicates 1-3, Scenario S4-BF

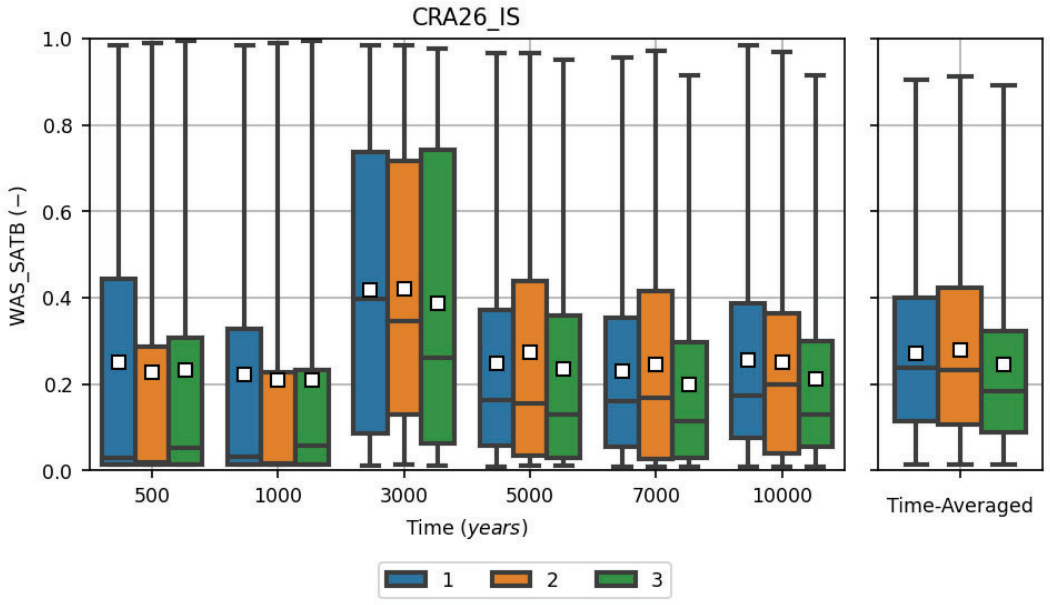

Figure 176. Brine saturation distribution comparison for the Waste Panel, Replicates 1-3, Scenario S6-BF

Information Only

12.0 APPENDIX D – CONFIDENCE INTERVALS

With three replicates, and therefore three independent estimates of the mean, a confidence interval for the mean can be calculated. The confidence intervals are computed around the overall (300 vector) mean. A 95% confidence level will be used for these confidence intervals. The confidence interval is a measure of the adequacy of the sample size and represents a range where new replicate means would likely exist. The confidence interval is not a representation of where the individual vector estimates would exist.

Mean and lower/upper confidence intervals for Waste Panel pressures and brine saturations are summarized in Table 113 and Table 114 for RPPCR and CRA26_IS, respectively.

Table 113. Time-averaged Confidence Interval Limits for RPPCR

Quantity	Scenario	Mean	Lower 95% CI	Upper 95% CI
WAS_PRES	S1-BF	7.5	7.2	7.9
WAS_PRES	S2-BF	11.2	11.1	11.4
WAS_PRES	S4-BF	10.4	10.3	10.5
WAS_PRES	S6-BF	7.1	6.8	7.4
WAS_SATB	S1-BF	0.24	0.23	0.25
WAS_SATB	S2-BF	0.54	0.52	0.56
WAS_SATB	S4-BF	0.46	0.45	0.47
WAS_SATB	S6-BF	0.27	0.24	0.30

Table 114. Time-averaged Confidence Interval Limits for CRA26_IS

Quantity	Scenario	Mean	Lower 95% CI	Upper 95% CI
WAS_PRES	S1-BF	6.7	6.6	6.8
WAS_PRES	S2-BF	11.5	11.4	11.6
WAS_PRES	S4-BF	10.6	10.5	10.7
WAS_PRES	S6-BF	6.3	6.2	6.4
WAS_SATB	S1-BF	0.14	0.13	0.16
WAS_SATB	S2-BF	0.33	0.32	0.35
WAS_SATB	S4-BF	0.28	0.26	0.29
WAS_SATB	S6-BF	0.16	0.15	0.18

