

**APPLICATION FOR AN UNDERGROUND  
COAL MINE PERMIT**

**KAISER STEEL CORPORATION  
SUNNYSIDE MINES  
CARBON COUNTY, UTAH**

**BOOK 8**

ARCHIVES BOX 93-003

SUNNYSIDE FUEL CORPORATION ACT/007/007  
WASTE DISPOSAL AREA  
KAISER COAL CORPORATION  
D R A F T

1988

VOLUME I  
Chapters 1-4

VOLUME II  
Chapters 5-12

ARCHIVES BOX 93-004

SUNNYSIDE FUEL CORPORATION ACT/007/007  
WASTE DISPOSAL AREA  
KAISER COAL CORPORATION

PLATES - 1988

Coarse Refuse File Expansion Permit Application - 1987

ORGANIZATION OF PERMIT APPLICATION

- Book 1 Chapters 1, 2, and 3 through exhibits
- Book 2 Chapter 3 (continued)  
Appendix III-1 through III-3
- Book 3 Chapter 3 (continued)  
Appendix III-4  
Plate III-1 through Plate III-4
- Book 4 Chapter 3 (continued)  
Plate III-5 through Plate III-19
- Book 4A Chapter 3 (continued)  
Plate III-20 through Plate III-41
- Book 5 Chapters 4 and 5
- Book 6 Chapters 6 and 7
- Book 7 Chapters 8 and 9
- Book 8 Chapters 10, 11, 12, 13, 14, and 15
- Book 9 Chapter 16

*revised*  
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CHAPTER I

INTRODUCTION AND SUMMARY OF PERMIT APPLICATION

TABLE OF CONTENTS

|   | Page |
|---|------|
| 1.1 Scope of Operation                    | 1    |
| 1.2 Summary of Environmental Impacts      | 2    |
| 1.3 Introduction to Document Organization | 4    |
| 1.4 Acknowledgement                       | 5    |
| List of Exhibits                          | 7    |

CHAPTER II

LEGAL, FINANCIAL, COMPLIANCE AND  
RELATED INFORMATION

TABLE OF CONTENTS

|  | Page |
|--|------|
| 2.1 Scope  | 1    |
| 2.2 Identification of Interests                              | 1    |
| 2.3 Compliance Information                                   | 8    |
| 2.4 Right of Entry and Operations<br>Information             | 17   |
| 2.5 Relationship to Areas Designated<br>Unsuitable to Mining | 20   |
| 2.6 Permit Term  | 21   |
| 2.7 Personal Injury and Property<br>Damage Insurance         | 22   |
| 2.8 Proposed Performance Bond                                | 22   |
| 2.9 Other Licenses and Permits                               | 22   |
| 2.10 Location of Public Office for<br>Filing Application     | 24   |
| 2.11 Newspaper Advertisement                                 | 25   |
| List of Exhibits   | 26   |

## CHAPTER III

### OPERATION AND RECLAMATION PLAN

#### TABLE OF CONTENTS

|   | Page |
|---|------|
| 3.1 Scope   | 1    |
| 3.2 Surface facilities  | 1    |
| 3.2.1 Site selection and preparation                                | 2    |
| 3.2.2 Portals   | 2    |
| 3.2.3 Surface buildings and structures                              | 4    |
| 3.2.4 Coal handling processing, preparation<br>and storage          | 4    |
| 3.2.5 Power system, transmission lines<br>substations, mine feeders | 5    |
| 3.2.6 Water supply system   | 5    |
| 3.2.7 Sewage system   | 5    |
| 3.2.8 Water diversion structures                                    | 5    |
| 3.2.9 Sediment control structures and<br>water treatment facilities | 6    |
| 3.2.10 Transportation, roads, parking area,<br>railroad spurs       | 7    |
| 3.2.10.1 Belt conveyors and railtracks                              | 8    |
| 3.2.11 Total area for surface disturbance<br>during permit term     | 8    |
| 3.2.12 Additional areas for surface disturbance<br>for life of mine | 8    |
| 3.2.13 Detailed construction schedule                               | 9    |
| 3.3 Operating plan  | 9    |
| 3.3.1 Mining plans  | 9    |
| 3.3.1.1 Orientation and multiple seam                               |      |

|   |    |
|---|----|
| considerations  | 9  |
| 3.3.1.2 Portals, shafts and slopes  | 10 |
| 3.3.1.3 Mining methods  | 11 |
| 3.3.1.4 Mine development  | 11 |
| 3.3.1.5 Retreat mining  | 12 |
| 3.3.1.6 Roof control, ventilation, water systems, dust suppression, dewatering and electrical | 12 |
| 3.3.2 Barrier pillars   | 15 |
| 3.3.2.2 Protection of surface structures and streams  | 15 |
| 3.3.2.3 Property boundaries   | 15 |
| 3.3.2.4 Outcrop protection  | 15 |
| 3.3.3 Conservation of coal resource   | 15 |
| 3.3.3.1 Projected maximum recovery  | 15 |
| 3.3.3.2 Justification for non-recovery  | 16 |
| 3.3.3.3 Access to future reserves   | 16 |
| 3.3.4 Equipment selections  | 16 |
| 3.3.4.1 Surface equipment   | 16 |
| 3.3.4.2 Underground equipment   | 17 |
| 3.3.5 Mine safety, fire protection, security  | 17 |
| 3.3.5.1 Signs   | 17 |
| 3.3.5.2 Fences and gates  | 18 |
| 3.3.5.3 Fire protection   | 18 |
| 3.3.5.4 Explosives  | 19 |
| 3.3.6 Operations schedule   | 19 |
| 3.3.6.1 Annual production per year for permit term  | 19 |

|         |  |    |
|---------|--|----|
| 3.3.6.2 | Operating schedule   | 19 |
| 3.3.6.3 | Operating schedule   | 19 |
| 3.3.7   | Acreeage and delineation of<br>mine permit area total permit area                      | 20 |
| 3.3.8   | Mine plan area   | 20 |
| 3.4.1   | Preservation of land-use   | 20 |
| 3.4.1.1 | Projected impacts of mining on<br>current and future land use                          | 20 |
| 3.4.1.2 | Control measures to mitigate impact  | 21 |
| 3.4.2   | Protection of human values   | 21 |
| 3.4.2.1 | Projected impacts of mining on<br>human values - historical and<br>cultural            | 21 |
| 3.4.2.2 | Control measures to mitigate<br>impacts  | 22 |
| 3.4.3   | Protection of hydrological balance   | 22 |
| 3.4.3.1 | Projected impacts of mining on<br>hydrologic balance                                   | 22 |
| 3.4.3.2 | Control measures to mitigate impacts   | 23 |
| 3.4.3.3 | Monitoring procedures to measure<br>impacts and control                                | 23 |
| 3.4.4   | Preservation of soil resources   | 25 |
| 3.4.4.1 | Projected impacts of mining on<br>soil resources                                       | 25 |
| 3.4.4.2 | Control measures to mitigate impacts   | 25 |
| 3.4.5   | Protection of vegetative resources   | 25 |
| 3.4.5.1 | Projected impacts of mining on<br>vegetative resources                                 | 25 |
| 3.4.5.2 | Mitigating measures to be employed<br>to reduce impacts on the vegetative<br>resources | 25 |
| 3.4.5.3 | Monitor procedures - reference   |    |

|  |    |
|--|----|
| areas and revegetation   | 26 |
| 3.4.6 Protection of fish and wildlife                                      | 26 |
| 3.4.6.1 Protected impacts of mining on<br>fish and wildlife                | 26 |
| 3.4.6.2 Mitigating measures to be employed<br>to protect fish and wildlife | 27 |
| 3.4.7 Protection of air quality  | 27 |
| 3.4.7.1 Projected impacts of mining<br>on air quality                      | 27 |
| 3.4.7.2 Mitigating measures to be employed<br>to control air pollutants    | 27 |
| 3.4.7.3 Air quality monitoring plan  | 27 |
| 3.4.8 Subsidence   | 28 |
| 3.4.9 Waste disposal plans   | 31 |
| 3.4.9.1 Projected impacts of disposal<br>areas on the environment          | 31 |
| 3.4.9.2 Control measures to mitigate impacts                               | 32 |
| 3.5.1 Reclamation plan   | 33 |
| 3.5.1.1 Contemporaneous reclamation  | 33 |
| 3.5.1.2 Soil removal and storage   | 35 |
| 3.5.2 Final abandonment  | 38 |
| 3.5.3.1 Sealing of mine openings   | 38 |
| 3.5.3.2 Removal of surface structures                                      | 38 |
| 3.5.3.3 Disposition of dams, ponds and<br>diversions                       | 39 |
| 3.5.4 Backfilling and grading plans  | 40 |
| 3.4.5.1 Recontouring   | 40 |
| 3.4.5.2 Removal or reduction of highwalls                                  | 41 |
| 3.5.4.3 Terracing and erosion control                                      | 41 |

|         |   |     |
|---------|---|-----|
| 3.5.4.4 | Soil distribution and stabilization   | 42  |
| 3.5.5   | Revegetation plan   | 43  |
| 3.5.5.1 | Soil preparation  | 44  |
| 3.5.5.2 | Seeding and transplanting   | 44  |
| 3.5.5.3 | Mulching  | 46  |
| 3.5.5.4 | Management  | 46  |
| 3.5.5.5 | Monitoring  | 47  |
| 3.5.6   | Schedule of reclamation   | 47  |
| 3.5.6.1 | Detailed timetable  | 47  |
| 3.5.7   | Cost estimate for reclamation   | 48  |
| 3.5.7.1 | Cost estimate of each step of<br>reclamation  | 50  |
| 3.5.7.2 | Statistical methodology   | 63  |
| 3.5.7.3 | Forecast of performance bond<br>liability during permit term and<br>forecast of liability for the life<br>of the mine | 65  |
| 3.6     | Bibliography  | 66  |
| 3.7     | Pictures  | 70  |
|         | List of Exhibits  | 103 |

## CHAPTER IV

### LAND STATUS, LAND-USE AND POST-MINING LAND-USE

#### TABLE OF CONTENTS

|  | Page |
|--|------|
| 4.1 Scope  | 1    |
| 4.2 Methodology                                      | 1    |
| 4.3 Land Status                                      | 2    |
| 4.3.1 Surface Land Status/Mine Plan Area             | 2    |
| 4.3.1.1 Ownership                                    | 2    |
| 4.3.1.2 Surface Managing Authorities                 | 2    |
| 4.3.1.3 Utility Corridors and Other<br>Rights-of-Way | 2    |
| 4.3.1.4 Special Use Permits and Leases               | 3    |
| 4.3.2 Mineral Ownership/Mine Plan Area               | 3    |
| 4.3.2.1 Coal Ownership and Mines                     | 3    |
| 4.3.2.2 Coal Leases                                  | 3    |
| 4.3.2.3 Mineral Ownership, Mines and Wells           | 3    |
| 4.4 Land-Use   | 3    |
| 4.4.1 Regional Land-Use                              | 3    |
| 4.4.2 Land-use in Mine Plan Area                     | 4    |
| 4.4.3 Land-use During Operations                     | 4    |
| 4.5 Post-mining Land-use                             | 5    |
| 4.6 Socioeconomic Considerations                     | 5    |
| 4.7 Bibliography                                     | 6    |
| List of Exhibits                                     | 7    |

## CHAPTER VI

### GEOLOGY

#### TABLE OF CONTENTS

|  | Page |
|--|------|
| 6.1 Scope  | 1    |
| 6.2 Methodology  | 1    |
| 6.3 Regional geologic framework  | 2    |
| 6.4 Geology of project vicinity  | 3    |
| 6.4.1 Stratigraphy   | 3    |
| 6.4.2 Structure  | 4    |
| 6.4.3 Coal geology   | 5    |
| 6.5 Geology of coal bed and adjustment                                   | 10   |
| 6.5.1 Exploration  | 10   |
| 6.5.2 Geology  | 10   |
| 6.5.3 Adjacent units   | 11   |
| 6.5.3.1 Rock characteristics, acid-toxic,<br>pyrite, clay and alkalinity | 12   |
| 6.5.4 Coal quality   | 13   |
| 6.6 Geologic effect of mining  | 13   |
| 6.6.1 Mining hazards   | 13   |
| 6.6.2 Surface hazards  | 14   |
| 6.6.3 Impacts of mining  | 14   |
| 6.6.3.1 Subsurface water   | 14   |
| 6.6.3.2 Toxic wastes   | 14   |
| 6.6.3.3 Subsidence   | 14   |
| 6.7 Bibliography   | 16   |

List of Exhibits

18

## CHAPTER VII

### GROUND HYDROLOGY

#### TABLE OF CONTENTS

|   | Page |
|---|------|
| 7.1 Ground hydrology                                    | 1    |
| 7.1.1 Methodology                                       | 1    |
| 7.2.1 Existing groundwater resources                    | 1    |
| 7.1.2.2 Permit area groundwater hydrology               | 2    |
| 7.1.3 Groundwater development and mine dewatering       | 6    |
| 7.1.3.1 Water supply                                    | 6    |
| 7.1.4 Effects of mining operation on groundwater        | 8    |
| 7.5.1 Mitigation and control plan                       | 9    |
| 7.1.6 Groundwater monitoring plan                       | 10   |
| 7.2 Surface water hydrology                             | 10   |
| 7.2.0 Scope   | 10   |
| 7.2.1 Methodology                                       | 11   |
| 7.2.2 Existing surface water resources                  | 12   |
| 7.2.2.1 Regional surface water hydrology                | 12   |
| 7.2.2.2 Mine plan area surface water hydrology          | 13   |
| 7.2.3 Surface water development, control and diversions | 17   |
| 7.2.3.1 Water supply                                    | 17   |
| 7.2.3.2 Sedimentation control structures and diversions | 18   |
| 7.2.4 Effect of mining on surface water                 | 19   |
| 7.2.5 Mitigation and control plans                      | 20   |

|   |    |
|---|----|
| 7.2.6 Monitoring plan                   | 21 |
| 7.3 Alluvial valley floor determination | 21 |
| 7.4 Bibliography                        | 24 |

CHAPTER IX  
VEGETATION RESOURCES

TABLE OF CONTENTS

|  | Page |
|--|------|
| 9.1 Scope  | 1    |
| 9.2 Methodology  | 1    |
| 9.3 Existing resources                                     | 4    |
| 9.3.1 General site description                             | 4    |
| 9.3.2 Vegetation types                                     | 4    |
| 9.3.2.1 Cover data   | 5    |
| 9.3.2.2 Production data                                    | 5    |
| 9.3.2.3 Tree data  | 5    |
| 9.3.2.4 General description                                | 5    |
| 9.3.2.5 Species list                                       | 5    |
| 9.3.2.6 Total acres in mine plan area                      | 5    |
| 9.3.2.7 Total acres of vegetation types<br>to be disturbed | 6    |
| 9.3.2.8 Reference area supporting data                     | 6    |
| 9.4 Threatened and endangered species                      | 7    |
| 9.5 Effects of mining operation on vegetation              | 7    |
| 9.6 Mitigation and management                              | 7    |
| 9.6.1 Mitigation   | 7    |
| 9.7 Revegetation methods and justification                 | 8    |
| 9.8 Revegetation monitoring                                | 11   |
| 9.9 Bibliography   | 12   |
| List of Exhibits   | 15   |

## CHAPTER VIII

### SOIL RESOURCES

#### TABLE OF CONTENTS

|  | Page |
|--|------|
| 8.1 Scope  | 1    |
| 8.2 Methodology  | 1    |
| 8.3 Soil resource information of mine plan area  | 1    |
| 8.3.1 Soils identification   | 1    |
| 8.3.2 Soils description  | 2    |
| 8.3.3 Present and potential productivity<br>of existing soils                              | 2    |
| 8.4 Prime farmland investigation and<br>determination                                      | 2    |
| 8.5 Physical and chemical properties of soils<br>and results of analyses, tests and trials | 2    |
| 8.6 Use of selected overburden materials<br>or substitutes                                 | 3    |
| 8.7 Plans for removal, storage and<br>protection of soils                                  | 5    |
| 8.8 Plans for redistribution of soils  | 6    |
| 8.9 Nutrients and soil amendments  | 6    |
| 8.10 Effects of mining operations on soils,<br>nutrients and soil amendments to be used    | 7    |
| 8.11 Mitigation and control plans  | 7    |
| 8.12 Bibliography  | 8    |
| List of Exhibits   | 10   |

CHAPTER X

FISH AND WILDLIFE RESOURCES

TABLE OF CONTENTS

|   | Page |
|---|------|
| 10.1 Scope  | 1    |
| 10.2 Methodology                                      | 1    |
| 10.3 Existing fish and wildlife resources             | 2    |
| 10.3.1 Wildlife habitats in mine plan area            | 2    |
| 10.3.2 Wildlife                                       | 3    |
| 10.3.2.1 Aquatics                                     | 5    |
| 10.3.2.2 Mammals                                      | 6    |
| 10.3.2.3 Birds  | 9    |
| 10.3.2.4 Reptiles                                     | 10   |
| 10.3.3 Species of special interest                    | 11   |
| 10.3.3.1 Threatened and endangered species            | 11   |
| 10.3.3.2 Raptors                                      | 11   |
| 10.4 Effects of mining operation on fish and wildlife | 12   |
| 10.5 Mitigation and management plan                   | 13   |
| 10.6 Fish and wildlife monitoring                     | 14   |
| 10.7 Bibliography                                     | 16   |
| List of Exhibits                                      | 18   |

CHAPTER XI  
CLIMATOLOGY AND AIR QUALITY

TABLE OF CONTENTS

|  | Page |
|--|------|
| 11.1 Scope                                       | 1    |
| 11.2 Methodology                                 | 1    |
| 11.3 Existing environment                        | 1    |
| 11.3.1 Precipitation                             | 1    |
| 11.3.2 Temperature                               | 2    |
| 11.3.3 Evaporation                               | 3    |
| 11.3.4 Relative humidity                         | 3    |
| 11.3.5 Wind                                      | 3    |
| 11.4 Effects of mining operations on air quality | 4    |
| 11.5 Climatological and air quality monitoring   | 5    |
| 11.6 Bibliography                                | 6    |
| List of Exhibits                                 | 7    |

