

## TABLE OF CONTENTS

|   |           |
|---|-----------|
| <b>1. Introduction.....</b>   | <b>1</b>  |
| 1.1 Project Background.....   | 1         |
| 1.1.1 Navajo Mine .....   | 2         |
| 1.2 Regulatory Background .....                                     | 5         |
| 1.2.1 Surface Mining Control and Reclamation Act Permitting.....    | 5         |
| 1.2.2 Burnham Road Realignment Approvals .....                      | 6         |
| 1.2.3 Clean Water Act Permitting.....                               | 6         |
| 1.2.4 Resource Recovery Protection Plan.....                        | 7         |
| 1.2.5 Potential Closure of Four Corners Power Plant Units 1-3 ..... | 7         |
| 1.2.6 Related Environmental Studies.....                            | 8         |
| 1.3 Regulatory Framework and Necessary Authorizations .....         | 10        |
| 1.4 Purpose and Need .....  | 11        |
| 1.4.1 OSM Statement of Project Purpose .....                        | 11        |
| 1.4.2 USACE Statement of Project Purpose.....                       | 11        |
| 1.4.3 BIA’s Statement of Project Purpose .....                      | 12        |
| 1.4.4 BLM’s Statement of Project Purpose .....                      | 12        |
| 1.4.5 Background on Project Purpose and Need .....                  | 12        |
| 1.4.5.1 Mining to Fulfill Coal Supply Contract Obligations .....    | 12        |
| 1.4.5.2 Need for USACE Permit .....                                 | 13        |
| 1.4.5.3 Need for R2P2 .....   | 13        |
| 1.4.5.4 Need for Burnham Road Realignment .....                     | 13        |
| 1.4.5.5 Project Benefits .....                                      | 13        |
| 1.4.6 Summary .....   | 13        |
| 1.5 Issues Identified through Public Workshops and Conferences..... | 14        |
| 1.5.1 Public Workshops.....   | 14        |
| 1.5.2 Comment Summary .....   | 14        |
| 1.5.3 OSM Informal Conference .....                                 | 16        |
| <b>2. Description of Proposed Action and Alternatives .....</b>     | <b>17</b> |
| 2.1 Alternatives.....   | 17        |
| 2.1.1 Proposed Action .....   | 17        |
| 2.1.1.1 Mine Plan Revision for a Portion of Area IV North.....      | 18        |
| 2.1.1.2 Mining Activities.....                                      | 18        |

|  |           |
|--|-----------|
| 2.1.1.3 Vegetation and Topdressing Removal.....                                    | 20        |
| 2.1.1.4 Drilling and Blasting of Overburden and Interburden.....                   | 20        |
| 2.1.1.5 Removal of Overburden, Interburden, and Coal .....                         | 21        |
| 2.1.1.6 Transportation of Coal.....  | 23        |
| 2.1.1.7 Access Roads.....  | 23        |
| 2.1.1.8 Electric Power Lines.....  | 23        |
| 2.1.1.9 Reclamation.....   | 23        |
| 2.1.1.10 Backfilling and Grading .....   | 24        |
| 2.1.1.11 Replacement of Topdressing .....  | 26        |
| 2.1.1.12 Revegetation .....  | 26        |
| 2.1.1.13 Monitoring and Bond Release .....   | 26        |
| 2.1.1.14 Operational Infrastructure .....  | 27        |
| 2.1.1.15 Burnham Road Realignment .....  | 28        |
| 2.1.1.16 Fill in Waters of the United States.....                                  | 29        |
| 2.1.1.17 Resource Recovery and Protection Plan and Maximum Economic Recovery ..... | 30        |
| 2.1.1.18 Proposed Action Resource Protections Measures .....                       | 30        |
| 2.1.2 Proposed Action with Additional Conditions.....                              | 34        |
| 2.1.3 USACE Considered Mining Alternatives.....                                    | 36        |
| 2.1.4 No Action Alternative.....   | 37        |
| 2.1.5 Comparison of Alternatives.....  | 38        |
| 2.2 Alternatives Considered but Eliminated from Detailed Analysis .....            | 39        |
| <b>3. Affected Environment.....</b>  | <b>40</b> |
| 3.1 Geological Resources .....   | 40        |
| 3.1.1 Definition of Resource.....  | 40        |
| 3.1.2 Affected Environment .....   | 41        |
| 3.1.2.1 Geology .....  | 41        |
| 3.1.2.2 Soils .....  | 43        |
| 3.1.2.3 Paleontological Resources.....   | 43        |
| 3.2 Water Resources .....  | 44        |
| 3.2.1 Definition of Resource.....  | 44        |
| 3.2.2 Affected Environment .....   | 45        |
| 3.2.2.1 Groundwater.....   | 45        |
| 3.2.2.1.1 Groundwater Use.....   | 45        |