Information Only

12.1 Waste Panel Pressure

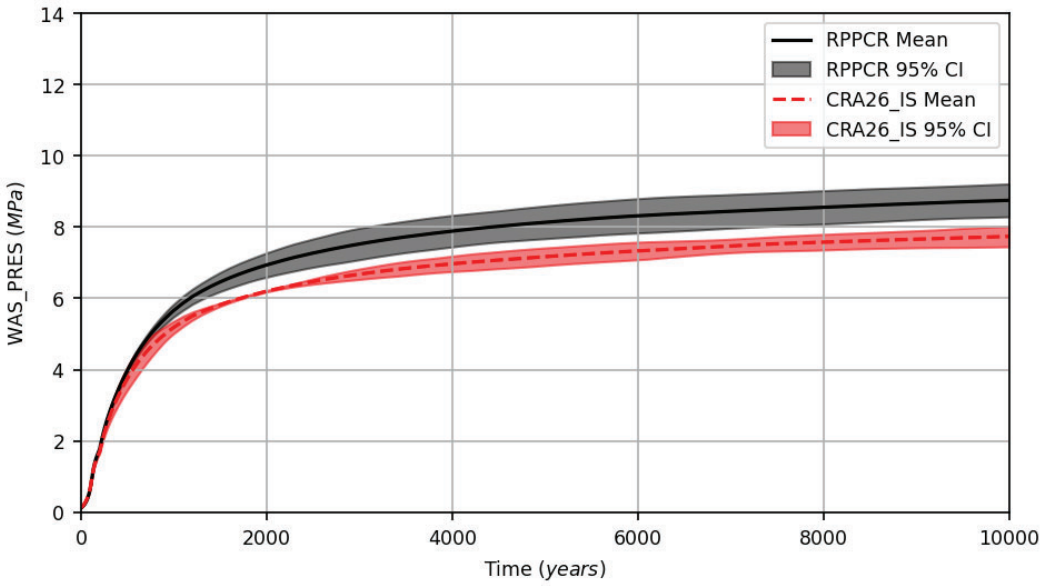

Figure 177. Pressure means and confidence intervals for the Waste Panel, Scenario S1-BF

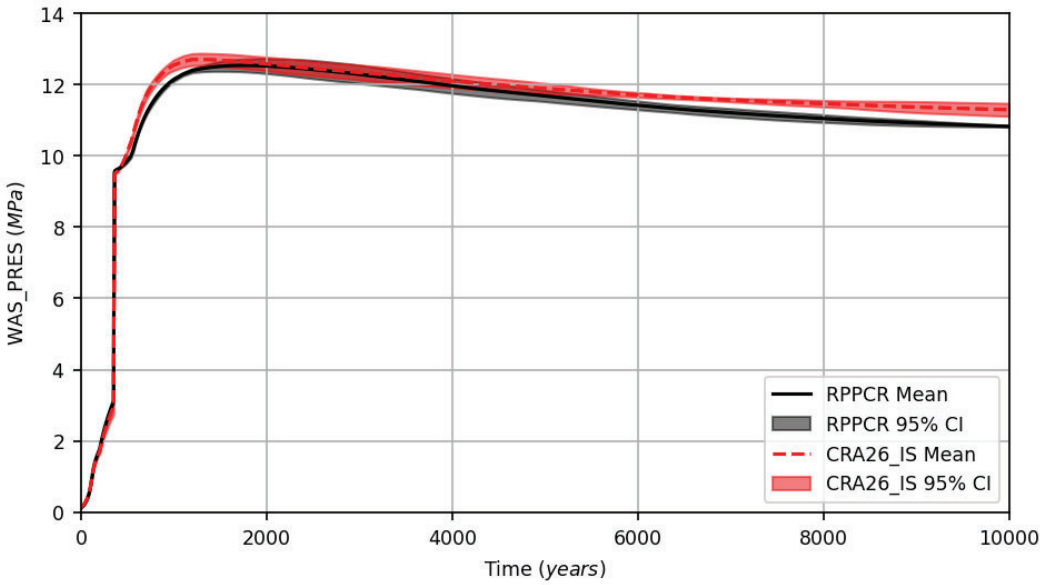

Figure 178. Pressure means and confidence intervals for the Waste Panel, Scenario S2-BF