CHAPTER XII

GEOTECHNICAL INFORMATION

TABLE OF CONTENTS

|   | Page |
|---|------|
| 12.1 Scope                                    | 1    |
| 12.2 Methodology                              | 1    |
| 12.3 Underground mine design                  | 1    |
| 12.3.1 Geotechnical tests and analysis        | 2    |
| 12.3.2 Coal pillar design                     | 2    |
| 12.3.3 Roof span design                       | 2    |
| 12.4 Surface subsidence effects of mining     | 2    |
| 12.5 Stability analysis of earthen structures | 3    |

CHAPTER XIII

DESIGNS

TABLE OF CONTENTS

|  | Page |
|--|------|
| 13.1 Data for this chapter have been included<br>in other chapters | 1    |

CHAPTER XIV

CONSULTTION AND COORDINATION

TABLE OF CONTENTS

|  | Page |
|--|------|
| 14.1 Scope                                 | 1    |
| 14.2 Federal Consultation and Coordination | 1    |
| 14.3 State Consultation and Coordination   | 2    |
| 14.4 Local Consultation and Coordination   | 3    |
| 14.5 Other Consultation                    | 4    |

CHAPTER XV

RESOURCE RECOVERY AND PROTECTION PLAN

TABLE OF CONTENTS

|  | Page |
|--|------|
| 15.1 (abridged) Resource recovery and protection<br>plan | 1    |

CHAPTER XVI  
B-CANYON REVISION  
 TABLE OF CONTENTS

|   | <u>PAGE NO.</u> |
|---|-----------------|
| LIST OF TABLES, MAPS, AND EXHIBITS.....                                   | iii             |
| INTRODUCTION.....   | 1               |
| Document Description.....   | 1               |
| Urgency.....  | 1               |
| Document Organization.....  | 2               |
| Document Scope.....   | 3               |
| Description of Revision Area and Operations.....                          | 4               |
| Summary of Environmental Impacts.....                                     | 6               |
| UMC 771.25 PERMIT FEES.....   | 8               |
| UMC 771.27 VERIFICATION OF APPLICATION.....                               | 9               |
| UMC 782.16 RELATIONSHIP TO AREAS DESIGNATED UNSUITABLE<br>FOR MINING..... | 10              |
| UMC 782.21 NEWSPAPER ADVERTISEMENT AND PROOF OF<br>PUBLICATION.....       | 11              |
| UMC 783.14 GEOLOGY DESCRIPTION.....                                       | 12              |
| UMC 783.15 GROUND WATER INFORMATION.....                                  | 13              |
| UMC 783.16 SURFACE WATER INFORMATION.....                                 | 21              |
| UMC 783.19 VEGETATION INFORMATION.....                                    | 22              |
| UMC 783.20 FISH AND WILDLIFE RESOURCES INFORMATION.....                   | 23              |
| UMC 783.22 LAND-USE INFORMATION.....                                      | 24              |
| UMC 783.27 PRIME FARMLAND INVESTIGATION.....                              | 25              |
| UMC 784.14 RECLAMATION PLAN: PROTECTION OF<br>HYDROLOGIC BALANCE.....     | 26              |
| UMC 784.20 SUBSIDENCE CONTROL PLAN.....                                   | 27              |
| UMC 784.21 FISH AND WILDLIFE PLAN.....                                    | 28              |
| UMC 784.24 TRANSPORTATION FACILITIES.....                                 | 29              |
| Belt Loading Station.....   | 29              |
| Conveyor Belts.....   | 29              |
| Conveyor Drives.....  | 30              |
| Transfer Points.....  | 30              |

*revised*  
9/13/88

CHAPTER XVI  
TABLE OF CONTENTS

|             |   | <u>PAGE NO.</u> |
|-------------|---|-----------------|
| UMC 784.25  | RETURN OF COAL PROCESSING WASTE TO<br>ABANDONED UNDERGROUND WORKINGS.....                   | 32              |
| UMC 817.41  | HYDROLOGIC BALANCE: GENERAL REQUIREMENTS...   | 33              |
| UMC 817.48  | HYDROLOGIC BALANCE: ACID-FORMING AND<br>TOXIC-FORMING MATERIALS.....                        | 34              |
| UMC 817.50  | HYDROLOGIC BALANCE: UNDERGROUND MINE ENTRY<br>AND ACCESS DISCHARGES.....                    | 35              |
| UMC 817.52  | HYDROLOGIC BALANCE: SURFACE AND GROUND<br>WATER MONITORING.....                             | 36              |
| UMC 817.59  | COAL RECOVERY.....  | 37              |
| UMC 817.71  | DISPOSAL OF EXCESS SPOIL AND UNDERGROUND<br>DEVELOPMENT WASTE:<br>GENERAL REQUIREMENTS..... | 38              |
| UMC 817.88  | COAL PROCESSING WASTE: RETURN TO<br>UNDERGROUND WORKINGS.....                               | 39              |
| UMC 817.97  | PROTECTION OF FISH, WILDLIFE, AND RELATED<br>ENVIRONMENTAL VALUES.....                      | 40              |
| UMC 817.121 | SUBSIDENCE CONTROL: GENERAL REQUIREMENT....   | 41              |
| UMC 817.122 | SUBSIDENCE CONTROL: PUBLIC NOTICE.....  | 42              |
| UMC 817.124 | SUBSIDENCE CONTROL: SURFACE OWNER<br>PROTECTION.....  | 43              |
| UMC 817.126 | SUBSIDENCE CONTROL: BUFFER ZONES.....   | 44              |

CHAPTER X  
FISH AND WILDLIFE RESOURCES

TABLE OF CONTENTS

|   | Page |
|---|------|
| 10.1 Scope  | 1    |
| 10.2 Methodology                                      | 1    |
| 10.3 Existing fish and wildlife resources             | 2    |
| 10.3.1 Wildlife habitats in mine plan area            | 2    |
| 10.3.2 Wildlife                                       | 3    |
| 10.3.2.1 Aquatics                                     | 5    |
| 10.3.2.2 Mammals                                      | 6    |
| 10.3.2.3 Birds  | 9    |
| 10.3.2.4 Reptiles                                     | 10   |
| 10.3.3 Species of special interest                    | 11   |
| 10.3.3.1 Threatened and endangered species            | 11   |
| 10.3.3.2 Raptors                                      | 11   |
| 10.4 Effects of mining operation on fish and wildlife | 12   |
| 10.5 Mitigation and management plan                   | 13   |
| 10.6 Fish and wildlife monitoring                     | 15   |
| 10.7 Bibliography                                     | 16   |
| List of Exhibits                                      | 18   |

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CHAPTER X

10.1 Scope

Kaiser Coal's Sunnyside Mines has been in continuous operation for over eighty years. During the course of operation, approximately 244 acres (1.7 percent of the 14,475 acre permit area) was disturbed.

The focus of this chapter is the existing wildlife resources within the permit boundary, wildlife affected or potentially affected by the mining operations, and mitigation/management plans.

10.2 Methodology

The existence of Sunnyside Mines predates 30 CFR, 741 and the performance standards of 30 CFR, 817.97, the regulations pertaining to mining permits and wildlife information respectively. Thus, there are no pre-mine baseline data available for the permit area. Impact assessment is therefore subjective. Impacts to wildlife populations began eighty years ago with the first mining operations in Whitmore Canyon. Since that time, the welfare of wildlife has varied with changing climatic, seral, economic, social and technical conditions. The populations in and near the permit area have survived these changing conditions and are adapted to the present environment. Inventory type studies would provide data on status of these populations, but in view of the fact that no disturbance is planned during the five year permit period, the value of such studies is questionable. The goal of Sunnyside's wildlife program is to conserve wildlife through sound management techniques and monitoring methods. A recent aquatic study (Winget 1980) is the only information relevant to existing wildlife resources (aquatic fauna) within the permit boundary.

The purpose of the aquatic study was to collect adequate data to: 1) describe the condition of aquatic resources in Grassy Trail Creek; and 2) provide the baseline for preparing a management plan for said resources.

Aquatic macroinvertebrates were collected with a modified Surber sampler on three dates from selected stations above and below suspected impact points (see Figure VII-2, Chapter VII-Hydrology). Sediment sizes, chemical composition and water quality were determined for each stream section. Comparisons between physical/chemical measurements and aquatic macroinvertebrate community condition were used to indicate environmental impacts on aquatic resources.

## CHAPTER X

The information sources for the discussion of other wildlife resources are publications of the Utah Division of Wildlife Resources (UDWR), Final Environmental Statement, Development of Coal Resources in Central Utah, Department of the Interior, and UDWR report submitted to Kaiser on November 15, 1979 (see Appendix X-1).

### 10.3 Existing Fish and Wildlife Resources

Wildlife is a rather broadly defined term that includes many vertebrate as well as invertebrate species. For practical and economic reasons, it becomes necessary to concentrate on the most "important" species, which can be identified by using a predetermined set of criteria. The UDWR has defined high interest wildlife as 1) all game species, 2) any economically important species, 3) any species of special aesthetic, scientific or educational significance, and 4) all federally listed threatened or endangered species. Unless otherwise noted, the wildlife discussed in the following sections have been classified as high interest.

#### 10.3.1 Wildlife Habitats in Mine Plan Area

The habitats of major concern are those of high interest species. Because most terrestrial species use a variety of habitats during a lifetime, the discussion will begin with a general description of habitats found on the permit area.

The long axis of the permit area follows Whitmore Canyon in a northwest-southeast orientation (Plate X-1). Whitmore Canyon is flanked by West Ridge to the west and Patmos Ridge to the east. Elevations along the east-west section boundaries defined by the southern boundary of Section 29, R14E, T14S, are: Whitmore Canyon - 7000 feet, West Ridge - 8600 feet, Patmos Ridge - 9800 feet.

Vegetation types in the canyon bottom include riparian/cottonwood grove, riparian/willow, riparian-bulrush/sedge, and sagebrush/grass (see the vegetation Sections 9.3.2 and 9.3.2.5 for a description of vegetation types and scientific names of plants respectively).

The exposed south and west aspect slopes are dominated by xeric vegetation. The vegetation types are classified as: mountain brush, pinyon-juniper (PJ), PJ/grass. PJ/mountain brush, PJ/sagebrush

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JUN 12 1985

CHAPTER X

DIVISION OF OIL  
GAS & MINING

and sagebrush/grass. The vegetation types found on the more protected north and east aspect slopes are classified as Douglas fir, Douglas fir/aspens, Douglas fir/mountain brush, Douglas fir/PJ and aspens. The sagebrush/grass vegetation type covers the exposed ridge tops.

A unique habitat is the rim-rock cliffs along the eastern boundary of the permit area at about 8200 feet elevation. The rock ledges are sites for raptor eyries and nests of other birds. The caves and crevasses provide roosting sites for bats. Cliff habitat is indicated on Plate X-1.

Grassy Trail Reservoir and Grassy Trail Creek in Whitmore Canyon (Plate X-1) are habitats for numerous aquatic species. The rainbow trout (see Table X-1 in the Appendix for scientific names) and brown trout are high interest species that inhabit the creek and reservoir respectively. The associated riparian zones provide habitats for many other species.

The UDWR has developed a classification system for habitat based primarily on two criteria, 1) the dependency of one or more species of wildlife on a habitat (The UDWR uses the phrase "wildlife use area") and 2) the amount of habitat available. The values from high dependency, limited habitat to low dependency, unlimited habitat are: crucial-critical, high-priority, substantial value, and limited value. The corresponding aquatic habitat value system is crucial-critical - Class 1 or 2, high-priority - Class 3, substantial value - Class 4 and limited value - Class 5 or 6.

Areas within the permit boundary have been designated by UDWR as high-priority for high interest species. Mule deer are most stressed during winter months when forage availability is low, thus winter habitat is high-priority. Winter habitat for deer is shown on Plate X-1.

High interest species whose habitat requirements are found on the permit area are listed in Table X-1.

### 10.3.2 Wildlife

The permit area for Kaiser Coal's Sunnyside Mine project encompasses a portion of the West Tavaputs Plateau in Carbon County, Utah. According to the UDWR (1978) 356 vertebrate species inhabit this region. The total is comprised of 13 fish, 5 amphibians, 14 reptiles, 244 birds and 80 mammals.

JUN 12 1985

## CHAPTER X

DIVISION OF OIL  
GAS & MINING

Many of the species that potentially occur on the permit area have some or all of the habitat requirements in the riparian zones associated with drainage bottoms, seeps, springs, wetlands and flood plains. In the permit area, the canyon bottomlands provide most of the riparian habitats and are most productive in terms of herbage produced and wildlife use. Historically, the bottomlands have also been the areas preferred for human land use activity.

In addition to mining, the major land use activities have been grazing, recreation and water development (Grassy Trail Reservoir). Forage available for grazing on the permit area is limited because of the steep canyon slopes. Therefore, grazing occurs primarily in the canyon bottoms. A plan was designed to protect bottomlands from overgrazing and to stimulate production by a rest-rotation grazing system.

This plan is presently being reviewed by the Soil Conservation Service and will be submitted to the Division for approval when it becomes available.

Presently, Kaiser Coal Corporation leases grazing rights to four operators who have 200-250 cattle on the permit area. Don Andrews, range conservationist with the Soil Conservation Service, conducted a range survey and his observation was "that the range was being properly used and there wasn't any signs of over stocking as of August 17, 1983" (SCS 1983).

Reseeded areas will be protected from livestock grazing by fencing. Fence specifications are height of top wire not more than forty inches and spacing of other wires at 16, 22 and 30 inches (J. Yoakum and W.P. Dasmann. 1969. Habitat management practices In Wildlife Management Techniques, ed. Robert H. Giles, Jr. The Wildlife Society, Washington, D.C. 623 pp). The forty inch height is easily jumped by deer and the spacing between wires prohibits twisting on legs.

New 5-year lease periods are proposed to allow more flexibility for grazing management. During the lease period operators and forage condition will be monitored for compliance with lease terms.

Low stocking rates and fence control are management techniques that will maintain forage production at optimum levels for the benefit of livestock and wildlife.

A rodeo arena is located in riparian habitat in Section 29, R14E, T14S. Recreational use of the arena is limited to warm weather months. Another recreational activity that occurs in the riparian habitat in Whitmore Canyon is a "put and take"

## CHAPTER X

fishery discussed in the following section.

Post-mining land use will continue to be wildlife, grazing, recreation and culinary water use in Grassy Trail Reservoir. The sites disturbed by mining activity will be reclaimed to wildlife and grazing uses.

### 10.3.2.1 Aquatics

The UDWR has stocked Grassy Trail Reservoir and Grassy Trail Creek with brown trout and rainbow trout respectively. Brown trout were stocked to control a nuisance population of tiger salamanders and the UDWR (1979) has reported success.

The brown and rainbow trouts are exotic game species that are of high interest to Utah. According to Larry Dalton, WDWR game biologist, (personal communication) rainbow trout are reproducing in the stream below Whitmore Reservoir. A section of the stream was sampled in 1983 and again in 1984 and the density average was 120 and 200 fish per mile of stream. Fishing in Grassy Trail Reservoir is presently prohibited because the water is used for culinary purposes.

The tiger salamander is a year long resident of the permit area. Grassy trail reservoir and Grassy Trail Creek are used as breeding and larva habitat during the period March - September. Riparian habitat along Grassy Trail Creek is used by the adult life form.

A three mile segment of Grassy Trail Creek below the reservoir (Plate X-1) is designated a Class 3 fishery (significant value) by the UDWR. The rainbow trout fishery is sustained on a put and take basis during seasons of adequate water flow. The remainder of Grassy Trail Creek and all other streams on the permit area have a limited value for sport fisheries and have been designated as Class 5 or Class 6. Class 6 streams are dewatered during portions of the year.

Aquatic macroinvertebrates were the organisms studied in the aquatic resource analysis of Grassy Trail Creek. According to Winget (1980), aquatic macroinvertebrates are generally much more susceptible to water-borne toxicants and other environmental stresses than are fish and other higher animals and for this reason they are excellent indicators of water resource condition.

Because the study was designed to address the potential impacts of mining activity on the aquatic environment of the Creek, the results are discussed in section 10.4.

## CHAPTER X

### 10.3.2.2 Mammals

There are seventeen high interest species listed in Table X-1 that potentially occur on the permit area. The total is comprised of three small game, six furbearers, four big game, one endangered, and three with none of the above classifications.

The permit area is year-round habitat for cottontail rabbits and snowshoe hare. Generally, 7000 feet is an elevational boundary with mountain cottontail preferring habitats above and desert cottontail preferring habitats below. The habitat requirements of the snowshoe hare are provided by the spruce-fir vegetation type. The population trends of the cottontails are stable while the trend of snowshoe hare is cyclic.

There are six beaver dams on Grassy Trail Creek in the Left Fork of Whitmore Canyon above the reservoir (Plate X-1). One beaver dam was observed in Water Canyon. Some of the dams appear in an active state of repair. Habitats of the other furbears occur on the permit area, but population densities are unknown. According to the UDWR (1978), the population trends of the beaver and striped skunk are increasing while that of mink is unknown and those of the furbears are stable.

The permit area is part of deer herd unit 27B - Range Creek. Herd unit 27B occupies the east half of Carbon County, part of the north side of Emery County, and the south side of Duchesne County for a total land area of 1,169,408 acres (Utah State Department of Fish and Game 1967). Whitmore Canyon is on the south side of the unit.

Unit 27B was included in range inventory investigations conducted in 1966 by the UDWR (then the Utah State Department of Fish and Game) to determine winter distribution patterns, range condition information and land ownership status. The distribution pattern observed was summer range on the West Tavaputs Plateau in the center of the unit and winter range at lower outlying elevations. The unit is 19 percent summer range and 49 percent winter range, during severe winters the range decreases to 31 percent. The permit area is in the Pinyon-Juniper-Mountain Brush-Grass vegetation type which comprises 34 percent of the normal winter range and 42 percent of the severe winter range (Utah State Department of Fish and Game 1967). The optimum winter range population of deer in unit 27B is 29,885 (Table X-2).

On the permit area, deer summer range is on West Ridge, Patmos Ridge and high country to the north and east. Winter

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DIVISION OF OIL  
GAS & MINING

CHAPTER X

range is at lower elevations than summer range (Plate X-1). With severe winters deer move down into Whitmore Canyon and west off West Ridge to the adjacent flat, P-J country.