|           |   |    |
|-----------|---|----|
| 3.2.2.1.2 | Groundwater Quantity and Flow .....                     | 47 |
| 3.2.2.1.3 | Groundwater Quality .....                               | 47 |
| 3.2.2.2   | Surface Water .....                                     | 50 |
| 3.2.2.2.1 | Cottonwood and Lowe Arroyos .....                       | 50 |
| 3.2.2.2.2 | Ephemeral Tributaries .....                             | 52 |
| 3.2.2.2.3 | Water Quality .....                                     | 52 |
| 3.2.2.2.4 | Waters of the United States .....                       | 53 |
| 3.3       | Noise and Vibration .....                               | 53 |
| 3.3.1     | Definition of Resource.....                             | 53 |
| 3.3.1.1   | Noise.....  | 53 |
| 3.3.1.2   | Vibration.....  | 56 |
| 3.3.1.3   | Applicable Noise Regulations .....                      | 57 |
| 3.3.1.3.1 | Federal Regulations .....                               | 57 |
| 3.3.1.3.2 | Navajo Tribal Regulations.....                          | 58 |
| 3.3.1.3.3 | New Mexico State Regulations .....                      | 58 |
| 3.3.1.3.4 | Local Regulations.....                                  | 58 |
| 3.3.1.4   | Applicable Vibration Regulations .....                  | 58 |
| 3.3.2     | Affected Environment .....                              | 58 |
| 3.3.2.1   | Existing Noise-Sensitive Land Uses.....                 | 58 |
| 3.3.2.2   | Ambient Noise Measurements.....                         | 59 |
| 3.3.2.3   | Vibration Measurements .....                            | 60 |
| 3.4       | Visual Resources .....                                  | 63 |
| 3.4.1     | Definition of Resource.....                             | 63 |
| 3.4.2     | Affected Environment .....                              | 63 |
| 3.5       | Air Quality .....                                       | 70 |
| 3.5.1     | Definition of Resources .....                           | 70 |
| 3.5.1.1   | Air Quality Regulatory Framework.....                   | 70 |
| 3.5.1.1.1 | National Ambient Air Quality Standards .....            | 72 |
| 3.5.1.1.2 | Navajo Nation Regulatory Program .....                  | 73 |
| 3.5.2     | Affected Environment .....                              | 74 |
| 3.5.2.1   | Existing Navajo Mine Sources of Emissions .....         | 74 |
| 3.5.2.2   | Other Existing Stationary Sources within the AQRA ..... | 77 |
| 3.5.2.3   | Baseline AQRA Air Quality.....                          | 78 |

|  |     |
|--|-----|
| 3.5.2.4 Regional Haze .....                                      | 80  |
| 3.5.2.5 Climate and Meteorology .....                            | 81  |
| 3.5.2.6 Greenhouse Gas Emissions (GHGs) and Climate Change ..... | 83  |
| 3.5.2.6.1 GHGs Framework .....                                   | 83  |
| 3.5.2.6.2 GHG Emissions .....                                    | 84  |
| 3.5.2.6.3 Climate Change .....                                   | 85  |
| 3.6 Vegetation.....  | 86  |
| 3.6.1 Definition of Resource.....                                | 86  |
| 3.6.2 Affected Environment .....                                 | 86  |
| 3.7 Wildlife .....   | 91  |
| 3.7.1 Definition of Resource.....                                | 91  |
| 3.7.2 Affected Environment .....                                 | 91  |
| 3.8 Threatened and Endangered Species, Sensitive Species.....    | 93  |
| 3.8.1 Definition of Resource.....                                | 93  |
| 3.8.2 Affected Environment .....                                 | 94  |
| 3.8.2.1 Federally Listed Threatened and Endangered Species ..... | 94  |
| 3.8.2.2 Navajo Nation Listed Species of Concern.....             | 97  |
| 3.8.2.3 Migratory Birds .....                                    | 99  |
| 3.9 Socioeconomics .....   | 99  |
| 3.9.1 Definition of Resource.....                                | 99  |
| 3.9.2 Affected Environment .....                                 | 99  |
| 3.9.2.1 Population.....  | 101 |
| 3.9.2.2 Royalty, Tax Revenues, and Local Contributions .....     | 102 |
| 3.9.2.3 Mine and Non-Mine Employment.....                        | 104 |
| 3.9.2.4 Mine and Non-Mine Income .....                           | 105 |
| 3.9.2.5 Social Baseline Conditions.....                          | 106 |
| 3.10 Land Use.....   | 107 |
| 3.10.1 Definition of Resource.....                               | 107 |
| 3.10.2 Affected Environment .....                                | 107 |
| 3.10.2.1 SMCRA Land Use Requirements.....                        | 111 |
| 3.11 Environmental Justice.....                                  | 112 |
| 3.11.1 Definition of Resource.....                               | 112 |
| 3.11.2 Affected Environment .....                                | 113 |