Information Only

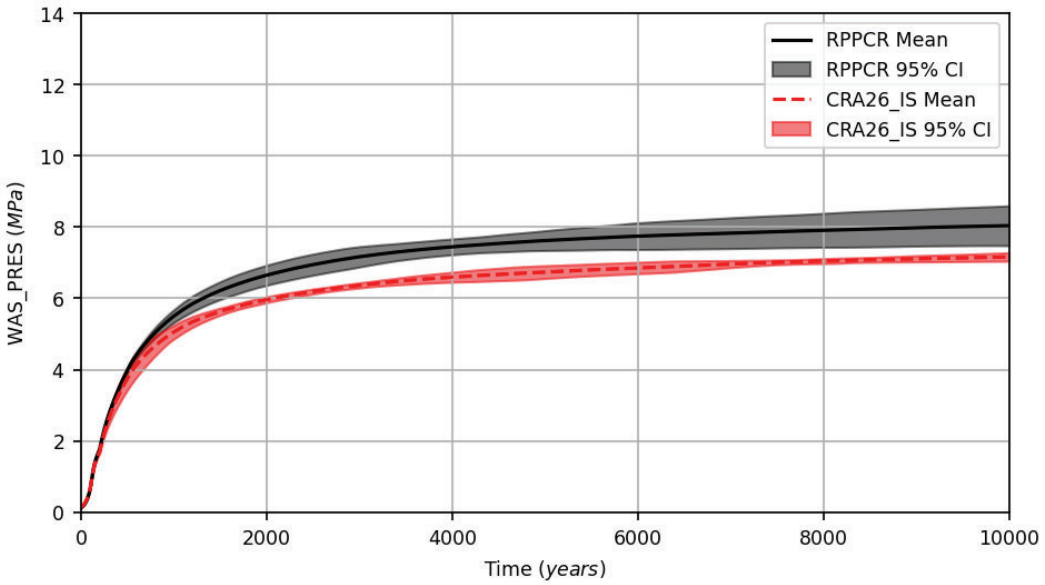

Figure 179. Pressure means and confidence intervals for the Waste Panel, Scenario S4-BF

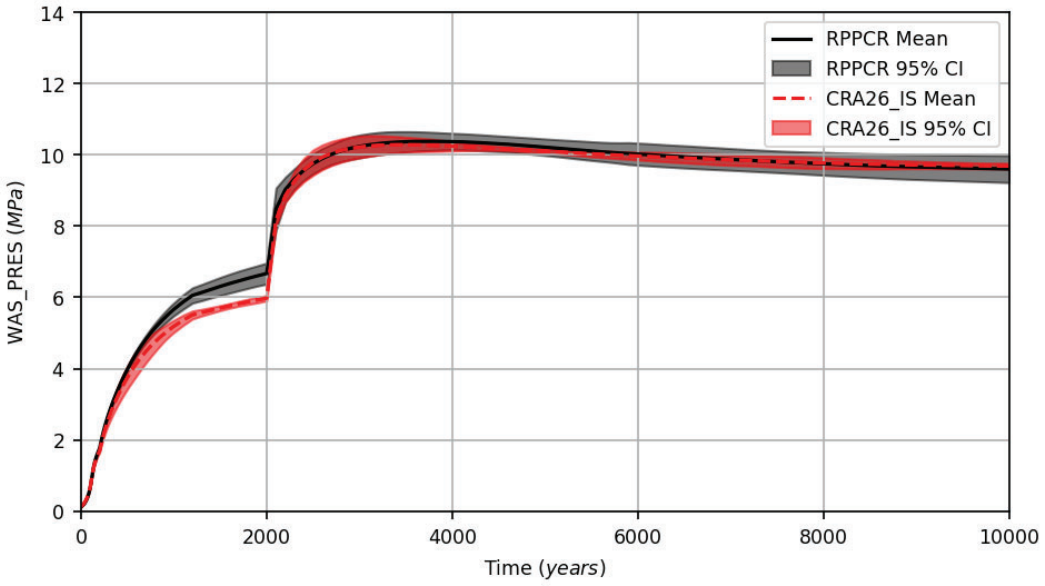

Figure 180. Pressure means and confidence intervals for the Waste Panel, Scenario S6-BF