According to UDWR, winter ranges are inhabited between November 1 and May 15 each year, depending on weather conditions. Snow accumulation at high elevations force deer to habitat where energy costs of thermoregulation are low. Whitmore Canyon and pediment slopes east of the permit area are considered winter range (Wildlife Map, Plate X-1). Climatological information provided in section 783.18 (Chapter XI) supports this statement. Records at the Sunnyside NOAA weather station located at the engineering building, elevation 1982, (6500 feet), show the greatest mean daily snow accumulation, 10.2 (4.01 inches), occurring in January. This is far below the reported 46 cm (1.5 feet) accumulation which precludes use of the range by deer (Gilbert et al., 1970; Hosely, 1956).

The chained areas on the pediment slopes east of the permit area have had a serious impact on wintering deer. Chaining was conducted by the Bureau of Land Management (BLM) using two caterpillar tractors pulling a 41 kg (90 pound) link chain between them. Two areas, Mud Springs, No. 88 and Mud Springs, No. 10 were chained in 1966. No. 88 was 778 ha (1922 acres) and No. 10 was 685 ha (1962 acres). Both areas were seeded with crested wheatgrass (Agropyron cristatum), fourwing saltbus (Atriplex canescens), and alfalfa (Medicago sativa). According to David Mills, wildlife biologist with the BLM (personal communication 18 August 1983), the chaining was a negative impact for the following fifteen years because no cover was left for escape or thermoregulation. Vegetation is now providing suitable cover and deer utilization is increasing. Data from pellet transect established in the chained areas in 1976 show that winter deer use from 1976-77 to 1979-80 has trended upwards (UDWR 1980).

Published data are available on big game management unit. The permit area is approximately 1 percent of unit 27B and it may not be representative of the unit in terms of deer density. However, for the purposes of this discussion, it is assumed that data published on unit 27B is more representative of the permit area than data published on any other herd unit.

The health of a deer herd is largely dependent on the quality of habitat relative to animal density (carry capacity). An approximation of the status of 27B can be discerned by comparing selected data of certain management units (Table X-3). Unit 27A adjoins 27B, unit 19 had a high buck harvest, success ratio and above average fawn doe ratio, unit 30B had a low buck harvest and has a comparatively small deer range and unit 29B has a comparatively large deer range. A comparison of these data

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CHAPTER X

DIVISION OF OIL  
GAS & MINING

requires that all variables relative to the hunt be held equal, i.e. weather conditions, hunter access to unit, hunter distribution on unit, etc.

Fawns per 100 does are an indicator of herd health. The Density Index (DI) as used here is an indicator of carrying capacity. The carrying capacity is proportional to the DI value. The log of the range area was used to make the index more sensitive to hunter success. The most productive unit, 19, also has the highest DI. Unit 27A was the least productive and has the lowest DI. The second lowest DI was unit 27B, which would indicate that the region has a relatively low carrying capacity for deer.

Since 1976, both the hunter success and the fawn/100 doe ratio have declined in unit 27B, although the latter ratio was lower in 1978 than 1979 (UDWR 1980a).

The nearest elk management unit is the Book Cliffs-Unit 21, which is 40 miles east of the permit area. This unit has a low population of elk and considerable forage availability. The UDWR recognized the opportunity for herd expansion and released 50 animals during the winter of 1979-80. An additional 50 animals are to be released during the 1980-81 winter period (UDWR 1980b).

Although the permit area contains habitat suitable for elk, no elk have been observed there is potential for elk in the Book Cliff herd to expand their range to the permit area, but this would take many years and favorable conditions.

The cougar received protection as a game animal on February 15, 1967. Harvest data has been reported by deer management units and unit 27B ranks fourth with a total harvest of 51 animals for the years 1972 to 1979 (UDWR 1980c). This indicates that the permit area probably contains habitat suitable for cougars and than cougars may be present.

The black bear received protection as a game animal at the same time as the cougar. The total harvest reported by the UDWR (1980d) for the years 1969-79, also for deer management unit 27B, was 25 animals, the third highest reported. It is also probable that there is suitable black bear habitat and some animals on the permit area.

The muskrat, kit fox, and bobcat are other high interest species that could occur on the permit area. Because of the lack of suitable habitat, the kit fox is the least likely to be found. The endangered black-footed ferret is discussed in Section 10.3.3.1.

## CHAPTER X

### 10.3.2.3 Birds

Of the 244 bird species that potentially occur in the region, 51 are high interest species with preferred habitat on the permit area. The 51 are comprised of 29 species of migratory game birds, 13 raptors, 5 small game (upland birds) and 4 migratory birds of high federal interest. Eight of the raptors are also of high federal interest. The 51 species are listed and classified in Table X-1.

The 29 species of migratory game birds are comprised of 27 waterfowl, the American Coot, and the Mourning Dove. Grassy Trail Reservoir provides habitat for waterfowl and American Coot. The lack of agriculture land in the vicinity precludes use by geese or dabbling ducks on a yearlong basis.

Mourning Doves nest in pinyon-juniper and riparian habitats near water sources. These components are found in any canyon bottomland on the permit area. Hunting of Mourning Doves occurs on a very limited basis.

Five species of small game bird species are listed as occurring on the permit area, however probability of occurrence varies because of availability of key habitat components. Blue Grouse utilize Douglas fir habitat types during winter months. During spring and summer months they migrate to sagebrush, pinyon-juniper or shrubland habitat.

Ruffed Grouse generally prefer habitat within 0.25 miles of water. Aspen forests are important during winter months, because staminate buds are a food source.

The occurrence of California Quail is marginal while sage grouse are improbable. Chukar prefer open, rocky areas associated with desert scrub or shrubland habitats but have been observed at the mouth of Slaughter Canyon and near the refuse dump. Sage grouse require open expanses of low growth-form sage brush for leks. These habitat characteristics are generally lacking on the permit area.

The Great Blue Heron, Long-billed Curlew, Black Swift and Western Bluebird are migratory birds of high federal interest. According to UDWR, there are no rookeries of the Great Blue Heron due to the absence of preferred nesting habitat. However, Grassy Trail Reservoir is feeding habitat so Heron are occasional visitors.

Long-billed Curlews prefer grasslands as breeding habitat and thus would probably not be found on the permit area. Grassy

## CHAPTER X

Trail Reservoir provides feeding habitat during migrations.

The Black Swift is a summer resident of West Tavaputs Plateau. Cliffs and tallus slopes are preferred habitat, but nesting is usually associated with moist ledged or crevices near or behind waterfalls. No nesting habitat occurs on the permit area.

The Western Bluebird is an uncommon summer resident of the region. It is a cavity nester with no particular preference for habitat type. Any cavity trees on the permit area is potential nesting habitat.

### 10.3.2.4 Reptiles

The Utah milk snake is a yearlong resident of the permit area. Riparian habitat found along Grassy Trail Creek and side canyon bottomlands are preferred habitat. The milk snake is furtive due to its nocturnal habitats. No milk snakes or their dens have been observed on the permit area.

## CHAPTER X

### 10.3.3 Species of Special Significance

#### 10.3.3.1 Threatened and Endangered Species

**Mammals:** The black-footed ferret is on the Federal List of Endangered and Threatened Wildlife and Plants (50 CFR 1711). There is a strong association of ferrets with prairie dog towns because the prairie dog is a primary prey species and its burrows are used as ferret dens.

A potential range of the ferret is the pediment slopes southwest of the permit area (Hinkley 1970, Scott et al. 1977, both cited in USDI 1979). Two whitetailed prairie dog towns are known to occur on the permit area, section 6 (R14E, T15S) in the southwest corner (Plate X-1). The town on the southwest-southeast quarter section boundary is in an abandoned cemetery and contains ten active burrows. No ferrets or ferret sign have been observed, but only reconnaissance surveys have been conducted. The nearest probable ferret sighting was about two miles northwest of Woodside on Highway 6, about eighteen miles south of the permit area (Scott et al. 1977, cited in USDI 1979). The date of this sighting is not known.

A recent unconfirmed sighting of a black-footed ferret is documented in Carbon County, eastern 1/2 section 10, T15S, R13E, according to Phil Garcia, conservation office, Utah Division of Wildlife Resources on 02-10-80.

The applicant will notify the Division of any future occurrence of threatened or endangered species or golden eagles on the permit area.

#### 10.3.3.2 Raptors

Raptors are considered species of special significance because of their rareness and because they are indicators of toxicants in the environment. The permit area contains nesting and/or hunting habitat of thirteen raptors. The bald eagle and peregrine falcon are on the Federal List of Endangered and Threatened Wildlife and Plants (50 CFR 17.11).

The permit area is considered winter range of bald eagles (UDWR 1979). Food supply is probably the most critical feature of the biology of wintering bald eagles (Steenhof 1978). The feeding habitats vary with the season and region; eagles in the Great Basin rely mostly on avian and mammalian carrion (Murphy 1975, cited by Steenhof 1978). Eagles prefer fish (including fish carrion) when it is available.

## CHAPTER X

Roost trees are an important part of bald eagle habitat. There are no known roost trees on the permit area. The nearest roost tree observed by Boner et al. (1977, cited in USDI 1979) was three miles southwest of Mounds, which is about seventeen miles southwest of the permit area.

The peregrine has been sighted in the region, but no active eyries have been identified (USDI 1979). The sighting nearest the permit area was about two miles north of Mounds (Boner et al. 1977, cited in USDI 1979). The peregrine usually lives in open country around rock cliffs overlooking or at least within one mile of streams or rivers; an abundance of birds for food supply must be within hunting range.

The burrowing owl is a raptor that has special nesting requirements. They commonly use prairie dog burrows as nest sites. The prairie dog towns on the permit area will not be disturbed without consultation with DOGM and UDWR.

### 10.4 Effects of Mining Operation on Fish and Wildlife

Development of Sunnyside Mines has resulted in the disturbance of approximately 287.36 acres (see Section 9.3.2.7 for a breakdown of vegetation types). Disturbed areas are indicated on Plate III-1. The construction and present mine use of roads and bridges causes sedimentation of Grassy Trail Creek. The species that have been potentially impacted by mine development and continued operation are listed in Table X-1. The list includes 9 fish, 4 amphibians, 12 reptiles, 63 birds and 33 mammals. Although each species listed was potentially affected, the number of species actually affected is probably a small percentage of the total, because of the relatively small area disturbed.

The ongoing mining operations have altered the environments of local aquatic and terrestrial faunal communities. Impacts of operations include noise pollution, air pollution, vehicular collisions of roads, and sedimentation of Grassy Trail Creek.

The results of aquatic resource analysis study (Winget 1980) show that water quality in Grassy Trail Creek above the mine discharge is adequate for most aquatic species, except for questionable levels of nickel, zinc and oil and grease. Water quality below the mine discharge shows considerable degradation: increases in conductivity, TDS, alkalinity, chloride, nitrate, phosphate, sulfate, sodium and oil and grease. There was an increase in sediment fines proceeding downstream; however, there was no evidence of toxicity type impacts chemical analyses

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DIVISION OF OIL  
GAS & MINING

## CHAPTER X

nor biological community investigations provided any data that indicated a heavy metal problem in Grassy Trail Creek (see Section 7.2.4).

Generally, there was very little biotic community difference between Stations UPGTR, GTC-02; Station GTC-AP showed moderate impact related changes, caused more by physical stress than chemical; Station GTC-03 showed severe stress reactions with indications of both physical and chemical stresses; and Station GTC-05 community exhibited similar responses as at Station GTC-03 but with evidence of limited recovery (see Figure VII-2). Fine sediments and oil and grease were apparently the major factors affecting Grassy Trail Creek.

It should be pointed out that mine waters contribute greater than 90 percent of total stream flow. Without mine water, Grassy Trail Creek would be near intermittent part of the year during most years.

### 10.5 Mitigation and Management Plans

Some impacts of the construction and operation of the ventilation fans are unavoidable. Where possible, mitigations will be achieved by minimizing these impacts and after the impacts, restoration to pre-impact conditions.

Dozing will be restricted to the minimum amount necessary for the shaft sites, power transmission lines and road upgrading. Upgrading the roads will be carried out according to current road building standards.

All disturbed sites no longer needed for mining operations are being reclaimed according to current reclamation standards. The reclamation techniques and seed mixtures used are designed to achieve a post-mining land use of wildlife and grazing. The Sunnyside topography consists of steep canyon slopes and undulating bottomlands. Revegetation of small areas in this rugged topography will create natural, scattered plant groupings which will optimize edge effects. No special plant groupings are planned for small acreages. Reforestation will occur by natural succession and shrubs will be broadcast or drill seeded.

All revegetated areas will create induced and/or inherent edges. Induced edges are a result of various adjacent successional stages of the same community. Inherent edges occur where two different communities meet, e.g., where mountain brush on a slope abuts sage/grass vegetation on a valley floor. On the largest areas of disturbance, a mosaic of induced edges will

## CHAPTER X

develop where revegetated areas adjoin non-mined areas and older reclaimed areas planted with crested wheatgrass.

The potential for optimizing the edge effect through vegetation groupings at Sunnyside is limited. The amount of edge is determined by length, width and configuration. Although boundaries of many disturbed areas are long, they are also very regular and narrow, thus restricting the potential to create more edge. Additionally, because most areas are small in size, habitat richness and variation of configuration is restricted (Thomas et al, 1979). The value to wildlife of plant species being used for reclamation is discussed in Section 9.7.

For the most part, Sunnyside Mine operations have developed without consideration of potential impacts on wildlife. However, impacts on wildlife have been avoided during the course of operations even though wildlife may not have been the motivation. For example, during the early stages of operations, when mining was under lower cover near Grassy Trail Creek, pillars were left to protect surface structures and streams (Section 3.3.2.2 for further discussion of subsidence see Sections 3.4.8 and 6.6.3.3).

The ongoing operations have altered the environments of local aquatic and terrestrial faunal communities. Unless problems arise, the environments will continue in their altered state until mining operations cease.

The riparian habitat along Grassy Trail Creek is a primary concern for wildlife protection. During the course of mine development, facilities were constructed within 100 feet of the stream. Most of the construction occurred at the mine site in Section 32 (Plate X-1). The riparian habitat that remains is marked with buffer zone sign (4) posted between the upper mine entrance to a point below the lower mine workings (SW1/4 Section 32).

Water discharged into Grassy Trail Creek must meet NPDES effluent criteria. Different water quality parameters are being monitored on a monthly, quarterly and semi-annual basis at six check points along the creek (Chapter VII, Permit Application).

All mine employees will receive the UDWR wildlife educational program during annual refresher safety training. The program consists of slides and a tape explaining wildlife value and how the individual can help protect wildlife resources.

The applicant will avoid the use of persistent pesticides in the permit area during underground coal mining and reclamation activities unless approved by the Division.

## CHAPTER X

### 10.6 Fish and Wildlife Monitoring

The water quality of Grassy Trail Creek will be monitored during the life of the mine. Corrective measures will be undertaken if parameters exceed limits set in National Standards if the cause is due to mining activity.

No other active monitoring programs are planned at this time.

## CHAPTER X

### 10.7 Bibliography

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CHAPTER X

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## CHAPTER X

### LIST OF EXHIBITS

|          |     |  |
|----------|-----|--|
| Figure   | X-1 | USFWS raptor information letter and map key  |
| Table    | X-1 | High interest species that potentially occur on the permit area and species that were potentially impacted by mine development and operation |
| Table    | X-2 | Optimum deer population on winter range in Unit 27B  |
| Table    | X-3 | Selected data from deer management units - 1979  |
| Appendix | X-1 | UDWR cover letter and report   |
| Plate    | X-1 | Wildlife plan map  |



United States Department of the Interior

FISH AND WILDLIFE SERVICE  
ECOLOGICAL SERVICES  
1311 FEDERAL BUILDING  
125 SOUTH STATE STREET  
SALT LAKE CITY, UTAH 84138-1197

IN REPLY REFER TO:

August 23, 1983

Mr. Curt Jansen  
Intermountain Scientific Associates  
1322 Webster Avenue  
Fort Collins, Colorado

Dear Mr. Jansen:

Enclosed are the raptor nest maps and index you requested for the Sunnyside mine Area. All the data was collected from U.S. Fish and Wildlife Service (FWS) raptor inventories in 1981. If you have any questions concerning this information, please contact the FWS Energy Operations division in Salt Lake City, Utah (801) 524-5649.

Sincerely yours,

Robert D. Jacobsen  
Field Supervisor

Enclosure

FIGURE X-1

CHAPTER X

36. 1 In Buteo
37. 1 In Raven
38. 1 In Raven
39. 1 In GE
40. 1 ISN; 1 Pos. Buteo (In)
41. 4 In GE
42. Potential Prairie
43. 2 Buteo, 1 Act. Red tail (2<sup>+</sup> young), 1 In
44. 1 LISN
45. 4 GE, 1 active (2 young), 1 other tended, 2 alternates
46. 1 ISN
47. 1 ISN
48. 1 Raven, poss. occ.
49. 1 ISN, 1 In Buteo
50. 1 stick nest possible occ. (GHO?)
51. 1 Act. GE (2 young)
52. 1 In Raven
53. 1 In Raven
54. 1 Act GE (1 young)
55. 1 In Buteo
56. 1 In GE
57. Obs. pair of eagles
58. 1 In GE
59. 2 In GE both very old
60. AO GE obs.
61. 1 ISN very old
62. VOIL number
63. 1 SISN prob raven
64. 1 But/Raven old
65. Obs. Gos (Ad) with prey
66. 4 Raven nest
67. 1 Act Red Tail (3 young)
68. 2 In Buteo
69. 2 Buteo, 1 Act RT (3 young); 1 In
70. 1 In Buteo
71. 1 In Raven
72. 1 In Raven
73. 1 ISN old
74. 1 Act RT (2<sup>+</sup> young)
75. 2 Buteo, 1 Act RT (2 young); 1 In
76. 1 In Buteo
77. 1 In Buteo
78. 1 In Buteo old
79. 1 In Buteo old
80. 1 InButeo old
81. 1 But/Raven In
82. Obs. Ad. Eagle
83. 1 Buteo ? Greenery occ.
84. 1 Buteo (In)
85. 1 In GE
86. 1 Raven, poss occupied
87. 1 Raven
88. 1 In GE

CHAPTER X

- 89. 1 Act GE (2 young)
- 90. Obs. 2 Ad. GE
- 91. 1 In GE
- 92. 5 In GE
- 93. 1 Raven (In)
- 94. 3 In GE
- 95. 1 In GE old
- 96. Ad. Prairie obs.
- 97. 2 In GE
- 98. Ad. Ge obs
- 99. Prairie obs (Ad.)
- 100. 1 Act Prairie eagly - young fledged (one seen)
- 101. 1 Act Prairie - 2 young seen fledged
- 102. 2 GE 1 tenden/occ; 1 inactive
- 103. 1 GE, inact
- 104. 1 GE inact very old
- 105. 1 Buteo nest very old
- 106. 1 GE inactive

Key

ISN - inactive stick nest  
SISN - small inactive stick nest  
LISN - large inactive stick nest  
IN - inac - inactive  
GE - golden eagle  
TV - turkey vulture

Figure X-1 Cont.