|   |            |
|---|------------|
| 3.12 Cultural Resources.....                          | 116        |
| 3.12.1 Definition of Resource.....                    | 116        |
| 3.12.2 Affected Environment .....                     | 117        |
| 3.12.2.1 Archaeological and Historical Resources..... | 121        |
| 3.12.2.2 Traditional Cultural Concerns .....          | 121        |
| 3.12.2.3 Burial Sites and Related Objects .....       | 122        |
| 3.13 Traffic and Transportation.....                  | 122        |
| 3.13.1 Definition of Resource.....                    | 122        |
| 3.13.2 Affected Environment .....                     | 123        |
| 3.14 Health and Safety.....                           | 127        |
| 3.14.1 Definition of Resource.....                    | 127        |
| 3.14.1.1 Worker Health and Safety .....               | 127        |
| 3.14.1.2 Public Health and Safety .....               | 128        |
| 3.14.2 Affected Environment .....                     | 129        |
| 3.14.2.1 Worker Health and Safety .....               | 129        |
| 3.14.2.2 Public Health and Safety .....               | 129        |
| <b>4. Environmental Consequences.....</b>             | <b>131</b> |
| 4.1 Geological Resources .....                        | 131        |
| 4.1.1 Impact Assessment Methodology.....              | 131        |
| 4.1.2 Impacts.....                                    | 132        |
| 4.1.2.1 Proposed Action .....                         | 132        |
| 4.1.2.2 Proposed Action with Conditions.....          | 133        |
| 4.1.2.3 No Action Alternative .....                   | 133        |
| 4.2 Water Resources .....                             | 134        |
| 4.2.1 Impact Assessment Methodology.....              | 134        |
| 4.2.2 Impacts.....                                    | 135        |
| 4.2.2.1 Proposed Action .....                         | 135        |
| 4.2.2.1.1 Groundwater Impacts .....                   | 135        |
| 4.2.2.1.2 Surface Water .....                         | 138        |
| 4.2.2.2 Proposed Action with Conditions.....          | 144        |
| 4.2.2.3 No Action Alternative .....                   | 145        |
| 4.3 Noise and Vibration.....                          | 145        |
| 4.3.1 Impact Assessment Methodology.....              | 145        |

|  |     |
|--|-----|
| 4.3.1.1 Noise.....   | 145 |
| 4.3.1.2 Vibration.....   | 145 |
| 4.3.2 Impacts.....   | 148 |
| 4.3.2.1 Proposed Action .....                                      | 148 |
| 4.3.2.2 Proposed Action with Conditions.....                       | 153 |
| 4.3.2.3 No Action Alternative .....                                | 153 |
| 4.4 Visual Resources .....   | 154 |
| 4.4.1 Impact Assessment Methodology.....                           | 154 |
| 4.4.2 Impacts.....   | 156 |
| 4.4.2.1 Proposed Action .....                                      | 157 |
| 4.4.2.2 Proposed Action with Conditions.....                       | 158 |
| 4.4.2.3 No Action Alternative .....                                | 158 |
| 4.5 Air Quality .....  | 158 |
| 4.5.1 Impact Assessment Methodology.....                           | 158 |
| 4.5.2 Impacts.....   | 159 |
| 4.5.2.1 Proposed Action .....                                      | 159 |
| 4.5.2.1.1 Assessment of Emissions under the Proposed Action.....   | 159 |
| 4.5.2.1.2 Modeling Analysis of Particulate Impacts.....            | 164 |
| 4.5.2.1.3 Emissions from Burnham Road Relocation .....             | 171 |
| 4.5.2.1.4 Regional Haze .....                                      | 171 |
| 4.5.2.1.5 GHG Emissions and Climate Change .....                   | 172 |
| 4.5.2.2 Proposed Action with Conditions.....                       | 172 |
| 4.5.2.3 No Action Alternative .....                                | 172 |
| 4.5.2.3.1 Operational and Emissions Changes .....                  | 173 |
| 4.5.2.3.2 Air Quality Impacts under the No Action Alternative..... | 173 |
| 4.6 Vegetation.....  | 174 |
| 4.6.1 Impact Assessment Methodology.....                           | 174 |
| 4.6.2 Impacts.....   | 174 |
| 4.6.2.1 Proposed Action .....                                      | 175 |
| 4.6.2.2 Proposed Action with Conditions.....                       | 177 |
| 4.6.2.3 No Action Alternative .....                                | 177 |
| 4.7 Wildlife .....   | 177 |
| 4.7.1 Impact Assessment Methodology.....                           | 177 |

|   |     |
|---|-----|
| 4.7.2 Impacts.....  | 178 |
| 4.7.2.1 Proposed Action .....                             | 178 |
| 4.7.2.2 Proposed Action with Conditions.....              | 180 |
| 4.7.2.3 No Action Alternative .....                       | 180 |
| 4.8 Threatened and Endangered and Sensitive Species ..... | 180 |
| 4.8.1 Impact Assessment Methodology.....                  | 180 |
| 4.8.2 Impacts.....  | 181 |
| 4.8.2.1 Proposed Action .....                             | 181 |
| 4.8.2.2 Proposed Action with Conditions.....              | 182 |
| 4.8.2.3 No Action Alternative .....                       | 183 |
| 4.9 Socioeconomics .....                                  | 183 |
| 4.9.1 Impact Assessment Methodology.....                  | 183 |
| 4.9.2 Impacts.....  | 183 |
| 4.9.2.1 Proposed Action .....                             | 183 |
| 4.9.2.2 Proposed Action with Conditions.....              | 183 |
| 4.9.2.3 No Action Alternative .....                       | 183 |
| 4.10 Land Use.....  | 184 |
| 4.10.1 Impact Assessment Methodology.....                 | 184 |
| 4.10.2 Impacts.....                                       | 185 |
| 4.10.2.1 Proposed Action .....                            | 185 |
| 4.10.2.2 Proposed Action with Conditions.....             | 186 |
| 4.10.2.3 No Action Alternative .....                      | 186 |
| 4.11 Environmental Justice.....                           | 186 |
| 4.11.1 Impact Assessment Methodology.....                 | 186 |
| 4.11.2 Impacts.....                                       | 187 |
| 4.11.2.1 Proposed Action .....                            | 187 |
| 4.11.2.2 Proposed Action with Conditions.....             | 187 |
| 4.11.2.3 No Action Alternative .....                      | 187 |
| 4.12 Cultural Resources.....                              | 189 |
| 4.12.1 Impact Assessment Methodology.....                 | 189 |
| 4.12.2 Impacts.....                                       | 190 |
| 4.12.2.1 Proposed Action .....                            | 190 |
| 4.12.2.2 Proposed Action with Conditions.....             | 191 |