Information Only

12.2 Waste Panel Brine Saturation

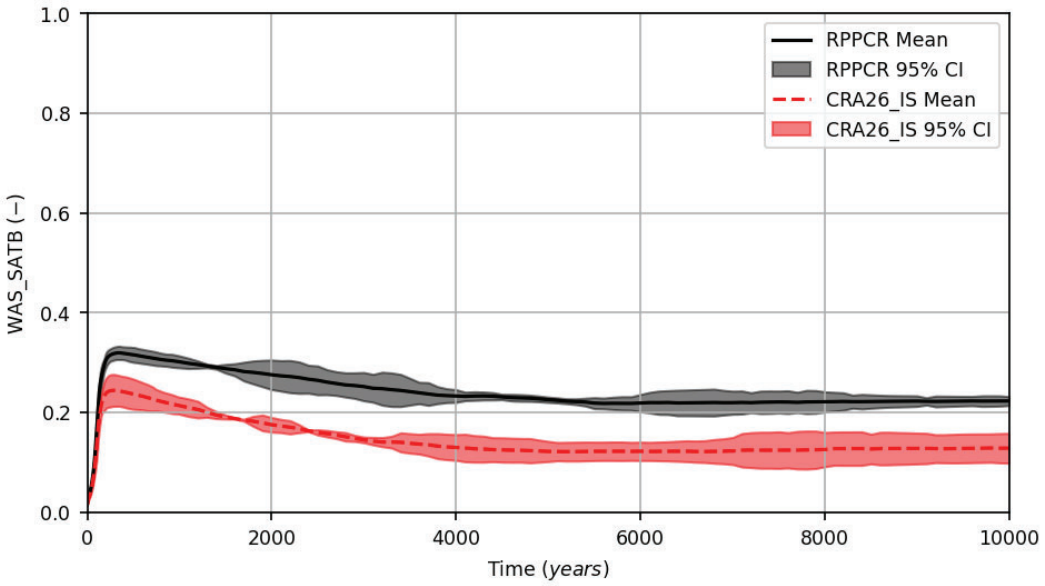

Figure 181. Brine saturation means and confidence intervals for the Waste Panel, Scenario S1-BF

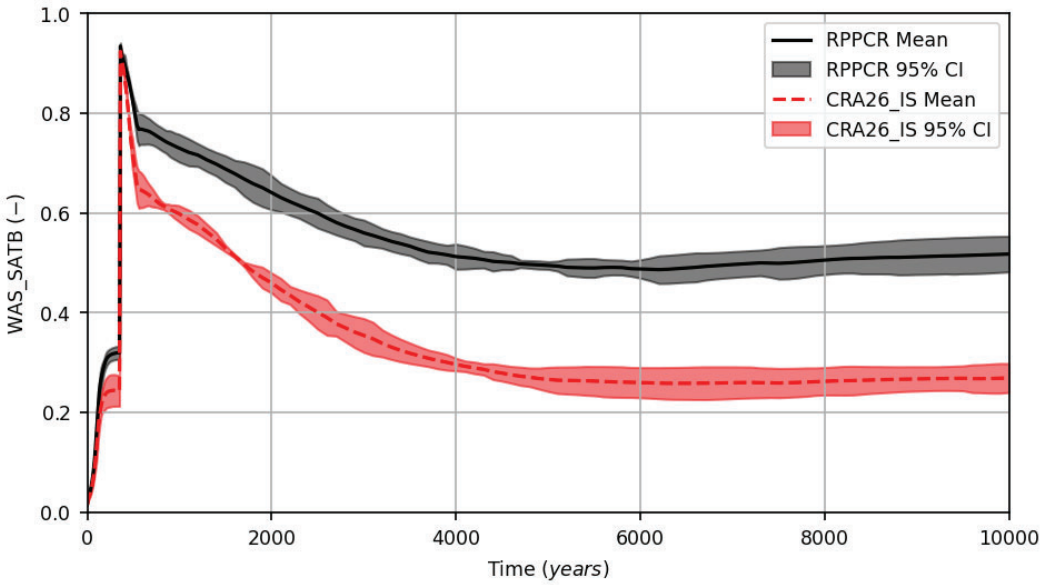

Figure 182. Brine saturation means and confidence intervals for the Waste Panel, Scenario S2-BF