Table X-1 High Interest Species that Potentially Occur on the Permit Area and Species that were Potentially Impacted by Mine Development and Operation

|   | <u>Status</u> | <u>Population Trend</u> |
|---|---------------|-------------------------|
| <b>Fishes</b>   |               |                         |
| <b>Family Salmonidae</b>  |               |                         |
| Cutthroat Trout ( <u>Salmo clarki</u> )                           | C-P-GF        | Stable                  |
| Rainbow Trout ( <u>Salmo gairdneri</u> )                          | C-P-GF        | Stable                  |
| Brown Trout ( <u>Salmo trutta</u> )                               | C-P-GF        | Stable                  |
| <b>Family Cyprinidae</b>  |               |                         |
| Utah Chub ( <u>Gila atraria</u> )                                 | L-P-I         | Abundant                |
| Roundtail Chub ( <u>Gila robusta</u> )                            | C-P-I         | Stable                  |
| Red Shiner ( <u>Notropis lutrensis</u> )                          | C-P-I         | Increasing              |
| Fathead Minnow ( <u>Pimephales promelas</u> )                     | C-P-I         | Stable                  |
| Colorado Squawfish ( <u>Ptychocheilus lucius</u> )                | E-P-I         | Decreasing              |
| Speckled Dace ( <u>Rhinichtys osculus</u> )                       | C-P-I         | Stable                  |
| Redside Shiner ( <u>Richardsonius balteatus</u> )                 | C-P-I         | Stable                  |
| <b>Family Catostomidae</b>  |               |                         |
| Bluehead Sucker ( <u>Catostomus discobolus</u> )                  | C-P-I         | Stable                  |
| Flannelmouth Sucker<br>( <u>Catostomus latipinnis</u> )           | C-P-I         | Stable                  |
| <b>Amphibians</b>   |               |                         |
| <b>Family Ambystomatidae</b>                                      |               |                         |
| Tiger Salamander ( <u>Ambystoma tigrinum</u> )                    | C-P-I         | Unknown                 |
| <b>Family Pelobatidae</b>   |               |                         |
| Great Basin Spadefoot Toad<br>( <u>Scaphiopus intermontanus</u> ) | C-N-I         | Unknown                 |
| <b>Family Bufonidae</b>   |               |                         |
| Woodhouse's Toad ( <u>Bufo woodhousei</u> )                       | C-N-I         | Unknown                 |
| <b>Family Ranidae</b>   |               |                         |
| Leopard Frog ( <u>Rana pipiens</u> )                              | C-N-I         | Unknown                 |
| <b>Reptiles</b>   |               |                         |
| <b>Family Iguanidae</b>   |               |                         |
| Collared Lizard ( <u>Crotaphytus collaris</u> )                   | C-N-I         | Unknown                 |
| Leopard Lizard<br>( <u>Crotaphytus wislizenii</u> )               | C-N-I         | Unknown                 |
| Eastern Fence Lizard<br>( <u>Sceloporus undulatus</u> )           | C-N-I         | Unknown                 |
| Sagebrush Lizard<br>( <u>Sceloporus graciosus</u> )               | C-N-I         | Unknown                 |

|   | <u>Status</u>                                | <u>Population<br/>Trend</u> |
|---|--|-----------------------------|
| Order Galliformes                                     |  |                             |
| Family Phasiandiae                                    |  |                             |
| California Quail<br>( <u>Lophortyx californicus</u> ) | C-P-SG-I<br>resident                         | Stable                      |
| Chukar ( <u>Alectoris chukar</u> )                    | C-P-SG-I<br>resident                         | Stable                      |
| Order Gruiformes                                      |  |                             |
| Family Rallidae                                       |  |                             |
| American Coot ( <u>Fulica americana</u> )             | C-P-MG<br>resident and<br>transient          | Stable                      |
| Order Charadriiformes                                 |  |                             |
| Family Charadriidae                                   |  |                             |
| Mountain Plover<br>( <u>Charadrius montanus</u> )     | R-P-I<br>transient                           | Stable                      |
| Family Scolopacidae                                   |  |                             |
| Long-billed Curlew<br>( <u>Numenius americanus</u> )  | U-P-X<br>summer resident<br>and transient    | Declining                   |
| Order Columbiformes                                   |  |                             |
| Family Columbidae                                     |  |                             |
| Mourning Dove ( <u>Zenaida macroura</u> )             | C-P-MG-I<br>summer resident<br>and transient | Stable                      |
| Order Strigiformes                                    |  |                             |
| Family Strigidae                                      |  |                             |
| Great Horned Owl ( <u>Bubo virginianus</u> )          | C-P-I<br>resident                            | Stable                      |
| Pygmy Owl ( <u>Glaucidium gnoma</u> )                 | K-P-I<br>resident                            | Unknown                     |
| Burrowing Owl ( <u>Speotyto cunicularia</u> )         | L-P-X<br>resident                            | Declining                   |
| Long-eared Owl ( <u>Asio otus</u> )                   | C-P-I<br>resident                            | Stable                      |
| Order Caprimulgiformes                                |  |                             |
| Family Caprimulgidae                                  |  |                             |
| Poor-will ( <u>Phalaenoptilus nuttallii</u> )         | C-P-I<br>summer resident                     | Stable                      |

|  | <u>Status</u>              | <u>Population Trend</u> |
|--|----------------------------|-------------------------|
| Order Apodiformes  |                            |                         |
| Family Apodidae  |                            |                         |
| Black Swift ( <u>Cypseloides niger</u> )                       | U-P-I-X<br>summer resident | Unknown                 |
| White-throated Swift<br>( <u>Aeronautes saxatalis</u> )        | C-P-I<br>summer resident   | Unknown                 |
| Family Trochilidae   |                            |                         |
| Black-chinned Hummingbird<br>( <u>Archilochus alexandri</u> )  | C-P-I<br>summer resident   | Unknown                 |
| Broad-tailed Hummingbird<br>( <u>Selasphorus platycercus</u> ) | C-P-I<br>summer resident   | Unknown                 |
| Order Piciformes   |                            |                         |
| Family Picidae   |                            |                         |
| Common Flicker<br>( <u>Colaptes auratus</u> )                  | C-P-I<br>resident          | Stable                  |
| Order Passeriformes  |                            |                         |
| Family Tyrannidae  |                            |                         |
| Cassin's Kingbird<br>( <u>Tyrannus vociferans</u> )            | U-P-I<br>summer resident   | Unknown                 |
| Ash-throated Flycatcher<br>( <u>Myiarchus cinerascens</u> )    | C-P-I<br>summer resident   | Stable                  |
| Says Phoebe ( <u>Sayornis saya</u> )                           | C-P-I<br>resident          | Unknown                 |
| Dusky Flycatcher<br>( <u>Empidonax oberholseri</u> )           | C-P-I<br>summer resident   | Unknown                 |
| Gray Flycatcher<br>( <u>Empidonax wrightii</u> )               | K-P-I<br>summer resident   | Unknown                 |
| Family Alaudidae   |                            |                         |
| Horned Lark<br>( <u>Eremophila alpestris</u> )                 | C-P-I<br>resident          | Unknown                 |
| Family Corvidae  |                            |                         |
| Scrub Jay ( <u>Aphelocoma coerulescens</u> )                   | C-P-I<br>resident          | Unknown                 |
| Black-billed Magpie ( <u>Pica pica</u> )                       | C-P-I<br>resident          | Unknown                 |
| Pinion Jay ( <u>Gymnorhinus cyanocephala</u> )                 | C-P-I<br>resident          | Unknown                 |
| Family Paridae   |                            |                         |
| Plain Titmouse<br>( <u>Parus inornatus</u> )                   | C-P-I<br>resident          | Unknown                 |
| Bushtit ( <u>Psaltriparus minimus</u> )                        | C-P-I<br>resident          | Unknown                 |

|  | <u>Status</u>                             | <u>Population<br/>Trend</u> |
|--|---|-----------------------------|
| Family Sittidae  |   |                             |
| White-breasted Nuthatch<br>( <u>Sitta carolinensis</u> )       | C-P-I<br>resident                         | Unknown                     |
| Family Troglodytidae   |   |                             |
| Bewick's Wren ( <u>Thryomanes bewickii</u> )                   | C-P-I<br>resident                         | Unknown                     |
| Family Mimidae   |   |                             |
| Gray Catbird<br>( <u>Dumetella carolinensis</u> )              | U-P-I<br>summer resident                  | Unknown                     |
| Sage Thrasher<br>( <u>Oreoscoptes montanus</u> )               | C-P-I<br>resident                         | Unknown                     |
| Family Muscicapidae  |   |                             |
| Western Bluebird<br>( <u>Sialia mexicana</u> )                 | U-P-I-X<br>summer resident                | Unknown                     |
| Townsend's Solitaire<br>( <u>Myadestes townsendi</u> )         | C-P-I<br>resident                         | Unknown                     |
| Family Sylviidae   |   |                             |
| Blue-gray Gnatcatcher<br>( <u>Polioptila caerulea</u> )        | C-P-I<br>summer resident                  | Unknown                     |
| Golden-crowned Kinglet<br>( <u>Regulus satrapa</u> )           | U-P-I<br>resident                         | Unknown                     |
| Family Laniidae  |   |                             |
| Northern Shrike<br>( <u>Lanius excubitor</u> )                 | U-P-I<br>winter resident                  | Unknown                     |
| Family Vireonidae  |   |                             |
| Solitary Vireo<br>( <u>Vireo solitarius</u> )                  | U-P-I<br>summer resident                  | Unknown                     |
| Family Parulidae   |   |                             |
| Orange-crowned Warbler<br>( <u>Vermivora celata</u> )          | C-P-I<br>summer resident<br>and transient | Unknown                     |
| Virginia's Warbler<br>( <u>Vermivora virginiae</u> )           | C-P-I<br>summer resident                  | Unknown                     |
| Black-throated Gray Warbler<br>( <u>Dendroica nigrescens</u> ) | C-P-I<br>summer resident                  | Unknown                     |
| Family Embarizidae   |   |                             |
| Black-headed Grosbeak<br>( <u>Pheucticus melanocephalus</u> )  | C-P-I<br>summer resident                  | Unknown                     |
| Lapland Longspur<br>( <u>Calcarius lapponicus</u> )            | R-P-I<br>winter resident                  | Unknown                     |
| Lazuli Bunting ( <u>Passerina amoena</u> )                     | C-P-I<br>summer resident                  | Unknown                     |
| Green-tailed Towhee<br>( <u>Chlorura chlorura</u> )            | C-P-I<br>summer resident                  | Unknown                     |

|  | <u>Status</u>            | <u>Population<br/>Trend</u> |
|--|--------------------------|-----------------------------|
| Family Embarizidae (Continued)                             |                          |                             |
| Rufous-sided Towhee<br>( <u>Pipilo erythrophthalmus</u> )  | C-P-I<br>resident        | Unknown                     |
| Lark Bunting<br>( <u>Calamospiza melanocorys</u> )         | O-P-I<br>transient       | Unknown                     |
| Vesper Sparrow<br>( <u>Pooecetes gramineus</u> )           | C-P-I<br>summer resident | Unknown                     |
| Lark Sparrow<br>( <u>Chondestes grammacus</u> )            | C-P-I<br>summer resident | Unknown                     |
| Sage Sparrow ( <u>Amphispiza belli</u> )                   | U-P-I<br>summer resident | Unknown                     |
| Gray-headed Junco ( <u>Junco caniceps</u> )                | C-P-I<br>summer resident | Unknown                     |
| Brewer's Sparrow<br>( <u>Spizella breweri</u> )            | C-P-I<br>summer resident | Unknown                     |
| White-crowned Sparrow<br>( <u>Zonotrichia leucophrys</u> ) | C-P-I<br>resident        | Unknown                     |
| Song Sparrow<br>( <u>Zonotrichia melodia</u> )             | C-P-I<br>resident        | Unknown                     |
| Black-throated Sparrow<br>( <u>Amphispiza bilineata</u> )  | U-P-I<br>summer resident | Unknown                     |
| Family Fringillidae  |                          |                             |
| House Finch<br>( <u>Carpodacus mexicanus</u> )             | C-P-I<br>resident        | Unknown                     |
| Lesser Goldfinch<br>( <u>Carduelis psaltria</u> )          | C-P-I<br>resident        |                             |
| Mammals  |                          |                             |
| Order Insectivora  |                          |                             |
| Family Soricidae   |                          |                             |
| Merriam Shrew ( <u>Sorex merriami</u> )                    | U-N-I                    | Unknown                     |
| Order Chiroptera   |                          |                             |
| Family Vespertilionidae                                    |                          |                             |
| Fringed Myotis ( <u>Myotis thysanodes</u> )                | U-N-I                    | Unknown                     |
| Western Big-eared Bat<br>( <u>Plecotus townsendii</u> )    | C-N-I                    | Unknown                     |
| Pallid Bat<br>( <u>Antrozous pallidus</u> )                | C-N-I                    | Unknown                     |
| Order Lagomorpha   |                          |                             |
| Family Leporidae   |                          |                             |
| White-tailed Jackrabbit<br>( <u>Lepus townsendii</u> )     | C-N-I                    | Stable                      |
| Snowshoe Hare ( <u>Lepus americanus</u> )                  | C-P-SG                   | Cyclic                      |
| Black-tailed Jackrabbit<br>( <u>Lepus californicus</u> )   | C-N-I                    | Stable                      |

|   | <u>Status</u> | <u>Population<br/>Trend</u> |
|---|---------------|-----------------------------|
| Family Leporidae (Continued)  |               |                             |
| Mountain Cottontail<br>( <u>Sylvilagus nuttallii</u> )              | C-P-SG-I      | Stable                      |
| Desert Cottontail<br>( <u>Sylvilagus audubonii</u> )                | C-P-SG-I      | Stable                      |
| Order Rodentia  |               |                             |
| Family Sciuridae  |               |                             |
| White-tailed Prairie Dog<br>( <u>Gynomys leucurus</u> )             | C-N           | Stable                      |
| Golden-mantled Ground Squirrel<br>( <u>Spermophilus lateralis</u> ) | C-N-I         | Stable                      |
| Least Chipmunk ( <u>Eutamias minimus</u> )                          | C-N-I         | Stable                      |
| Utah Chipmunk<br>( <u>Eutamias umbrinus</u> )                       | C-N-I         | Stable                      |
| Cliff Chipmunk ( <u>Eutamias dorsalis</u> )                         | U-N-I         | Stable                      |
| Family Geomyidae  |               |                             |
| Valley or Botta Pocket Gopher<br>( <u>Thomomys bottae</u> )         | C-N-I         | Unknown                     |
| Ord Kangaroo Rat ( <u>Dipodomys ordii</u> )                         | C-N-I         | Unknown                     |
| Family Castoridae   |               |                             |
| Beaver ( <u>Castor canadensis</u> )                                 | C-P-F         | Increasing                  |
| Family Cricetidae   |               |                             |
| Canyon Mouse ( <u>Peromyscus crinitus</u> )                         | C-N-I         | Unknown                     |
| Deer Mouse<br>( <u>Peromyscus maniculatus</u> )                     | C-N-I         | Unknown                     |
| Brush Mouse ( <u>Peromyscus boylei</u> )                            | C-N-I         | Unknown                     |
| Pinion Mouse ( <u>Peromyscus truei</u> )                            | C-N-I         | Unknown                     |
| Desert Wood Rat ( <u>Neotoma lepida</u> )                           | C-N-I         | Unknown                     |
| Muskrat ( <u>Ondatra zibethicus</u> )                               | C-N-I         | Stable                      |
| Mountain Vole ( <u>Microtus montanus</u> )                          | C-N-I         | Unknown                     |
| Longtail Vole<br>( <u>Microtus longicaudus</u> )                    | C-N-I         | Unknown                     |
| Order Carnivora   |               |                             |
| Family Canidae  |               |                             |
| Coyote ( <u>Canis latrans</u> )                                     | C-N-I         | Stable                      |
| Red Fox ( <u>Vulpes fulva</u> )                                     | C-N-I         | Stable                      |
| Kit Fox ( <u>Vulpes macrotis</u> )                                  | U-N           | Stable                      |
| Gray Fox<br>( <u>Urocyon cinereoargenteus</u> )                     | C-N-I         | Stable                      |
| Family Ursidae  |               |                             |
| Black Bear ( <u>Ursus americanus</u> )                              | C-P-BG        | Increasing                  |
| Family Procyonidae  |               |                             |
| Ring-tailed Cat<br>( <u>Bassariscus astutus</u> )                   | C-N-I         | Stable                      |

|  | <u>Status</u> | <u>Populatica<br/>Trend</u> |
|--|---------------|-----------------------------|
| <b>Family Mustelidae</b>                           |               |                             |
| Short-tailed Weasel<br>( <u>Mustela erminea</u> )  | R-P-F-I       | Stable                      |
| Long-tailed Weasel<br>( <u>Mustela frenata</u> )   | C-P-F-I       | Stable                      |
| Mink ( <u>Mustela vison</u> )                      | L-P-F         | Unknown                     |
| Black-footed Ferret<br>( <u>Mustela nigripes</u> ) | E-P           | Unknown                     |
| Striped Skunk<br>( <u>Mephitis mephitis</u> )      | C-P-F-I       | Increasing                  |
| Spotted Skunk<br>( <u>Spilogale gracilis</u> )     | C-P-F-I       | Stable                      |
| <b>Family Felidae</b>                              |               |                             |
| Bobcat ( <u>Lynx rufus</u> )                       | C-P-I         | Declining                   |
| Cougar ( <u>Felis concolor</u> )                   | C-P-BG        | Stable                      |
| <b>Order Artiodactyla</b>                          |               |                             |
| <b>Family Cervidae</b>                             |               |                             |
| Mule Deer ( <u>Odocoileus hemionus</u> )           | C-P-BG-I      | Increasing                  |
| Rocky Mountain Elk<br>( <u>Cervus canadensis</u> ) | C-P-BG-I      | Increasing                  |

**STATUS KEY:**

- K Status unknown - It is believed that these species are present, but little is known of their population dynamics.
- C Common - These species are widespread and abundant.
- U Uncommon - These species are widespread, but not abundant.
- R Rare - These species are seldom identified during any one year.
- O Occasional - These species are periodically identified during a long term period - 10-50 years.
- E Endangered - These species are endangered with extinction or extirpation from wildland in Utah.
- T Threatened - These species are threatened with becoming endangered in Utah.
- L Limited - These species are common but restricted to a particular use area or habitat type in Utah.
- P Protected - These species are protected by state or federal laws in Utah.
- N Nonprotected - These species are not protected by any laws in Utah.
- F These species are classified as furbearers.
- I These species were potentially impacted by mine development and operation.
- X A migratory bird of high federal interest
- GF These species are classified as game fish.
- SG These species are classified as small game.
- BG These species are classified as big game.
- MG These species are migratory game birds.