|   |            |
|---|------------|
| 4.12.2.3 No Action Alternative .....  | 191        |
| 4.13 Traffic and Transportation .....   | 192        |
| 4.13.1 Impact Assessment Methodology .....  | 192        |
| 4.13.2 Impacts.....   | 192        |
| 4.13.2.1 Proposed Action .....  | 192        |
| 4.13.2.2 Proposed Action with Conditions.....   | 193        |
| 4.13.2.3 No Action Alternative .....  | 193        |
| 4.14 Health and Safety.....   | 193        |
| 4.14.1 Impact Assessment Methodology.....   | 193        |
| 4.14.2 Impacts.....   | 194        |
| 4.14.2.1 Proposed Action .....  | 194        |
| 4.14.2.2 Proposed Action with Conditions.....   | 194        |
| 4.14.2.3 No Action Alternative .....  | 194        |
| <b>5. Cumulative Impacts, Unavoidable Adverse Effects, and Irreversible and Irretrievable<br/>Commitment of Resources .....</b> | <b>195</b> |
| 5.1 Past, Present, Reasonably Foreseeable Actions in the Project Vicinity.....  | 195        |
| 5.1.1 Reasonably Foreseeable Development (RFD) Scenario.....  | 197        |
| 5.2 Cumulative Impacts .....  | 201        |
| 5.2.1 Geological Resources .....  | 201        |
| 5.2.1.1 Temporal and Geographic Scope .....   | 201        |
| 5.2.1.2 Cumulative Effects .....  | 201        |
| 5.2.2 Water Resources .....   | 202        |
| 5.2.2.1 Temporal and Geographic Scope .....   | 202        |
| 5.2.2.2 Cumulative Effects .....  | 203        |
| 5.2.2.2.1 Groundwater .....   | 203        |
| 5.2.2.2.2 Surface Water .....   | 207        |
| 5.2.3 Noise and Vibration.....  | 209        |
| 5.2.3.1 Temporal and Geographic Scope .....   | 209        |
| 5.2.3.2 Cumulative Effects .....  | 209        |
| 5.2.4 Visual Resources .....  | 209        |
| 5.2.4.1 Temporal and Geographic Scope .....   | 209        |
| 5.2.4.2 Cumulative Impacts.....   | 210        |
| 5.2.5 Air Quality.....  | 212        |



|  |     |
|--|-----|
| 5.2.5.1 Ambient Air Quality .....                        | 212 |
| 5.2.5.1.1 Temporal and Geographic Scopes .....           | 212 |
| 5.2.5.1.2 Cumulative Effects .....                       | 212 |
| 5.2.5.2 Regional Haze .....                              | 214 |
| 5.2.5.2.1 Temporal and Geographic Scopes .....           | 214 |
| 5.2.5.2.2 Cumulative Effects .....                       | 214 |
| 5.2.5.3 GHG Emissions and Climate Change .....           | 215 |
| 5.2.5.3.1 Temporal and Geographic Scope .....            | 215 |
| 5.2.5.3.2 Cumulative Effects .....                       | 215 |
| 5.2.6 Vegetation.....                                    | 216 |
| 5.2.6.1 Temporal and Geographic Scope .....              | 216 |
| 5.2.6.2 Cumulative Effects .....                         | 216 |
| 5.2.7 Wildlife.....                                      | 216 |
| 5.2.7.1 Temporal and Geographic Scope .....              | 216 |
| 5.2.7.2 Cumulative Effects .....                         | 216 |
| 5.2.8 Threatened, Endangered, and Sensitive Species..... | 217 |
| 5.2.8.1 Temporal and Geographic Scope .....              | 217 |
| 5.2.8.2 Cumulative Effects .....                         | 217 |
| 5.2.9 Socioeconomics .....                               | 217 |
| 5.2.9.1 Temporal and Geographic Scope .....              | 217 |
| 5.2.9.2 Cumulative Effects .....                         | 218 |
| 5.2.10 Land Use.....                                     | 219 |
| 5.2.10.1 Temporal and Geographic Scope .....             | 219 |
| 5.2.10.2 Cumulative Effects .....                        | 220 |
| 5.2.11 Environmental Justice.....                        | 220 |
| 5.2.11.1 Temporal and Geographic Scope .....             | 220 |
| 5.2.11.2 Cumulative Effects .....                        | 220 |
| 5.2.12 Cultural Resources.....                           | 221 |
| 5.2.12.1 Temporal and Geographic Scope .....             | 221 |
| 5.2.12.2 Cumulative Effects .....                        | 221 |
| 5.2.13 Traffic and Transportation.....                   | 222 |
| 5.2.13.1 Temporal and Geographic Scope .....             | 222 |
| 5.2.13.2 Cumulative Effects .....                        | 222 |