Information Only

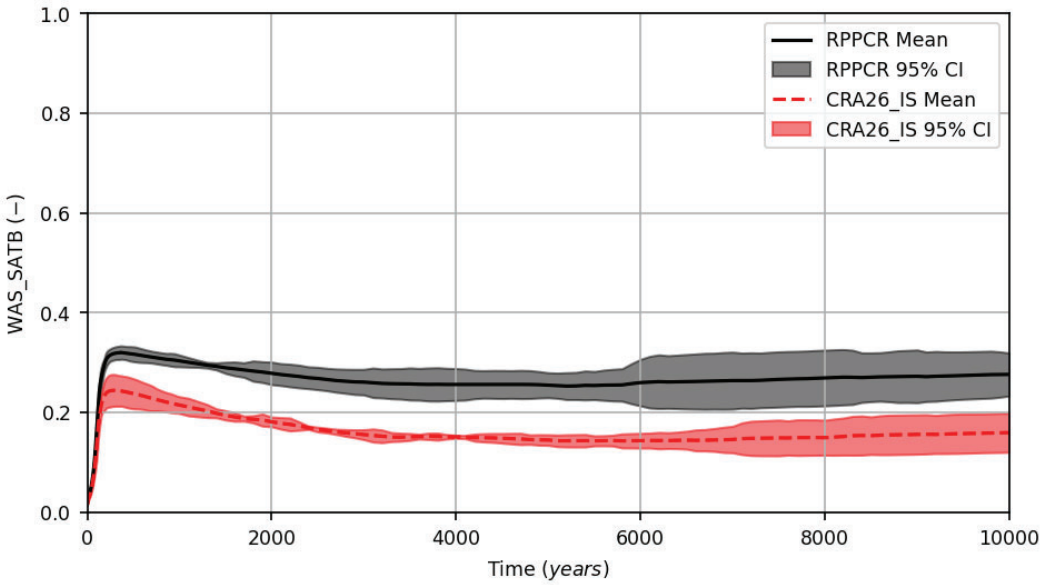

Figure 183. Brine saturation means and confidence intervals for the Waste Panel, Scenario S4-BF

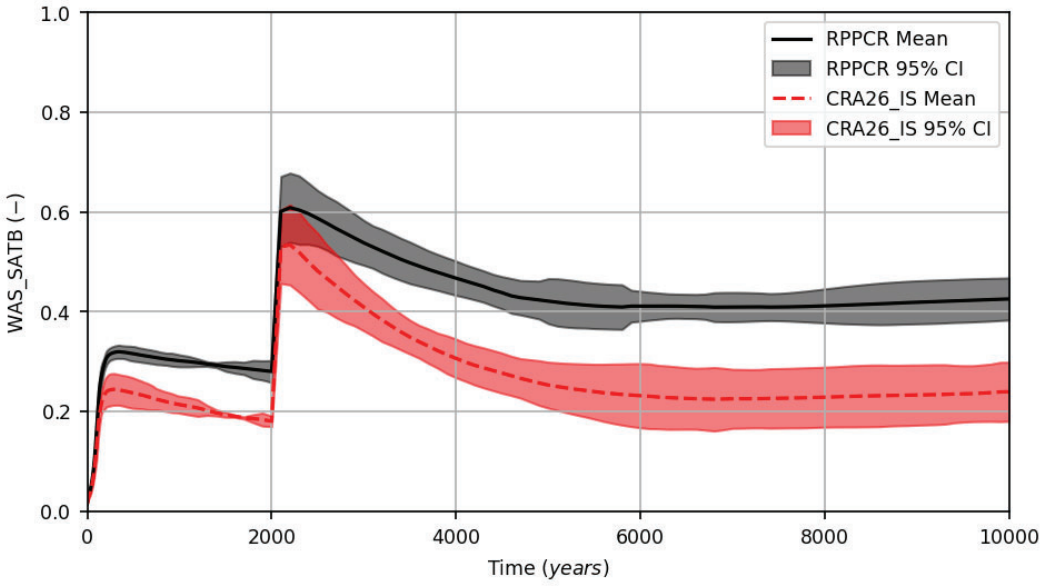

Figure 184. Brine saturation means and confidence intervals for the Waste Panel, Scenario S6-BF

Information Only

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. This research is funded by WIPP programs administered by the Office of Environmental Management (EM) of the U.S. Department of Energy.







Information Only