The following terminology is used to describe the seasonal status for avian species.

Transient - These species pass through southeastern Utah twice a year during their migratory travels.

Resident - These species occur yearlong in southeastern Utah.

Summer Resident - These species breed in southeastern Utah and migrate elsewhere for the winter.

Winter Resident - These species breed elsewhere but winter in southeastern Utah.

Reference: Utah Division of Wildlife Resources (1978)

Table X-2 Optimum Deer Population on Winter Range in Unit 27B.\*

| <u>Vegetation Type</u>                  | <u>Acres Available</u> |                      | <u>Optimum Deer Population</u> |
|---|------------------------|----------------------|--------------------------------|
|   | <u>Normal Winter</u>   | <u>Severe Winter</u> |                                |
| Total winter range                      | 573,824                | 364,864              | 29,885                         |
| Pinyon-juniper-<br>mountain brush-grass | 195,584                | 157,760              | 10,893                         |
| Grassland                               | 14,208                 | 14,208               | 1,133                          |

\*Utah State Department of Fish and Game 1967, and written communication, L.J. Wilson 1977, both cited in USDI 1979.

Table X-3 Selected Data from Deer Management Units - 1979.<sup>1</sup>

|                                   | <u>Fawns per<br/>100 Does<sup>2</sup></u> | <u>Bucks<br/>Harvested</u> | <u>Hunter<br/>Success-%(A)</u> | <u>Range-Acres<sup>3</sup>(B)</u> | <u>Density Index<br/>A/Log B</u> |
|-----------------------------------|---|----------------------------|--------------------------------|-----------------------------------|----------------------------------|
| All Units- $\bar{x}$ <sup>4</sup> | 81  | 743                        | 30                             | 401,432                           | 5.4                              |
| 27B                               | 76  | 468                        | 26                             | 793,700                           | 4.4                              |
| 27A                               | 37  | 78                         | 13                             | 267,500                           | 2.4                              |
| 19                                | 93  | 3,673                      | 49                             | 331,100                           | 8.9                              |
| 30B                               | -   | 29                         | 25                             | 94,100                            | 2.4                              |
| 29                                | 52  | 87                         | 29                             | 1,737,000                         | 4.6                              |

<sup>1</sup>UDWR 1980a, 1980b.

<sup>2</sup>Preseason.

<sup>3</sup>Includes total of winter and summer range available to deer.

<sup>4</sup>Desired data was not available for some units.

APPENDIX X-1

UDWR Cover Letter and Report

state of utah



## DIVISION OF WILDLIFE RESOURCES

DOUGLAS F. DAY 1596 West North Temple/Salt Lake City, Utah 84116/801-533-9333  
*Director*

Reply To SOUTHEASTERN REGIONAL OFFICE  
455 West Railroad Avenue, Box 840, Price, Utah 84501  
• (801) 637-2310 4

November 15, 1979

Mr. Lym Huntsman, Chief Engineer  
Kaiser Steel Corporation  
P. O. Box D  
Sunnyside, UT 84539

ATTENTION: John S. Huefner, PE

Dear Mr. Huntsman:

I want to take this opportunity to extend thanks for the assistance John Huefner, provided Larry Dalton in becoming familiar with surface facilities on the mine plan area encompassed by Kaiser Steel's project. I believe that you will find the enclosed information helpful at filing a mine and reclamation plan.

In response to your request for wildlife resources information (30 CFR, part 783.20) and the Division's recommendations concerning a wildlife plan (30 CFR, part 784.21) to accompany your permit application, the attached map delineating high value habitats for wildlife and supporting narrative for those use areas and other high interest wildlife species are provided. Since the primary or secondary premining and assumed postmining use of the mine plan area was and will be wildlands inhabited by wildlife, suggested vegetative species (seed list along with potential material supply sources for seed and seedlings) for use in enhancement and/or reclamation work that would benefit wildlife are included (30 CFR, parts 817.97 d 4, 817.97 d 5, 817.97 d 9, part 817.116 b 3 IV and part 817.117 c 2). Also, note that Utah's Division of Oil, Gas and Mining is the regulatory authority for approval of the mining and reclamation plan.

Thank you for an opportunity to assist Kaiser Steel in complying with OSM's permanent regulatory program for surface coal mining and reclamation and the resultant protection of Utah's wildlife resources. If the scientific name or other information relative to status of any wildlife

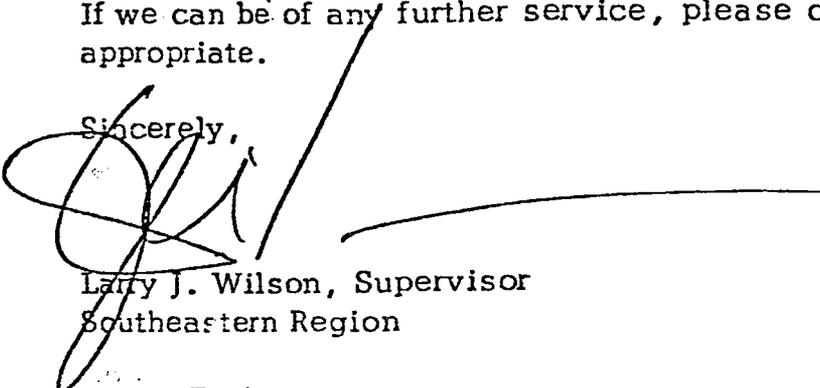
Mr. Lynn Huntsman, Chief Engineer

Page 2

species referenced is needed, please consult the Division publication 78-16 "Species List of Vertebrate Wildlife that Inhabit Southeastern Utah" that is enclosed.

If we can be of any further service, please contact Larry Dalton as appropriate.

Sincerely,



Larry J. Wilson, Supervisor  
Southeastern Region

LJW:LBD:ah

cc: Darrell Nish, Chief Resource Analysis  
Phil Garcia, East Carbon Conservation Officer  
Clark Johnson, Coal Coordinator, US Fish and Wildlife Service  
Leon Berggren, Area Manager, Bureau of Land Management

state of utah



DIVISION OF WILDLIFE RESOURCES

DOUGLAS F. DAY  
Director

EQUAL OPPORTUNITY EMPLOYER

1596 West North Temple/Salt Lake City, Utah 84116/801-533-9333

March 30, 1981

Reply To SOUTHEASTERN REGIONAL OFFICE  
455 West Railroad Avenue, Box 840, Price, Utah 84501  
(801) 637-3310

Mr. Joe Taylor, Director of Coal Operations  
Kaiser Steel Corporation  
Kaiser Center/300 Lakeside Drive  
P.O. Box 58  
Oakland, California 94604

*d/c*  
*For you files*  
*Tim*  
*Joe T.*

Attention: Hon Lee

Dear Joe:

I want to take this opportunity to extend thanks for the assistance John Huefner has provided Larry Dalton in becoming familiar with existing and planned surface facilities on the area encompassed by Kaiser Steel's Sunnyside mining project. I believe that you will find the enclosed information helpful at filing a mine and reclamation plan. Note, this information represents an update of materials provided to Mr. Lynn Huntsman on November 15, 1979. The maps provided at that time remain adequate, however, the enclosed narrative supercedes that provided earlier.

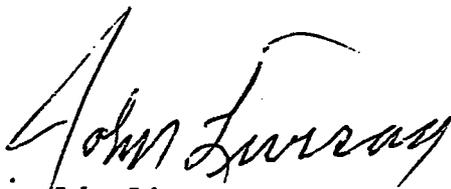
In response to your request for wildlife resource information (UMC 783.20) the attached data and comments are provided. The wildlife resource information is consistent with the formal guidelines for acquisition of fish, wildlife and habitat information that should have been provided your Company by Utah's Division of Oil, Gas and Mining. In instances where your Company was required to provide for study beyond existing information, such findings need be included alongwith our report.

Please note that the enclosed wildlife plan (UMC 784.21) represents our recommendations; Utah's Division of Oil, Gas and Mining is the regulatory authority for approval of the mining and reclamation plan. Implementation of the recommended wildlife plan should assist the Company in compliance with performance standards UMC 817.97.

Page 2  
March 30, 1981  
Mr. Joe Taylor

Thank you for an opportunity to assist your Company in complying with the State's permanent program for coal mining and reclamation and the resultant protection of Utah's wildlife resources. If the Division can be of any further service, please coordinate with our Regional Resource Analyst (Larry Dalton, phone 801-637-3310) as appropriate.

Sincerely,



John Livesay, Supervisor  
Southeastern Region

JL:LBD:gp

Attachment

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UMC 783.20; FISH AND WILDLIFE RESOURCE INFORMATION  
KAISER STEEL CORPORATION, SUNNYSIDE MINING PROJECT

General Wildlife Resource Information--All Species of Vertebrate Wildlife

The mine plan area encompasses a portion of the West Tavaputs Plateau in Carbon County, Utah. This area drains into Grassy Trail Creek and on to the Price River, which flows into the Green River and ultimately into the Colorado River at a point upstream from Lake Powell. Generally speaking, the West Tavaputs Plateau is encompassed by cold desert (upper Sonoran life zone), submontane (Transition life zone) and montane (Canadian life zone) ecological associations. These life zones could be inhabited on occasion and during different seasons of the year by about 363 species of vertebrate wildlife--20 fish species, 5 amphibian species, 14 reptile species, 244 bird species and 80 mammal species. It is interesting to note that 84 percent of these species are protected.

The mine plan area itself is represented by the Transition and Canadian life zones and probably provides habitat for approximately 296 species of wildlife--4 fish species, 5 amphibian species, 14 reptile species, 196 bird species and 77 mammal species. Ninety-five of these species are of high interest to the State of Utah.

The Division Publication No. 78-16 "Species List of Vertebrate Wildlife that Inhabit Southeastern Utah" is appended (Appendix A) to this report since it represents a low level of study for the wildlife species listed. It identifies those species having potential to inhabit the region (Biogeographic Area B) as well as those inhabiting the environs of the mine plan area (!). Appendix A also identifies which species are considered to be of high interest (\*) for the habitats and local area represented.

High interest wildlife are defined as all game species; any economically im-

portant species; and any species of special aesthetic, scientific or educational significance. This definition would include all federally listed, threatened and endangered species of wildlife.

A ranking and display of wildlife habitats and use areas relative to high interest species of vertebrate wildlife has been developed (Table 1 and 2 and the map provided November 15, 1979). Critical wildlife use areas followed in respective importance by high-priority, substantial value and limited value wildlife use areas require various levels of protection from man's activities and developments. Wildlife habitats and use areas ranked as being of critical or high-priority value to wildlife should be protected from surface disturbance, subsidence impacts and human or industrial disturbance. This can be accomplished through development and implementation of a wildlife plan.

For purposes of clarification, the classification of waters in Utah that will be referenced in the following narrative represents a Division of Wildlife Resources system developed and applied to all of the State's waters in 1970. The classification system determined a numerical rating for each of the stream sections or lakes within Utah. (Insofar as possible, each stream section represents an ecologically and physically uniform stream segments.) The numerical values were developed through an evaluation at each water of esthetics, availability of the water to sportsmen and production of fish. Class 1 waters are the best and Class 6 are the poorest.

Critical wildlife use areas are "sensitive use areas" necessary to sustain the existence and perpetuation of one or more species of wildlife during crucial periods in their life cycles. These areas are restricted in area and lie within high-priority wildlife use areas. All stream sections, reservoirs, lakes and ponds identified by Utah Division of Wildlife Resources as Class 1 or 2 are classified as being critical. Biological intricacies dictate that significant disturbances cannot be tolerated by the members of an ecological assemblage on critical sites. Professional opinion is that disturbance to critical use areas

or habitats will result in irreversible changes in species composition and/or biological productivity of an area.

High-priority wildlife use areas are "intensive use areas" for one or more species of wildlife. "Intensive use areas" are not restricted in area and in conjunction with limited value use areas form the substantial value distribution for a wildlife species. All stream sections, reservoirs, lakes and ponds identified by Utah Division of Wildlife Resources as Class 3 are classified as being of high-priority. In addition, wildlife use areas where surface disturbance or underground activities may result in subsidence that could interrupt underground aquifers and result in a potential for local loss of ground water and decreased flows in seeps and springs should be considered as being of high-priority to wildlife.

Substantial value wildlife use areas are "existence areas" for one or more species of wildlife. "Existence areas" represent a herd or population distribution and are formed by the merging of high-priority and limited value wildlife use areas for a species. All stream sections, reservoirs, lakes and ponds identified by Utah Division of Wildlife Resources as Class 4 are classified as being of substantial value.

Limited value wildlife use areas are "occasional use areas" for one or more species of wildlife. "Occasional use areas" are part of the substantial value wildlife use area for a species. All stream sections, reservoirs, lakes and ponds identified by Utah Division of Wildlife Resources as Class 5 or 6 are classified as being of limited value.

#### MAPPING

##### Vegetation and Wildlife Habitats

It is recommended that the Company's primary effort be placed on identifying species of vegetation in each wildlife habitat within the various wildlife use areas for purposes of reclamation. The Division does not have site specific information relative to vegetation types at the mine plan area. However, there are

ll wildlife habitats present--riparian or wetland types, agricultural, urban or park, cliffs and tallus, sagebrush, pinion-juniper forest, shrubland, aspen forest, ponderosa forest, parkland and spruce-fir forest. The Company should identify each of these habitat associations on appropriately scaled maps.

It is believed that if satisfactory reclamation is achieved and man's disturbance does not continue or become a factor, that most species of wildlife displaced from the mine plan area will return. Without doubt, the key to success for enhancing or restoring wildlands will be development of habitats so that the postmining condition as compared to the premining condition will have similar species, frequency and distribution of permanent plants in each vegetative type. This will allow for natural plant succession. Additionally, other habitat features that represent the various life requirements for local wildlife must be provided.

#### Wildlife Use Areas

The map provided earlier displays mapable, high value use areas for high interest wildlife on or adjacent to the mine plan area. This display includes stream sections and bodies of water, if any, utilized by high interest fish species. Also displayed are known seeps, springs, wetlands, and riparian zones. Note that there are high interest wildlife distributions that are so broad that they cover the entire map and therefore are not illustrated. However, all vertebrate species of high interest wildlife and their distributions are discussed in the following narrative.

#### Water

Due to demands of state and federal coal mining regulations, the Company will probably be required to identify and appropriately monitor all surface waters for potential impacts from subsidence. This information should be correlated with the wildlife use area information due to the value of water to wildlife.

### FISH AND WILDLIFE INVENTORY

#### Aquatic Use Areas

### Macrophytes

From a position of the aquatic wildlife resource it is believed that there is no practicality for information relative to macrophytes to be addressed by the mine permit application; such information is not generally available.

### Macroinvertebrates

The results from studies of macroinvertebrates may be required for purposes of determining need for stream buffer zones (UMC 817.57) in stream sections supporting biological communities. Since the permit application does not identify any plans to impact the local salmonid fishery or discharge of polluting effluents into local waters, no data relative to macroinvertebrates as a pollution index or a forage base for fishes or other predators dependent upon the aquatic resource need be presented.

Note, impact avoidance procedures that would protect the integrity of the aquatic resource need to be included with the mine permit application. Of importance would be facility designs that preclude impacts on streams or lakes and identification of procedures that will be utilized to keep any form of coal sediments or other pollution from entering Grassy Trail Creek and Grassy Trail Reservoir. Snow removal and road maintenance can be a significant contributor of sediments to local riverine systems. Deposition of coal particles in the aquatic system could have a variety of negative impacts on invertebrate and fish populations.

Studies relative to macroinvertebrates if desired or needed, must be conducted by a qualified, private consultant.

### Fish--Species Occurrence and Use Areas

Aquatic habitats associated with the mine plan area support two species of game and two species of non-game fish; all of which are protected. Of these fish, the two game species have been determined to be of high interest to Utah (Appendix A).

The rainbow trout is an exotic species. Within Utah there are several different strains of this species. Generally speaking, they spawn from mid-March

through June; hatching is normally completed by late June. It is important to note that natural reproduction by this species is almost non-existent, since it is managed as a stocked population. This management scheme has resulted since their catchability is higher than other trout and the life expectancy of hatchery fish is short.

The brown trout is an exotic species. Its spawning period begins as early as mid-October and is normally completed by late December; hatching of eggs begins in the spring and is usually completed by late May. Most populations are sustained through natural reproduction and supplemental plantings of fingerling brown trout.

The spawning period represents a crucial period for maintenance of trout populations spawning areas are ranked as being of critical value. Such areas are characterized by clean, gravel zones that are at least six inches deep. These zones must also be covered by a minimum of six inch deep water flowing at a velocity of not less than one foot per second. These physical parameters are necessary for optimum spawning success.