|  |            |
|--|------------|
| 5.2.14 Health and Safety.....                | 223        |
| 5.2.14.1 Temporal and Geographic Scope ..... | 223        |
| 5.2.14.2 Cumulative Effects .....            | 223        |
| <b>6. References.....</b>                    | <b>224</b> |
| 6.1 List of Preparers.....                   | 231        |

## LIST OF TABLES

|   |     |
|---|-----|
| Table 1.2-1. Recent CWA Permits at Navajo Mine.....   | 7   |
| Table 1.3-1. Federal Action Agencies and Regulatory Authorities .....   | 10  |
| Table 1.5-1. Comment Summary .....  | 14  |
| Table 2.1-1. Activity Summary Table – Dragline Stripping (Overburden and Interburden Removal) .....   | 22  |
| Table 2.1-2. Activity Summary Table – Coal Mining (tons of coal).....   | 22  |
| Table 2.1-3. Navajo Mine SMCRA Permit Protection Measures .....   | 30  |
| Table 2.1-4. Comparison of Activities for No Action and Proposed Action.....  | 38  |
| Table 2.2-1. Alternatives considered but eliminated from detailed analysis .....  | 39  |
| Table 3.1-1. Mineable Coal Seams in Area III and Area IV North .....  | 42  |
| Table 3.3-1. Definition of Acoustical Terms .....   | 54  |
| Table 3.3-2. Typical Noise Levels in the Environment .....  | 55  |
| Table 3.3-3. Reaction of People and Damage to Buildings Resources from Continuous Vibration Levels .....  | 56  |
| Table 3.3-4. Ambient Noise Measurements in Project Area .....   | 59  |
| Table 3.4-1. Key Observation Locations Used for Identifying Existing Conditions in the Project Region.....  | 68  |
| Table 3.5-1. Summary of National Ambient Air Quality Standards (NAAQS) .....  | 73  |
| Table 3.5-2. Categories of Area III Emission Sources.....   | 74  |
| Table 3.5-3. Emission Factors and Estimating Equations for Pollutant-Emitting Activities.....   | 75  |
| Table 3.5-4. Estimated Annual Baseline Emissions from Area III.....   | 76  |
| Table 3.5-5. Stationary Sources of Particulate Emissions with the Potential to Impact AQRA <sup>1</sup> .....   | 77  |
| Table 3.5-6. Navajo Mine PM <sub>10</sub> Monitoring Data .....   | 78  |
| Table 3.5-7. NMED Ambient Air Monitoring Stations in San Juan County .....  | 79  |
| Table 3.5-8. Measured PM <sub>10</sub> (µg/m <sup>3</sup> ), NMED Farmington SLAMS .....  | 79  |
| Table 3.5-9. Measured PM <sub>2.5</sub> (µg/m <sup>3</sup> ), NMED Farmington SLAMS .....   | 79  |
| Table 3.5-10. Monitored Ambient Air Data – NMED San Juan Substation.....  | 80  |
| Table 3.5-11. Climatology Summary: Mean Temperature and Precipitation in the Region .....   | 82  |
| Table 3.5-12. Estimated Annual Baseline GHG Emissions, Mtpy CO <sub>2e</sub> .....  | 85  |
| Table 3.6-1. Characterization of Vegetation in the Project Area .....   | 87  |
| Table 3.8-1. Species Listed by the U.S. Fish and Wildlife Service as Threatened, Endangered, Proposed Threatened, or Candidate for San Juan County, New Mexico and the Potential to Occur in the Action Area..... | 95  |
| Table 3.8-2. Navajo Nation Listed Species of Concern and the Potential to Occur in the Action Area.....   | 97  |
| Table 3.9-1. Population Estimates for Affected Area.....  | 101 |
| Table 3.9-2. Population Data for Navajo Chapters Surrounding Project Area .....   | 101 |