Once the rainbow trout have spawned their eggs incubate in the redds approximately 30 to 50 days--water temperatures ranging from 45 to 50 F. Brown trout eggs incubate throughout the winter which lasts approximately 100 to 150 days--water temperatures ranging from 35 to 40 F. During this crucial period water temperature affects the rate of embryonic develop--the warmer the water the more quickly incubation is completed. It is also during this period that ongoing sedimentation can result in suffocation of the eggs. Flucuations in stream flow also negatively affects incubation; wherever practicable, maintenance of a constant flow of water during the spawning period enhances reproductive success.

Grassy Trail Reservoir, which lies on the mine plan area, has been ranked as being of substantial value to Utah's cold water fishery management program; it is a Class 4 fishery. Use of the lake by sportsmen is prohibited since the water is used for culinary purposes. The reservoir supports brown trout. The

trout were introduced as a biological control for salamanders, since the amphibians have represented a nuisance by plugging water lines.

Brown trout from Grassy Trail Reservoir do not utilize the left and right forks of Grassy Trail Creek for spawning and nursery activities. Flows from these two tributary waters are not suitable for the fall spawning activities of the brown trout. Possibly, speckled dace and redbside shiner inhabit this stream section.

Grassy Trail Creek below the reservoir (stream section 2) is ranked as being of high-priority to Utah's cold water fishery management program and is a Class 3 fishery. It can support a catchable sized rainbow trout population. It may also be inhabited by speckled dace and redbside shiner. Note, that the trout population results from a "put and take" management scheme and is only practicable during the best of water years.

If project operations are planned or develop that would alter, destroy or discharge polluting effluents into any perennial waters, appropriate state and federal permits, a mitigation plan and results from high level studies of the fishery resource would be required of the Company. Achievement of mitigation would demand detailed studies of stream velocity correlated to flow, representatives of the stream channel profile, gradient, pool-riffle ratio, substrata types identifying percent representation of each type and surface water information required for SMC 779.16.

If modification of flows is anticipated, instream flow requirements must be considered to meet the needs of the existing fisheries, "biological community" and maintenance of existing riparian or wetland zones. Such baseline information would allow for development of mitigation or reclamation plans that would allow for avoidance, lessening or mitigation of impacts to the fishery and maintenance or re-establishment of unique habitat types. This baseline information is not generally available and would necessitate the services of a qualified private consultant and/or contracting Utah's Division of Wildlife Resources since special per-

mits would be required.

It is important to note that no species of fish having relative abundances so low as to have caused them to be federally listed as threatened or endangered inhabit the mine plan or adjacent areas. The endangered humpback chub, bonytail chub and Colorado squawfish inhabit the Green and Colorado Rivers. Additionally, the humpback (razorback) sucker also inhabits those rivers; it is likely that this species will one day be federally listed as threatened. It is not believed that implementation and operation of the Company's project will impact any of these species.

#### Terrestrial Use Areas

##### Wildlife Habitat Types

Of the eleven wildlife habitat types present on the mine plan area wetlands and riparian habitats are ranked as being of critical value to all wildlife. They are normally associated with drainage bottoms (ephemeral or intermittent), or perennial streams (SMC 700.5 and UMC 700.5), seeps and springs within the upper Sonoran, Transition and Canadian life zones. Cliffs and their associated tallus areas that lie within the upper Sonoran and Transition life zones are ranked as being of high-priority value to all wildlife. When compared to all other wildlife habitats the aforementioned situations are considered to represent unique habitat associations (Table 1).

Riparian and wetland areas are highly productive in terms of herbage produced and use by wildlife as compared to surrounding areas. Experience has shown that as much as 70 percent of a local wildlife population are dependent upon riparian zones. Cliffs and tallus are of special importance to many high interest wildlife. These unique habitat types must be identified in the permit application and protected due to their high value for all wildlife.

Quantitative (acreage) and qualitative (condition, successional stage and trend) data concerning the wildlife habitats in each ecological association should be included as part of the mine permit application. It is important to note that

each legal section of land represented by the mine plan and adjacent areas has been ranked as to its value for the total wildlife resource. Section 33 of Township 14 South Range 14 East has been ranked as being of critical value to wildlife. Sections 1, 12, 13, 24, 25 and 36 of Township 14 South Range 13 East have each been ranked as being of high-priority value to wildlife. This is also true for sections 4 through 9, 16 through 21 and 28 through 32 of Township 14 South Range 14 East, and sections 4 through 9 of Township 15 South Range 14 East. These rankings were developed through an analysis of cumulative values for use areas of individual wildlife species inhabiting each legal section of land (Table 2).

#### Amphibians—Species Occurrence and Use Areas

Five species of amphibians, all of which are protected, are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. It is probable that all of these species inhabit the project area (reference the Division Publication No. 78-16). Only one species of the amphibians inhabiting the project area has been-determined to be of high interest to the State of Utah (Appendix A).

The tiger salamander is a yearlong resident animal of the project area. The substantial value use area for the adult form is represented by any moist underground site or any similar habitat such as inside rotten logs, cellars or animal burrows. Such sites can be found within any wildlife habitat extending from the cold desert (upper Sonoran life zone) through the submontane (Transition life zone) and into the montane (Canadian life zone) ecological association. The larva form, often referred to as a mud-puppy, is a gilled animal that must remain in water within the above described ecological associations. It is interesting to note that the larva may fail to transform into an adult, even after their second season, and they can breed in the larva condition.

Once the larva is transformed into the adult form the animal is primarily terrestrial. Salamanders do migrate to water in the spring for breeding and

may remain there during much of the summer. Such an intensive use area would be ranked as being of high-priority value to the animal. In September the newly transformed animals leave the water to find suitable places to spend the winter.

The tiger salamander breeds from March through June and is sexually mature after one year. The male deposits a small tent-shaped structure containing a myriad of sperm on the pool bottom. During courtship the female picks up this structure in her cloaca; then the eggs are fertilized internally before or just at the time they are laid. The eggs, singly or in small clusters, adhere to submerged vegetation; after 10 to 12 days they hatch. Obviously, a critical period for maintenance of the population is when breeding salamanders, eggs or their larva are inhabiting a water.

Post-embryonic development of a salamander's larval form progresses at a pace somewhat controlled by water temperature; in some cold waters the larva may not transform into an adult and drying up of a pool may hasten the process.

Migration to or from water usually occurs at night, during or just after a rain storm. When inhabiting terrestrial sites the tiger salamander is most active at night, particularly on rainy nights, from March through September.

Larva, when small feed on aquatic invertebrates and become predacious to the point of cannibalism when they are larger. Food items for adults include insects, earthworms and occasionally small vertebrates.

No amphibians have relative abundances that are so low to have caused the animal to be federally listed as a threatened or endangered species.

#### Reptiles—Species Occurrence and Use Areas

Fourteen species of reptiles, all of which are protected, are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. It is probable that all of these species inhabit the project area. Only one species of the reptiles inhabiting the project area has been determined to be of high interest to the State of Utah (Appendix A).

The Utah milk snake is a yearlong resident animal of the project area. Its

substantial value use area encompasses all wildlife habitats extending from the upper Sonoran (cold desert life zone) through the submontane (Transition life zone) and into the montane (Canadian and possibly Hudsonian life zone) ecological associations. Although its use area spans a multitude of habitats, the animal is extremely secretive, mostly nocturnal and is often found inside or under rotten logs, stumps, boards, rocks or within other hiding places. At night they can be found in the open where they hunt for small rodents, lizards and other small snakes. Occasionally, the milk snake may take small birds or bird eggs.

The milk snake may live beyond twenty years and it becomes sexually mature during its third spring season. After mating, which occurs during spring or early summer when they are leaving the den, female milk snakes produce clutches which average seven eggs. The eggs are secreted in a moist warm environ and then abandoned; incubation lasts 65 to 85 days. The site where an individual snake has deposited its clutch of eggs is of critical value to maintenance of the species.

To date snake dens, which are protected and of critical value to snake populations, have not been identified on or adjacent to the project area. It is important to note that inventory for such has not been attempted. If the Company at some later time discovers a den it should be reported to the Utah Division of Wildlife Resources. If a den(s) is currently known, its location must be included with the permit application.

No reptiles have relative abundances that are so low to have caused the animal to be federally listed as a threatened or endangered species.

#### Birds-Species Occurrence and Use Areas

Two hundred forty-four species of birds, all of which are protected, are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. It is probable that one hundred ninety-six of these species inhabit the project area. Sixty-four species of the birds inhabiting the project area have been determined to be of high interest to the State of Utah (Appendix A).

The ~~west~~ western grebe is a summer resident of the environs associated with the project. Its substantial valued use area is always associated with large lakes or ponds where it feeds on fish. This bird builds a floating nest which is usually located in emergent vegetation at some backwater where wind-wave action is not severe. Usually the western grebe nests in a colony. The nest is a critical site while occupied for survival of the grebe population.

The ~~double~~ double-crested cormorant is a summer resident of the environs associated with the project. Its substantial valued use area is always associated with large lakes or ponds where it feeds on fish. This bird may nest on the ground at islands or other features that are nearly surrounded by water such as dikes. They also nest in trees along the waterways where they fish. They normally nest in colonies and the nest is a critical site while occupied for survival of the cormorant population.

The great blue heron is a yearlong resident of the environs associated with the project. The bird's substantial valued use area is always associated with open water where it feeds on aquatic wildlife. The great blue heron normally nests in rookeries that are often coinhabited by snowy egrets and black-crowned night herons. The nest may be placed high in a tree along a lake or stream edge, however, they will nest on the ground. The rookery, none of which are known to be located on the project area, is ranked as being of critical value to herons; it is normally a traditional site and utilized year after year by a nesting colony. It is important to note that rookeries are abandoned if they become vulnerable to predation or experience continual disturbance.

Swans, geese and ducks commonly known as waterfowl are represented by twenty-three species that may on occasion or during different seasons of the year inhabit the mine plan area. All of these species are of high interest to the State of Utah (Appendix A). Generally speaking, the riparian and wetland habitats encompassed by the project and adjacent areas provide substantial valued habitats for waterfowl. Each species has different life requirements and makes various uses

of the ~~riparian~~ and wetland environs associated with the project.

For ~~these~~ waterfowl that nest locally, the period March 15 through July 15 is ranked as being of crucial value to maintenance of the population. Following incubation, which dependent upon the species may vary between 20 and 28 days and extend up until mid-August, the riparian and wetland habitats represent a high-priority breeding area. Additionally, the wetland habitat (large open water areas or dense ~~wash~~land) is of high-priority for seclusion and protection of adult waterfowl during their flightless period when they moult. Males may begin the moult in early June and both sexes and the young are capable of flight by mid-August.

It is important to note that agricultural lands producing corn or other small grain crops are of critical value to geese and dabbling duck species on a yearlong basis. All wetlands and open water areas can become locally important as high-priority use areas for waterfowl during peak migration periods in the spring (March 15 through May 15) and-fall (August 15 through October 15).

The project and adjacent areas provides substantial valued habitat for a multitude of raptors--turkey vulture, bald and golden eagles, five species of falcons (prairie, American peregrine and arctic peregrine falcons; Merlin and American kestrel), seven species of hawks (goshawk, sharp-shinned, Cooper's, red-tailed, Swainson's, rough-legged and marsh hawks), osprey and eight species of owls (barn, screech, flammulated, great horned, pygmy, long-eared, short-eared and saw-whet owls). Many of these species are of high federal interest pursuant to 43 CFR, 3461.1 (n-1). All of these species are of high interest to the State of Utah (Appendix A).

Realistically, nesting habitat does not exist on the project or adjacent areas for many of these species. However, if a species were to nest on or adjacent to the project area, it would have a specific crucial period during which the aerie would need protection from disturbance; this period of time lies between February 1 and August 15. Generally speaking, aeries represent a critical valued site and need protection from significant or continual disturbance within

a one-half kilometer radius of the nest. This consideration need only be implemented during the period of time that the nest is occupied. Species specific protective stipulations for aeries are available from the Utah Division of Wildlife Resources and the U.S. Fish and Wildlife Service.

The current level of data relative to site specific use of the area by raptors is unsatisfactory. Likely, there are aeries that have not been identified. Many of these species are highly sensitive to man's disturbances. Therefore, it is recommended that intensive surveys be initiated on the mine plan and adjacent areas only in proximity to planned surface disturbed areas for determination of locations for raptor aerie territories. Such data may be merged with information provided within this report.

Golden eagles are a common yearlong resident of the mine plan area. To date there are no known active aerie territories associated with the project area. (Note, an aerie territory is utilized by one pair of eagles but may contain several nest sites.) It is believed that golden eagle aerie territories may exist on the project area. This belief is based upon the fact that suitable nesting habitat is widespread on the mine plan area and throughout the local area. It is important to note that the regularity of golden eagle observations and the fact that their status is common has resulted in documentation of mostly opportunistic observations of aerie territories.

An active golden eagle nest site is extremely sensitive to disturbance within a one-half kilometer radius. This buffer zone is ranked as being of critical value to maintenance of the eagle population when the bird is actually utilizing the aerie; that period of time is normally between April 15 and June 15. The radius for a buffer zone may need to be increased to one kilometer if a disturbance were to originate from above and within direct line of sight to the eagle aerie.

To date there are no known high-priority concentration areas or critical roost trees for golden eagles on the project area. The mine plan and adjacent areas have been ranked as being of substantial value to golden eagles.

The northern bald eagle is an endangered winter resident (November 15 to March 15) of the local area. To date there are no known high-priority concentration areas or critical roost trees for this species on or adjacent to the project. The mine plan area has been ranked as being of substantial value to wintering bald eagles. Note that no bald eagles are known to nest in Utah, however, historic data documents nesting activity by these birds in the State. There is no known historic evidence of the northern bald eagle nesting on the mine plan or adjacent areas.

The American peregrine falcon (status is endangered) and the prairie falcon (status is common) are yearlong residents of the mine plan and adjacent areas. Each of these species utilized cliff nesting sites. To date there are no known aerie sites for cliff nesting falcons on the project area. However, suitable nesting habitat for the prairie falcon is widespread. Suitable nesting habitat for the American peregrine falcon cannot be found on the mine plan and adjacent areas. The project area has been ranked as being of substantial value to the prairie falcon but only of limited value to the peregrine falcon.

For each falcon their aerie site while being utilized and a one-half kilometer radius would be ranked as being of critical value to maintenance of their populations. The falcon's period of use at the aerie site spans the spring and early summer period--prairie falcon, April 15 to June 30; peregrine falcon, March 1 to June 30.

The level of data relative to site specific use of the project area by cliff nesting falcons (not including the kestrel) is unsatisfactory and there could be aeries that have not been identified. Therefore, it is recommended that intensive surveys be initiated on the area for determination of locations for cliff falcon aerie sites.

The endangered arctic peregrine falcon is a winter resident (November 15 through March 15) of the local area. This species has not been observed to utilize the environs on or adjacent to the mine plan area, however, its occa-

sional presence would not be likely. Therefore, the project area is ranked as being of limited value to this species.

The blue grouse is a yearlong resident of the project area. Adult birds prefer open stands of conifers. During winter the blue grouse feeds exclusively upon needles and buds of douglas-fir and spruce trees. Thus, this wildlife habitat (spruce-fir forest) is ranked as being of critical value to over-winter survival of the population during the crucial period of December through February.

Blue grouse annually exhibit what has been termed a reverse vertical migration. That is, during the spring months, they migrate from the high elevation spruce-fir habitat to lower elevation sagebrush, pinion-juniper or shrubland habitats. This movement is caused by a need of the birds to feed on early developing vegetation. Such movement also facilitates successful breeding, nesting and brooding of their young. Then as the year progresses, they move to the higher elevations.

The males are polygamous and will set up and defend territories for booming and breeding activities against other breeding males. Such territories are critical to maintenance of the population during the crucial period of mid-March through mid-June.

After breeding the female develops a nest site which is secreted on the ground; the nest is of critical value to maintenance of the blue grouse population. Upon hatching, which occurs in late May and early June, the young accompanied by the hen immediately leave the nest. The young blue grouse while being brooded rely heavily on insects for their protein needs during the first several months of development. The adult bird also shifts its diet during this period to include a high proportion of insects. Brooding areas are ranked as being of high-priority value to blue grouse. The crucial period extends from hatching into mid-August.

As summer progresses into the fall season the grouse consumes large quantities of berries.

The ruffed grouse is a yearlong resident of the project area. These grouse are usually found in the continuum of habitats extending from aspen to shrubland types. But, during winter they often roost in dense stands of conifers. Generally speaking ruffed grouse prefer habitats lying within 0.25 mile of a stream course; such areas are ranked as being of high-priority value to their population. During winter the ruffed grouse feeds exclusively upon staminate aspen buds. Thus, this wildlife habitat (aspen forest) is ranked as being of critical value to over-winter survival of the population during the crucial period of December through February. During the remainder of the year their diet shifts to include a wide variety of plant and insect material.

Ruffed grouse do not exhibit any type of seasonal migration.

The males are polygamous and will set up and defend territories against other breeding males. The focal point for breeding activity is the drumming log; all such logs are ranked as being of critical value to grouse since they represent sites of historical use. Such territories are critical to maintenance of the population during the crucial period of early March through May.

After breeding the female develops a nest site which is secreted on the ground and deep within an aspen grove; the nest is of critical value to maintenance of the ruffed grouse population. Upon hatching, which occurs in late May and early June, the young accompanied by the hen immediately leave the nest. The young ruffed grouse while being brooded rely heavily on insects for their protein needs during the first several months of development. The adult bird also shifts its diet during this period to include a high proportion of insects. Brooding areas are ranked as being of high-priority value to ruffed grouse. The crucial period for brooding extends from hatching into mid-August.

Agricultural areas and adjoining wildlands associated with the project and adjacent areas may provide yearlong, substantial valued habitats for ringnecked pheasants. Due to the pheasants complete dependency on agricultural systems, all cultivated fields are ranked as being of critical importance to this species.

Pheasants depend primarily on waste grain, corn and other crops for food. They utilize ~~will~~ grains and insects to a lesser extent. Croplands can provide for all the ~~the~~ requirements of pheasants. High quality habitat must retain adequate ~~cover~~ and food for the birds use throughout the year.

Pheasants initiate nesting as early as mid-April and continue into mid-July. This ~~period~~ of time and successful nesting activities is of crucial importance to the ~~maintenance~~ of the pheasant population.

The ~~chukar~~ is a yearlong resident of the project area. It is important to note that ~~they~~ are an exotic species introduced from Asia during the 1950's. These birds prefer open rocky areas in the cold desert and submontane ecological associations. During summer chukars feed on grass shoots and insects, but during winter ~~their~~ diet is primarily seeds. Their substantial valued habitats are the cliff ~~and~~ talus type and the associated desert scrub or shrubland types.

The winter season is a crucial period (early December through mid-February) for chukars; the birds concentrate on selected areas. Winter range has been ranked as being of critical value to over-winter survival of the chukar populations. Disturbance on winter range must be avoided when chukars are present.

Chukars are monogamous; the pairs nest between early April and late May. Nest sites are critical to maintenance of the population during the crucial nesting period.

It is important to note that all sources of water within the substantial valued use area for chukars are critical to maintenance of their populations on a yearlong basis.

The American coot may be a summer resident of the project area. Transient individuals are also present during spring and fall migration. The discussions earlier provided for waterfowl also apply to this specie.

The snowy plover is only a transient in the project area during spring and fall migration periods. Since the environs associated with the project would be inhabited only on occasion, they have been ranked as being of only limited value to the snowy plover.

The ~~common~~ snipe is a summer resident of the project area. It may inhabit the project area on a yearlong basis by utilizing wetland habitats along running streams or at seeps that do not freeze over. This specie breeds in late May and early June and nests on the ground in wetland areas. The nest while being utilized is of critical value to maintenance of snipe populations.

Mourning doves normally inhabit the project and adjacent areas, which represents a substantial valued use area for these birds, between May 1 and September 15 each year. They nest throughout most of this period and each pair produces two clutches. The pinion-juniper and riparian habitats are ranked as being of high-priority value for nesting. Locally, mourning doves show two peaks in on-nest activity—early July and early August. Successful nesting activities and any water sources are critical to maintenance of the mourning dove population.

The yellow-billed cuckoo is a summer resident of the project area. This bird only nests in the riparian wildlife habitat, therefore, such areas are of critical value to maintenance of this species. Little is known concerning the yellow-billed cuckoo. Its nest is represented by a frail, saucer shaped structure of twigs and is always placed in bush or tree.

The black swift is a summer resident of the West Tavaputs Plateau. The montane ecological association represents the swift's substantial valued use area. Normally, the bird is associated with a small flock that represents a colony. Black swifts are usually observed soaring as pairs and they feed upon flying insects. A colony's nests are scattered along percipitous terrain where the nest is often secreted behind a waterfall. Such a moist habitat is not known to exist on the project area. Cliff and tallus wildlife habitats are ranked as being of high-priority value to the black swift. There is evidence that pair bonds are long lasting and that a nest may be utilized in successive years.

The belted kingfisher is a yearlong resident of the project area. It is found only along riverine systems and its substantial value use area extends from the cold desert through the submontane and into the montane ecological associations.

Therefore, the riparian wildlife habitat represents a high-priority valued use area for this bird. It feeds exclusively upon fish. The kingfisher's nest is always secreted within a burrow along stream banks, thus, dirt bank habitats along riparian areas are of critical value to this bird.

The pileated woodpecker is a species having high federal interest pursuant to 43 CFR 3461.1 (n-1). The spruce-fir and aspen wildlife habitats of the montane ecological association represent this bird's substantial valued use area. It is important to note that the pileated woodpecker has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where the bird is known to exist, it is a yearlong resident with a relative abundance considered to be rare.

The Williamson's sapsucker is another species having high federal interest pursuant to 43 CFR 3461.1 (n-1). Typically, the substantial valued use area for this species is the spruce-fir habitat of the Hudsonian life zone in the montane ecological association. Therefore, the spruce-fir habitat of the Canadian life zone on the project site would only represent the substantial valued use area for the yellow-bellied sapsucker. The yellow-bellied sapsucker is a yearlong resident of the environs associated with the project area and it has a relative abundance considered to be common. Whereas the Williamson's sapsucker has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where the Williamson's sapsucker is known to exist, it is a summer resident with a relative abundance considered to be uncommon.

The Lewis woodpecker is also another species having high federal interest pursuant to 43 CFR 3461.1 (n-1). Its substantial valued use area is represented by riparian habitats characterized by cottonwood stands and ponderosa forests. These habitats do not exist on the project site. It is important to note that the Lewis woodpecker has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where the bird is known to exist, it is a summer resident or only a transient. Its relative abundance is unknown.

The purple martin is a summer resident known to inhabit the environs of the biogeographic area that surrounds the project site. In Utah its substantial valued use area is represented by open spruce-fir, aspen or ponderosa forest habitats of the montane ecological association. The purple martin feeds on flying insects and may secret its nest within any suitable above-ground cavity.

The western bluebird is an uncommon summer resident known to inhabit the environs of the biogeographic area that surrounds the project site. Where as the mountain bluebird is a common yearlong resident of the area. Both birds are cavity nesting species. The western bluebird nests from the pinion-juniper habitat of the submontane ecological association up into the lower forest habitats within the Canadian life zone of the montane ecological association. The mountain bluebird utilizes the same continuum of habitats for nesting, but also extends its nesting use across the Canadian and Hudsonian life zones and into the Alpine life zone. During winter both species show elevational and longitudinal migrations; they then utilize all habitats associated with the cold desert ecological association. Therefore, the substantial valued use area for each species spans a broad continuum of habitats. It is important to note that trees with cavities located on the project area can be of critical value to bluebirds.

Grace's warbler is a species having high federal interest pursuant to 43 CFR 3461.1 (n-1). Its substantial valued use area is shrublands and associated ponderosa forest habitats of the submontane and montane ecological associations. This bird's nest is built twenty or more feet above ground in a ponderosa tree. It is important to note that the Grace's warbler has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where it is known to exist, it is a summer resident with a relative abundance considered to be uncommon.

Scott's oriole is also a species having high federal interest pursuant to 43 CFR 3461.1 (n-1). Its substantial valued use areas are riparian habitats characterized by cottonwood stands and the continuum of habitats extending from

the pinion-juniper forest into shrublands of the submontane ecological association. The oriole's nest is characterized as a grassy pouch and is hung in a tree. It is important to note that the Scott's oriole has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where it is known to exist, it is a summer resident with a relative abundance considered to be uncommon.

The grasshopper sparrow is a rare transient species known to inhabit the environs of the biogeographic area that surrounds the project site. It normally frequents dry grassland areas in the desert scrub habitat of the cold desert ecological association during spring and fall migration periods. The project area borders sites that could attract this specie. Since its use of such sites is best described as "occasional", those habitats in the region are only ranked as being of limited value to the bird.

#### Mammals--Species Occurrence and Use Areas

Eighty species of mammals, of which 22 percent are protected, are known to inhabit the biogeographic area in which the project and adjacent areas are located. It is probable that seventy-seven of these species inhabit the project area (reference the Division Publication No. 78-16). Twenty-seven species of the mammals inhabiting the project area have been determined to be of high interest to the State of Utah (Appendix A).

The dwarf (least) shrew is a yearlong inhabitant of the biogeographic area that surrounds the project site. This animal's substantial valued use area is characterized as open grass covered areas of any wildlife habitat in the submontane and montane (Canadian life zone) ecological associations. Since this shrew has a relative abundance determined to be limited, its use areas should be ranked as being of high-priority value to the animal.

The red bat is a summer resident of the biogeographic area that surrounds the project site. The animal roosts in wooded areas (riparian woods and pinion-juniper forests) of the submontane ecological association. Such areas represent this

animals substantial valued use area. An occasional individual has been known to utilize caves; those individuals could hibernate and remain over winter.

The western big-eared bat is a yearlong resident of the biogeographic area that surrounds the project site. This animal roosts and hibernates within caves, mine tunnels or suitable buildings located in the pinion-juniper, shrubland and low elevation spruce-fir habitats of the submontane and montane (Canadian life zone) ecological association. Such areas represent this bat's substantial valued use area.

The spotted bat may inhabit the environs of the project area. To date, little else is known of this specie.

The snowshoe hare is a yearlong resident of the biogeographic area that surrounds the project site. Its relative abundance has been determined to be limited, since its substantial valued use area is restricted to the spruce-fir and nearby aspen and riparian habitats of the montane (Canadian and Hudsonian life zones) ecological association. Such areas are ranked as being of high-priority value to the animal during its breeding season which spans the period between early April and mid-August.

The cottontail rabbit (mountain cottontail inhabits sites lying between 7,000 and 9,000 feet in elevation and the desert cottontail inhabits sites lower than 7,000 feet in elevation) is a yearlong resident of the biogeographic area that surrounds the project site. The entire project area represents a substantial valued use area for cottontails. Their young are born between April and July. This is a crucial period for maintenance of the cottontail population.

The northern flying squirrel is a yearlong resident of the biogeographic area that surrounds the project site. Currently, its relative abundance is unknown. Its substantial valued use area is restricted to spruce-fir or other mixed conifer habitats of the montane (Canadian and Hudsonian life zones) ecological association. This specie is the only nocturnal squirrel in Utah. The flying squirrel may build its nest within an old woodpecker hole or it may build an outside nest of leaves,

twigs and bark. Mating occurs twice in each year--February through March and June through July. Afterwhich, two to six young are born after a gestation period of 40 days--April through May and August through September. These periods are of crucial value to maintenance of their populations. During winter flying squirrels are gregarious; 20 or more have been known to den together.

Beaver are yearlong inhabitants of the biogeographic area that surrounds the project site. Their substantial valued use area is restricted to riparian and adjacent aspen habitats (those located within 100 meters of the riparian zone) in the cold desert, submontane and montane (Canadian life zone) ecological associations. These animals construct a conical shaped lodge in which a family group lives throughout the year. The lodge is of critical value to maintenance of the beaver population. One litter of kits is produced each year; they are born between late April and early July after a gestation period of 128 days. Kits and yearlings coinhabit the lodge with the adult pair. When they attain 2 years of age they are forced to leave; females can breed at 2.5 years of age. Due to the animals dependency upon flowing water and the associated riparian vegetation, the riparian wildlife habitat is ranked as being of critical value to beaver populations.

The red fox and kit fox are yearlong inhabitants of the biogeographic area that surrounds the project site. The substantial valued use area for the red fox would include all wildlife habitats extending from the cold desert through the montane (Canadian life zone) ecological associations. The substantial valued use area for the kit fox is restricted to all of the habitats of the cold desert ecological association and extends into the sagebrush and pinion-juniper habitats of the submontane ecological association. Almost nothing is known of their population dynamics. Without doubt a crucial period for both species is when they are caring for young in the den. Dens while being inhabited are a critical use area.

The gray wolf is a historic inhabitant of the biogeographic area that surrounds the project site. Currently its relative abundance is so low that the animal is listed as endangered with extinction. The wolf's substantial valued

use area would be represented by any remote habitat in any ecological association.

Black bears are inhabitants of the biogeographic area that surrounds the project site. Their substantial valued use area is represented by all natural wildlife habitats (excluding the pasture and fields and urban or park types) extending from the submontane into the montane (Canadian and Hudsonian life zones) ecological associations. These animals go into a semi-hibernation during winter. During this crucial period, which may last from December through March, the animal secretes itself in a den in order to conserve body energy reserves. The young are born in the den during January or February. Dens while being inhabited represent a critical valued use area for bears.

Many of the members of the family mustelidae are known to inhabit the biogeographic area that surrounds the project site. They are all protected and classified as furbearers--short-tailed and long-tailed weasels, mink, wolverine, black-footed ferret, marten, badger, striped and spotted skunks and the river otter. Additionally, raccoon and muskrat, although not furbearers, are also inhabitants of the biogeographic area that surrounds the project site. All of these species are of high interest due to their value in the fur market.

The substantial valued use area for short-tailed and long-tailed weasels, mink, river otter, muskrat and raccoons is the riparian habitat. Weasels, which are inhabitants of the project site, do make some use of other habitats that are proximal to riparian zones. Muskrats and raccoons are restricted to riparian habitats of the cold desert and submontane ecological association; thus, they are not found on the project area. The long-tailed weasel can be found from the cold desert up into the montane (Canadian and Hudsonian life zones) ecological associations. The short-tailed weasel, river otter and mink populations extend their use from the submontane into the montane ecological association. It is important to note that the weasel is restricted to the Canadian life zone; where as the river otter and mink utilize the Canadian and Hudsonian life zones. The river

otter is ~~not~~ known to inhabit the environs of the project area, but mink are present.

The substantial valued use area for marten and wolverine is the montane ecological association. The marten does not utilize the Alpine life zone but the wolverine can be found at that elevation. The wolverine may be found in the environs of the project site, but it is unlikely that the marten is present.

The black-footed ferret is a species primarily dependent upon prairie dogs as a prey source. Currently, the ferret's relative abundance is so low that the animal is endangered with extinction. Utah lies on the western edge of the black-footed ferrets historic range. The substantial value use area for this specie is restricted to prairie dog colonies. Prairie dog colonies are found within a multitude of wildlife habitats within the cold desert, submontane and montane (Canadian life zone) ecological associations. It should be noted that the project site does not provide habitat for prairie dogs; thus ferrets would also be absent.

The substantial valued use area for badger and skunks span all wildlife habitats other than dense forests in the cold desert, submontane and montane (Canadian life zone) ecological associations. Skunks show some affinity for habitats proximal to water. Skunks and badgers are dependent upon a suitable prey source.

A crucial period for maintenance of all furbearers, raccoons and muskrat populations is when they have young in a nest, den or lodge. Such sites are critical for reproductive success.

Bobcat, Canada lynx and cougar are known to inhabit the biogeographic area that surrounds the project site. For all of these species a crucial period for maintenance of their population is when the female has her young secreted at a den site. Such sites are of critical value when being utilized. It is also crucial to their survival that a female accompanied by young not be killed or harassed.

The substantial valued use area for bobcats extends from the cold desert through the submontane and into the montane (Canadian life zone) ecological as-

sociation. The bobcat is normally associated with percipitous terrain, but has been ~~observed~~ in every wildlife habitat within the aforementioned ecological associations. Their primary prey source is represented by small mammals and birds or any ~~other~~ small animal they can catch. It is important to note that bobcats occasionally do kill the young of big game animals.

The ~~substantial~~ valued use area for the Canada lynx is restricted to the Canadian ~~and~~ Hudsonian life zones of the montane ecological association. Normally, ~~this~~ cat would only be expected to utilize riparian and forested wildlife habitats. The lynx is similar in predation habits to the bobcat.

The ~~substantial~~ valued use area for the cougar (locally known as mountain lion) ~~extends~~ from the submontane into the montane (Canadian and Hudsonian life zone) ecological association. Due to the dependency of the cougar upon mule deer as a prey source, a ranking of the lion's seasonal distribution parallels that of the deer.

Mule deer are inhabitants of the biogeographic area that surrounds the project site. Their substantial valued use area spans all wildlife habitats extending ~~from~~ the cold desert through the submontane and montane ecological associations. In some situations deer show altitudinal migrations in response to winter ~~cond~~itions. There are, however, habitats where deer reside on a yearlong basis.

Migration of mule deer from summer range to winter range is initiated during late October; probably, the annual disturbance of the fall hunting season coupled with changing weather conditions is the initial stimulus. The onset of winter weather reinforces the deer's urge to migrate and continued adverse weather keeps the deer on the winter range.

A portion of the project site represents winter range for mule deer herd unit 27b. Winter ranges for mule deer are all ranked as being of high-priority value to the animal; these areas are usually inhabited between November 1 and May 15 each year. During winters with severe conditions the higher elevation portion of the winter range becomes unavailable to deer due to snow depth. Tradi-

tionally, ~~some~~ restricted portions of the winter range have shown concentrated use by ~~the~~ deer; these sites are ranked as being of critical value. Critical valued ~~sites~~ must be protected from man's disturbance when the deer are physically present ~~on~~ the range.

Deer begin their migration back to summer range during mid-May and remain there ~~throughout~~ October. Summer ranges on the project area represent deer herd unit 27b. They are ranked as being of high-priority value to mule deer. In instances ~~where~~ extent of summer range is the major limiting factor for a deer herd, ~~those~~ summer ranges are ranked as being of critical value.

There are ranges lying southwest of the project area that support mule deer on a yearlong basis. Most of these ranges are of limited value to deer. However, there are some areas supporting yearlong use that are ranked as being of high-priority value to deer. Within the yearlong range all riparian habitats are ranked as being of critical value to mule deer.

Mule deer fawn during the month of June. The continuum of wildlife habitats extending from the pinion-juniper through the shrubland and into the aspen type probably represents the fawning area. All riparian areas are of critical value for fawning and maintenance of the deer population. To date no specific areas showing annual use for fawning are known. It is probable that such areas exist; they would be ranked as being of critical value to deer. It is important to note that June represents a crucial period for maintenance of deer populations.

Agriculture areas nearby to the project area are utilized yearlong by mule deer. Their use is sometimes intensified during the winter and spring periods.

Rocky mountain elk are inhabitants of the biogeographic area that surrounds the project site. Their substantial valued use area spans all wildlife habitats extending from the submontane through the montane ecological association. Elk do not show as strong of altitudinal migration as mule deer do in response to winter conditions, but they do migrate to wintering areas.

Migration of elk from summer range to winter range is initiated during late

October; probably, the annual disturbance of the fall hunting seasons coupled with changing weather conditions is the initial stimulus. The onset of winter weather reinforces the elk's urge to migrate and continued adverse weather keeps elk on the winter range.

A portion of the project site represents winter range for the Range Creek elk herd. Winter ranges for elk are all ranked as being of high-priority value to the animal; these areas are usually inhabited between November 1 and May 15 each year. During winters with severe conditions some portions of the winter range becomes unavailable to elk due to snow depth. Traditionally, some restricted portions of the winter range have shown concentrated use by the elk; these sites are ranked as being of critical value. Note, that critical valued wintering sites have not yet been identified for the Range Creek herd. Critical valued sites must be protected from man's disturbance when the elk are physically present on the range.