|   |     |
|---|-----|
| Table 3.9-3. Annual Taxes and Royalties Paid by BNCC for Navajo Mine.....   | 102 |
| Table 3.9-4. Labor Force, Unemployment Rate, Average Household Income.....  | 104 |
| Table 3.9-5. Navajo Labor Force and Unemployment Rate in 2007.....  | 105 |
| Table 3.10-1. CUAs within the Land Use Resource Project Area.....   | 109 |
| Table 3.10-2. Dwellings within the Land Use Resource Assessment Area.....   | 112 |
| Table 3.11-1. Potential Affected Populations for Environmental Justice Impacts .....  | 113 |
| Table 3.12-1. Archeological and Historic Occupations within the Project Area.....   | 121 |
| Table 4.2-1. Magnitude of Impacts.....  | 134 |
| Table 4.2-2. Surface Water Quality at Stevenson's Ponds.....  | 143 |
| Table 4.3-1. Equipment Source Noise and Quantity in Permit Area.....  | 148 |
| Table 4.3-2. Calculated Noise Levels and Impact Determination at surrounding residences for Mining Activities.....  | 150 |
| Table 4.3-3. Calculated Noise Levels and Impact Determination at Surrounding Residences for Coal Transportation.....  | 152 |
| Table 4.3-4. Calculated Noise Levels and Impact Determination at Surrounding Residences for Burnham Road Realignment.....   | 152 |
| Table 4.3-5. Calculated Noise Levels and Impact Determination at Surrounding Residences for Reclamation Activities.....   | 153 |
| Table 4.4-1. Visual Quality Rating Guide .....  | 154 |
| Table 4.4-2. Visual Resource Impact Potential.....  | 155 |
| Table 4.4-3. Summary of Visual Impacts .....  | 156 |
| Table 4.5-1. Roster of Emission Source Categories at Area III and Area IV North.....  | 160 |
| Table 4.5-2. Estimated Emissions from Area III under the Proposed Action.....   | 161 |
| Table 4.5-3. Estimated Emissions from Area IV North under the Proposed Action .....   | 162 |
| Table 4.5-4. Estimated Total Emissions from Navajo Mine with Proposed Action.....   | 162 |
| Table 4.5-5. Emission Increase (Decrease) from Proposed Action .....  | 163 |
| Table 4.5-6. Estimated Annual GHG Emissions with Proposed Action, Mtpy CO <sub>2e</sub> .....   | 172 |
| Table 4.6-1. Impacts to Vegetation Communities .....  | 175 |
| Table 4.6-2. Acres of vegetation community types and percent of total affected by mining activities under the Proposed Action (not including the Burnham Road Realignment)..... | 176 |
| Table 4.6-3. Acres of vegetation community types and percent of total affected by the Burnham Road realignment under the Proposed Action.....                                   | 176 |
| Table 4.8-1. Determination of effects to federally listed species.....  | 181 |
| Table 4.8-2. Impacts to Navajo Nation Listed Species.....   | 182 |
| Table 4.12-1. Directly Impacted Archeological and Historical Resources.....   | 190 |
| Table 4.12-2. Traditional Cultural Properties within One Mile of Project Area .....   | 191 |
| Table 5.1-1. Land Use Patterns for San Juan County, NM. (Percentage of total acres).....  | 196 |

## LIST OF FIGURES

|  |    |
|--|----|
| Figure 1.1-1. Location of Navajo Mine .....  | 4  |
| Figure 2.1-1. Proposed Activities Map.....   | 19 |
| Figure 2.1-2. Mining and Reclamation Map.....  | 25 |
| Figure 2.1-3. Coal Removal under Existing, Historic, and Proposed Action Conditions..... | 28 |

Figure 3.2-1. Inventory of Water Wells and Springs..... 46  
Figure 3.2-2. Monitoring Wells and Piezometers ..... 49  
Figure 3.2-3. Regional Surface Water Features and Monitoring Locations ..... 51  
Figure 3.3-1. Noise Sampling Locations and Area Residences ..... 61  
Figure 3.3-2. Typical Vibration Measurement at Residence 5,539 Feet from Blasting Area during Blasting Activities ..... 62  
Figure 3.4-1. 20 Mile Vicinity Viewshed and Key Observation Points Map ..... 65  
Figure 3.4-2. Viewshed Detail and Key Observation Points Map ..... 66  
Figure 3.5-1. Air Quality Resource Area..... 71  
Figure 3.5-2. Measured Wind Speed and Direction Wind Rose for Area IV North..... 83  
Figure 3.6-1. Vegetation Distribution in Project Area..... 90  
Figure 3.9-1. Navajo Nation Counties ..... 100  
Figure 3.10-1. Land Use Map ..... 110  
Figure 3.11-1. Map of census tracts shaded to indicate the percent of Native American population..... 114  
Figure 3.11-2. Map of census tracts shaded to indicate percent of population below poverty level ..... 115  
Figure 3.12-1. Areas of Potential Effect ..... 120  
Figure 3.13-1. Regional Transportation Routes..... 125  
Figure 3.13-2. Transportation System within the Project Area ..... 126  
Figure 4.3-1. Noise Sampling Locations and Area Residences ..... 147  
Figure 4.5-1. 24-hour PM<sub>10</sub> SIL Isopleth and Surrounding Concentrations ..... 167  
Figure 4.5-2. Annual PM<sub>10</sub> SIL Isopleth and Surrounding Concentrations ..... 168  
Figure 4.5-3. 24-Hour PM<sub>2.5</sub> SIL Isopleth and Surrounding Concentrations..... 169  
Figure 4.5-4. Annual PM<sub>2.5</sub> SIL Isopleth and Surrounding Concentrations ..... 170  
Figure 5.1-1. Cumulative Impacts Vicinity Map ..... 198  
Figure 5.2-1. 20 Mile Vicinity Viewshed and Cumulative Impacts Map ..... 211

## **APPENDICES**

- Appendix A – USACE 404(b)(1)
- Appendix B – Existing, Historic and Proposed Action Operational Activities
- Appendix C – Amended Programmatic Agreement
- Appendix D – Visual Resource Summary
- Appendix E – Biological Evaluation for Pre-2016 Mine Plan for Area III and Area IV North
- Appendix F – Emissions Data
- Appendix G – Supporting Information on Development Activities included in the Reasonable Foreseeable Development

## ACRONYMS AND ABBREVIATIONS

|                          |   |      |
|--------------------------|---|------|
|                          |   | - #- |
| $\mu\text{g}/\text{m}^3$ | micrograms per cubic meter  |      |
| $\mu\text{Pa}$           | Micropascals  |      |
|                          |   | -A-  |
| AA                       | Antiquities Act   |      |
| AIRFA                    | American Indian Religious Freedom Act                                   |      |
| ALP                      | Animas La Plata Project   |      |
| AML                      | Abandoned Mine Lands  |      |
| ANFO                     | ammonium nitrate and fuel oil   |      |
| APE                      | Area of potential effect  |      |
| APS                      | Arizona Public Service  |      |
| AQRA                     | air quality resource area   |      |
| ARPA                     | Archaeological Resources Protection Act                                 |      |
|                          |   | -B-  |
| BART                     | best available retrofit technology                                      |      |
| BE                       | Biological Evaluation   |      |
| BIA                      | Bureau of Indian Affairs  |      |
| BLET                     | Black Lung Excise Tax   |      |
| BLM                      | Bureau of Land Management   |      |
| BMP                      | best management practice  |      |
| BNCC                     | BHP Navajo Coal Company   |      |
| Btu                      | British thermal units   |      |
|                          |   | -C-  |
| CAA                      | Clean Air Act   |      |
| CCB                      | coal combustion byproducts  |      |
| CCW                      | coal combustion waste   |      |
| CEQ                      | Council on Environmental Quality  |      |
| CFR                      | Code of Federal Regulations   |      |
| CHIA                     | Cumulative Hydrologic Impacts Analysis                                  |      |
| CLRD                     | chronic lower respiratory disease                                       |      |
| CO                       | carbon monoxide   |      |
| CO <sub>2</sub>          | carbon dioxide  |      |
| CO <sub>2eq</sub>        | carbon dioxide equivalent   |      |
| CUA                      | Customary use area  |      |
| CWA                      | Clean Water Act   |      |
|                          |   | -D-  |
| dB                       | Decibel   |      |
| dB(A)                    | A-weighted sound level  |      |
| dB <sub>L</sub>          | linear decibel  |      |
| DCA                      | San Juan County Museum Association Division of Conservation Archaeology |      |
| DCRM                     | Dinétahdóó CRM  |      |
| DEM                      | digital elevation model   |      |
| DOI                      | U.S. Department of the Interior   |      |
| DREP                     | Desert Rock Energy Project  |      |
|                          |   | -E-  |
| EA                       | Environmental Assessment  |      |
| EIS                      | Environmental Impact Statement  |      |

|   |   |     |
|---|---|-----|
| EMI   | Ecosystem Management Inc.   |     |
| EPA   | U.S. Environmental Protection Agency                                      |     |
| ESA   | Endangered Species Act  |     |
|   |   | -F- |
| FCGS  | Four Corners Generating Station   |     |
| FCPP  | Four Corners Power Plant  |     |
| FHWA  | Federal Highway Administration  |     |
| FIP   | Federal Implementation Plan   |     |
| FONSI   | Finding of No Significant Impact  |     |
| FSC   | final surface configuration   |     |
| FY  | fiscal year   |     |
|   |   | -G- |
| GHG   | greenhouse gas  |     |
| Gpm   | gallons per minute  |     |
| GCRP  | United States Global Change Research Program                              |     |
| GWP   | Global warming potential  |     |
|   |   | -H- |
| HAP   | hazardous air pollutant   |     |
| HSEC  | Health, Safety, Environmental and Community                               |     |
| HUC   | Hydrologic Unit Code  |     |
| HUD   | U.S. Department of Housing and Urban Development                          |     |
| Hwy   | Highway   |     |
| Hz  | Hertz   |     |
|   |   | -I- |
| IBR   | Incidental Boundary Revision  |     |
| IP  | Individual Permit   |     |
|   |   | -K- |
| KOP   | key observation point   |     |
| kV  | Kilovolt  |     |
|   |   | -L- |
| L <sub>10</sub> , L <sub>50</sub> , L <sub>90</sub> | noise levels exceeded 10, 50, or 90% of the time during a sampling period |     |
| LAER  | lowest achievable emission rate   |     |
| LAI   | Lined Ash Impoundment   |     |
| LDWI  | Lined Decant Water Impoundment  |     |
| Ldn   | day/night noise level   |     |
| LEDPA   | least environmentally damaging practicable alternative                    |     |
| L <sub>eq</sub>                                     | equivalent noise level  |     |
|   |   | -M- |
| M   | Million   |     |
| MACT  | maximum achievable control technology                                     |     |
| MER   | maximum economic recovery   |     |
| mm/sec  | millimeters per second  |     |
| MOU   | Memorandum of Understanding   |     |
| MSHA  | Mine Safety and Health Administration                                     |     |
| MT  | metric tons   |     |
| MW  | Megawatt  |     |
|   |   | -N- |
| NAAQS   | National Ambient Air Quality Standards                                    |     |
| NAGPRA  | Native American Graves Protection and Repatriation Act                    |     |
| NAPI  | Navajo Agricultural Products Industry                                     |     |

---

|                   |  |
|-------------------|--|
| NEPA              | National Environmental Policy Act  |
| NESHAP            | National Emission Standards for Hazardous Air Pollutants                             |
| NESL              | Navajo Endangered Species List   |
| NHP               | Natural Heritage Program   |
| NHPA              | National Historic Preservation Act   |
| NIIP              | Navajo Indian Irrigation Project   |
| NMDOT             | New Mexico Department of Transportation  |
| NMED              | New Mexico Environment Department  |
| NMGF              | New Mexico Department of Game and Fish   |
| NMOSE             | New Mexico Office of the State Engineer  |
| NMPIF             | New Mexico Partners in Flight  |
| NNAD              | Navajo Nation Archaeological Department  |
| NNC               | Navajo Nation Code   |
| NNCRPA            | Navajo Nation Cultural Resource Protection Act                                       |
| NNDFW             | Navajo Nation Department of Fish and Wildlife  |
| NNEPA             | Navajo Nation Environmental Protection Agency  |
| NNHPD             | Navajo Nation Historic Preservation Department                                       |
| NNOPR             | Navajo Nation Operating Permit Regulations   |
| NO                | nitric oxide   |
| NO <sub>2</sub>   | nitrogen dioxide   |
| NO <sub>x</sub>   | nitrogen oxides  |
| NPDES             | National Pollutant Discharge Elimination System                                      |
| NRCS              | Natural Resources Conservation Service   |
| NRHP              | National Register of Historic Places   |
| NSPS              | new source performance standards   |
| NSR               | new source review  |
| NTUA              | Navajo Tribal Utilities Authority  |
| NWP               | Nationwide Permit  |
| <b>-O-</b>        |  |
| O <sub>3</sub>    | Ozone  |
| OSM               | U.S. Department of the Interior Office of Surface Mining Reclamation and Enforcement |
| <b>-P-</b>        |  |
| PA                | Programmatic Agreement   |
| Pb                | Lead   |
| PCS               | Pictured Cliffs Sandstone  |
| PHC               | probable hydrologic consequences   |
| PL                | Public Law   |
| PM                | particulate matter   |
| PM <sub>10</sub>  | particulate matter less than or equal to 10 microns in diameter                      |
| PM <sub>2.5</sub> | particulate matter less than or equal to 2.5 microns in diameter                     |
| PMLU              | Post-mining land use   |
| ppb               | parts per billion  |
| Ppm               | parts per million  |
| PPV               | peak particle velocity   |
| PSD               | Prevention of Significant Deterioration  |
| <b>-R-</b>        |  |
| R2P2              | Resource Recovery and Protection Plan  |
| RACT              | Reasonably Available Control Technology  |
| RFD               | Reasonably Foreseeable Development   |
| RMS               | root mean square velocity  |

---

**-S-**

|                 |  |
|-----------------|--|
| SCAQMD          | South Coast Air Quality Management District        |
| SCR             | selective catalytic reduction                      |
| SIL             | Significant impact levels                          |
| SIP             | State Implementation Plan                          |
| SJCC            | San Juan Coal Company                              |
| SJGS            | San Juan Generating Station                        |
| SLAMS           | State and Local Air Monitoring Stations            |
| SMCRA           | Surface Mining Control and Reclamation Act         |
| SO <sub>2</sub> | sulfur dioxide                                     |
| SPCC            | Spill Prevention, Control and Countermeasures Plan |
| Std             | ozone standard                                     |
| STPF            | Severance Tax Permanent Fund                       |
| SWPPP           | stormwater pollution prevention plan               |

**-T-**

|     |                                 |
|-----|---------------------------------|
| TCP | Traditional Cultural Properties |
| TDS | total dissolved solids          |
| TIP | Tribal implementation plan      |
| TPY | tons per year                   |

**-U-**

|       |   |
|-------|---|
| USACE | U.S. Army Corps of Engineers            |
| USC   | United States Code                      |
| USDA  | United States Department of Agriculture |
| USFWS | U.S. Fish and Wildlife Service          |
| USGS  | U.S. Geological Survey                  |

**-V-**

|     |                            |
|-----|----------------------------|
| VOC | volatile organic compounds |
| VRM | Visual Resource Management |

**-W-**

|       |                              |
|-------|------------------------------|
| WCI   | Western Climate Initiative   |
| WESCO | Western Gasification Company |
| WQC   | Water Quality Certification  |
| WUS   | Waters of the United States  |