Elk begin their migration back to summer range during mid-May and remain there throughout October. Summer ranges on the project area support the Range Creek elk herd; they are ranked as being of high-priority value.

Elk calf during the month of June. Their preferred calving areas are best described as aspen forests with lush understory vegetation. All riparian areas on the summer range are of critical value for calving and maintenance of the elk population. To date no specific areas showing annual use for calving are known. It is probable that such areas exist; they would be ranked as being of critical value to elk. It is important to note that June represents a crucial period for maintenance of elk populations.

Pronghorn antelope representing the Icelander herd are inhabitants of the biogeographic area immediately west of the project site. Their substantial valued use area spans all wildlife habitats except urban and park areas in the cold desert and extends up into the pinion-juniper forest of the submontane ecological association. It is unlikely that antelope would extend their use on the project area. In some situations antelope show longitudinal migrations in response to winter

conditions. There are, however, habitats where antelope reside on a yearlong basis.

During winter and at times of severe snow conditions the portion of the range inhabited by antelope is ranked as being of critical value. During such a crucial period antelope must be protected from man's disturbance.

Within the yearlong range all riparian habitats are ranked as being of critical value to antelope.

Antelope kid during the month of June. This activity takes place in the area they happen to be when the time for birth occurs. The doe secrets herself from disturbance and predators and drops her kid. The young animal is capable of following the female in a few hours. Protection of the kid antelope from disturbance during the first day following birth is critical for maintenance of antelope populations.

Rocky mountain and desert bighorn sheep are inhabitants of the biogeographic area that surrounds the project site. The substantial valued use area for the rocky mountain subspecies spans all wildlife habitats (except the urban and parks habitat) extending from the submontane through the montane ecological association. The substantial valued use area for the desert subspecies spans all wildlife habitats (except the urban and parks habitat) in the cold desert and submontane ecological associations. In some situations bighorns show altitudinal migrations in response to winter conditions. There are, however, habitats where they reside on a yearlong basis.

Migration of bighorn sheep from summer range to winter range, in locals where this phenomenon exists, is initiated during the rut. Probably the change of weather conditions is the initial stimulus. The onset of winter weather reinforces the sheep's urge to migrate and continued adverse weather keeps them on the winter range; at which time that weather conditions allow, the bighorns then begin to migrate back to the summer range.

The environs associated with the project area support low numbers of the Range Creek rocky mountain bighorn herd on a yearlong basis. Desert bighorns

have not and will likely never extend their range onto the project area. Generally speaking, about 70 percent of the yearlong range is of limited value to sheep; such areas represent the less precipitous terrain within their substantial valued use area. The remaining 30 percent of the bighorn's yearlong use area is ranked as being of high-priority value; such areas are represented by precipitous terrain and adjacent habitats. Note, all riparian habitats within the bighorn's substantial valued use area are ranked as being of critical value.

Bighorns annually rut between November 1 and December 31. This is a crucial period for maintenance of their population.

Bighorn sheep lamb during the months of May and June. The cliff and tallus wildlife habitats represents a critical valued lambing area during the crucial period of mid-May through mid-June. To date no specific areas showing annual use for lambing are known. It is probable that such areas exist. It is important to note that May and June represents a crucial period for maintenance of sheep populations.

Currently, there are no other known high interest wildlife species or their habitat use areas on or adjacent to the project area. It is not unreasonable to suspect that in the future, some additional species of wildlife may become of high interest to the local area, Utah or the Nation. If such is the case, the required periodic updates of project permits and reclamation plans can be adjusted and appropriate recommendations made.

Table 1. Ranking of value per ecological association for wildlife habitats of vertebrate species having high interest to the state of Utah. Crucial-critical (C) habitats are the highest valued followed in respective order by high-priority (H), substantial value (S) and limited valued (L) habitats.

| Ecological Association                          | Wildlife Habitats  |              |                    |                |                   |                      |           |              |                  |          |                   |
|---|--|--------------|--------------------|----------------|-------------------|----------------------|-----------|--------------|------------------|----------|-------------------|
|   | Riparian and Wetland   | Desert Scrub | Pasture and Fields | Urban or Parks | Cliffs and Tallus | Sagebrush P-J Forest | Shrubland | Aspen Forest | Ponderosa Forest | Parkland | Spruce-fir Forest |
| Warm Desert                                     | LOWER SONORAN LIFE ZONE<br>This ecological association does not exist in the Southeastern Region |              |                    |                |                   |                      |           |              |                  |          |                   |
| Cold Desert C(H <sup>1</sup> , S <sup>2</sup> ) | S  | S            | S                  | S              | H                 |                      |           |              |                  |          |                   |
| Submontane C(H <sup>1</sup> , S <sup>2</sup> )  |  | S            | S                  | S              | H                 | S                    | S         |              |                  |          |                   |
| Montane C(H <sup>1</sup> , L <sup>2</sup> )     |  | S            | L                  | S              |                   |                      |           | S            | S                | S        | S                 |
| Montane H(S <sup>1</sup> , L <sup>2</sup> )     |  |              |                    |                | S                 |                      |           |              |                  |          | S                 |
| Montane   | ALPINE LIFE ZONE<br>This ecological association does not exist in the Southeastern Region        |              |                    |                |                   |                      |           |              |                  |          |                   |

This Table represents a summation of effort where by numerical values were assigned as a ranking per high interest specie to each wildlife habitat. The numerical values were as follows: critical, 1; high-priority, 2; substantial, 3; and limited, 4. Once the individual values were assigned they were then summed and a mean calculated, for each wildlife habitat. A mean value lying between 1.0 and 1.8 was ranked as critical; a value between 1.9 and 2.3 was ranked as high-priority; a value between 2.4 and 3.4 was ranked as substantial; and a value between 3.5 and 4.0 was ranked as limited.

1. Habitat ranking value for species associated with the riparian-wetland type that represents just the wet meadow situation.
2. Habitat ranking value for species associated with the riparian-wetland type that represents just the dirt bank situation.

Table 2. Ranking of wildlife value per legal section of land on coal producing lands in Utah. Crucial-critical (1), sections are the highest valued followed in respective order by high-priority (2), substantial value (3) and limited valued (4) sections.

BOOK CLIFFS

| T. | R. | Section                           | Rank |
|----|----|-----------------------------------|------|
| 12 | 8  | 1-36                              | 1    |
| 12 | 9  | 2,4-12,14,16-18,31-35             | 1    |
|    |    | 1,3,13,15,19-30,36                | 2    |
| 12 | 10 | 2-11,13-17,19-27                  | 1    |
|    |    | 1,12,18,28-36                     | 2    |
| 12 | 11 | 16-28,33-35                       | 1    |
|    |    | 1-15,29-32,36                     | 2    |
| 12 | 12 | 19,27-30,32-34                    | 1    |
|    |    | 1-18,20-26,31,35,36               | 2    |
| 13 | 8  | 1-3,5-16,19,29,22-24,28-31        | 1    |
|    |    | 4,17,18,21,25-27,32-36            | 2    |
| 13 | 9  | 1-11,14,15,17,18,28,29,31-35      | 1    |
|    |    | 12,13,16,19-27,30,36              | 2    |
| 13 | 10 | 1,2,6                             | 1    |
|    |    | 3-5,7-36                          | 2    |
| 13 | 11 | 14-16,21-28,34-36                 | 1    |
|    |    | 1-13,17-20,29-33                  | 2    |
| 13 | 12 | 4,19,30,31,35                     | 1    |
|    |    | 1-3,5-18,20-29,32-35              | 2    |
| 13 | 13 | 1-36                              | 2    |
| 14 | 13 | 1-36                              | 2    |
| 14 | 14 | 33                                | 1    |
|    |    | 1-32,34-36                        | 2    |
| 15 | 14 | 1-21,23-26,28-36                  | 2    |
|    |    | 22,27                             | 3    |
| 16 | 14 | 24-26,35,36                       | 1    |
|    |    | 1-23,27-34                        | 2    |
| 16 | 15 | 3,10,11,14,23-25,29-33            | 1    |
|    |    | 1,2,4-9,12,13,15-22,26-28,34-36   | 2    |
| 17 | 14 | 1,12,13,24,25,36                  | 1    |
|    |    | 2,3,10,11,14,15,22,23,26,27,34,35 | 2    |
| 17 | 15 | 4-9,16-22,27-34                   | 1    |
|    |    | 1-3,10-15,23-26,35,36             | 2    |
| 18 | 14 | 1,27                              | 1    |
|    |    | 2,3,10-15,22-26,34-36             | 2    |
| 18 | 15 | 4-10,15-18                        | 1    |
|    |    | 1-2,11-14,19,21-25,30-32          | 2    |
|    |    | 3,20,26-29,33-36                  | 3    |

HENRY MOUNTAINS

| T. | R. | Section                          | Rank |
|----|----|----------------------------------|------|
| 27 | 9  | 1-36                             | 1    |
| 30 | 9  | 25,32-36                         | 3    |
|    |    | 19-24,26-31                      | 4    |
| 30 | 10 | 20-29,32-36                      | 1    |
|    |    | 19,30,31                         | 3    |
| 31 | 8  | 1,7,12,13,18,19,24,25,30,31,36   | 3    |
|    |    | 2-6,8-11,14-17,20-23,26-29,32-35 | 4    |
| 31 | 9  | 4-9,16-21,28-33                  | 3    |
| 32 | 8  | 30,31                            | 2    |
|    |    | 1,6,7,10-15,18,20-29,33-36       | 3    |
|    |    | 2-5,8,9,16,17,19,32              | 4    |
| 32 | 9  | 1,12,13,24,25,35,36              | 1    |
|    |    | 2-11,14-23,26-34                 | 3    |
| 33 | 8  | 6-8,12-14,17-20,22-36            | 2    |
|    |    | 1-4,9-11,15,16                   | 3    |
|    |    | 5,21                             | 4    |
| 33 | 9  | 1-3,9-17,20-28,34-36             | 1    |
|    |    | 7,18,19,29-32                    | 2    |
|    |    | 4-6,8,33                         | 3    |
| 34 | 8  | 1-3,10-13,15                     | 2    |
|    |    | 14                               | 3    |
| 34 | 9  | 3                                | 1    |
|    |    | 2,5-11,13,14,16-19               | 2    |
|    |    | 1,4,12,15,20-24,26-28            | 3    |
|    |    | 25,29-36                         | 4    |
| 34 | 10 | 1-23,26-30,32-34,36              | 2    |
|    |    | 24,25,35                         | 3    |
|    |    | 31                               | 4    |

KAIPAROWITS PLATEAU

| T. | R. | Section                | Rank |
|----|----|------------------------|------|
| 33 | 1  | 26,27,34-36            | 1    |
|    |    | 28,33                  | 2    |
|    |    | 19-25,29-32            | 3    |
| 33 | 2  | 28,31-33               | 1    |
|    |    | 19-21,29-30            | 3    |
| 34 | 1  | 1-3,10-14,24           | 1    |
|    |    | 4-9,15-23,25-36        | 2    |
| 34 | 2  | 4-7,17,18,20,21,28,29  | 1    |
|    |    | 8,9,16,19,30-33        | 2    |
| 35 | 2W | 3-10,16-19             | 1    |
|    |    | 2,11,14,15,20-23,27-32 | 2    |
|    |    | 1,12,13,24-26,33-36    | 3    |

KAIPAROWITS PLATEAU (CONTINUED)

| T. | R. | Section                             | Rank |
|----|----|-------------------------------------|------|
| 25 | 1  | 1-34                                | 2    |
|    |    | 35-36                               | 3    |
| 35 | 2  | 4-9,16-20,25                        | 2    |
|    |    | 21-24,26-36                         | 3    |
| 35 | 3  | 30-32                               | 2    |
|    |    | 19-29,33-36                         | 3    |
| 36 | 3W | 1-3,10-12,14,15                     | 2    |
|    |    | 13                                  | 4    |
| 36 | 2W | 1-6,8-12                            | 3    |
|    |    | 7,13-18,22-27,34-36                 | 4    |
| 36 | 1W | 36                                  | 1    |
|    |    | 1,24-26,35                          | 2    |
|    |    | 2-23,27-34                          | 3    |
| 36 | 1  | 4-9,19-36                           | 2    |
|    |    | 1-3,10-18                           | 3    |
| 36 | 2  | 30,31                               | 2    |
|    |    | 1-29,32-36                          | 3    |
| 36 | 3  | 5,8,17,20,21,27,28,33-35            | 2    |
|    |    | 1-4,6,7,9-16,18,19,22-26,29-32,36   | 3    |
| 37 | 1W | 1,2,11-14,23-26,35,36               | 2    |
|    |    | 3-10,15-22,27-34                    | 3    |
| 37 | 1  | 1-36                                | 2    |
| 37 | 2  | 6,7,12,13,17-20,24,25,29-32,36      | 2    |
|    |    | 1-5,8-11,14-16,21-23,26-28,33-35    | 3    |
| 37 | 3  | 1,2,6-9,12,15-23,25-36              | 2    |
|    |    | 3-5,10,11,13,14,24                  | 3    |
| 37 | 4  | 20,21,28-33                         | 3    |
|    |    | 19                                  | 3    |
| 38 | 1W | 1-3,11-14                           | 2    |
|    |    | 4-10,15-18                          | 3    |
| 38 | 1  | 1-18,22-27,34-36                    | 2    |
| 38 | 2  | 17                                  | 1    |
|    |    | 1,4-9,12,13,16,18-21,24,25,28-33,36 | 2    |
|    |    | 35                                  | 3    |
| 38 | 3  | 1-36                                | 2    |
| 38 | 4  | 2-36                                | 2    |
|    |    | 1                                   | 4    |
| 38 | 5  | 19-22,26-36                         | 2    |
|    |    | 23-25                               | 4    |
| 39 | 1  | 1-18,22-27,34-36                    | 2    |
| 39 | 2  | 1,2,4-9,11-20,22,36                 | 2    |
|    |    | 3,10,21                             | 3    |
| 39 | 3  | 1-36                                | 2    |
| 39 | 4  | 1-36                                | 2    |
| 39 | 5  | 1-36                                | 2    |
| 40 | 2  | 1-36                                | 2    |
| 40 | 3  | 1-36                                | 2    |
| 40 | 4  | 1-36                                | 2    |
| 40 | 5  | 1-36                                | 2    |
| 40 | 6  | 4-9,16-21,28-33                     | 2    |
| 41 | 2  | 1-30                                | 2    |
|    |    | 31-36                               | 3    |
| 41 | 3  | 31-36                               | 1    |
|    |    | 1-21,29,30                          | 2    |
|    |    | 22-28                               | 3    |
| 41 | 4  | 31-36                               | 1    |
|    |    | 1-17,20-28                          | 2    |
|    |    | 18,19,29,30                         | 3    |
| 41 | 5  | 31-33                               | 1    |
|    |    | 1-9,11-14,18,23-26,35,36            | 2    |
|    |    | 10,15-17,19-22,27-30,34             | 4    |
| 42 | 1W | 13-36                               | 1    |
|    |    | 4,9                                 | 2    |
|    |    | 1-3,5-8,10-12                       | 4    |
| 42 | 3  | 1-36                                | 1    |
| 42 | 4  | 1-36                                | 1    |
| 42 | 5  | 2-36                                | 1    |
|    |    | 1                                   | 2    |
| 43 | 3  | 1-11,14-18                          | 1    |
|    |    | 12,13                               | 4    |

WASATCH PLATEAU NORTH

| T. | R. | Section                       | Rank |
|----|----|-------------------------------|------|
| 12 | 6  | 1-26,29,31,34-36              | 1    |
|    |    | 27,28,30,32,33                | 2    |
| 12 | 7  | 1-15,17-36                    | 1    |
|    |    | 16                            | 3    |
| 12 | 8  | 1-36                          | 1    |
| 13 | 6  | 1,2,5-8,10,13,17-20           | 1    |
|    |    | 3,4,9,11,12,14-16,21-36       | 2    |
| 13 | 7  | 1-4,9-17,19,22-26,31,32,35,36 | 1    |
|    |    | 5-8,13,20,21,27-30,33,34      | 2    |
| 13 | 8  | 1-3,5-16,19,20,22-24,28-31    | 1    |
|    |    | 4,17,18,21,25-27,32-36        | 2    |

WASATCH PLATEAU NORTH (CONTINUED)

| T. | R. | Section                             |
|----|----|-------------------------------------|
| 14 | 6  | 28-33                               |
|    |    | 1-27,34-36                          |
| 14 | 7  | 1,4-6,9,12,13,16                    |
|    |    | 2,3,7,8,10,11,14,15,17-36           |
| 15 | 6  | 4-6,10-15,22-24                     |
|    |    | 1-3,7-9,16-21,25-36                 |
| 15 | 7  | 32-36                               |
|    |    | 1-31                                |
| 15 | 8  | 9,15,20-22,27-29,32,33              |
|    |    | 1-8,10-14,16-19,23-26,30,31,34-36   |
| 16 | 6  | 11,13,14,16,20-26,28,29,31-33,35,36 |
|    |    | 1-10,12,15,17-19,27,30,34           |
| 16 | 7  | 1-5,9-16,21-28,34-36                |
|    |    | 6-8,17-20,29-33                     |
| 16 | 8  | 4,7,9,17-21,28-31                   |
|    |    | 1-3,5,6,8,10-16,22-27,32-36         |
| 17 | 6  | 4-9,11-14,16-22,24-35               |
|    |    | 1-3,10,15,23,36                     |
| 17 | 7  | 1,2,7,12,18,19,25,30                |
|    |    | 3-6,8-11,13-17,20-24,26-29,31-36    |
| 17 | 8  | 5,6,16,19                           |
|    |    | 4,7-9,17,18,20,21,28-33             |
| 18 | 6  | 1-3,10,11,13-15,22-27,34-36         |
|    |    | 12                                  |
| 18 | 7  | 4,5,7-11,13-17,19-27,29-32,34-36    |
|    |    | 1-3,6,12,18,28,33                   |
| 19 | 6  | 1-3,10-15,22-27,34-36               |
| 19 | 7  | 1-3,5,23,27-34                      |
|    |    | 4,24-26,35,36                       |

WASATCH PLATEAU SOUTH

| T. | R. | Section                    |
|----|----|----------------------------|
| 20 | 5  | 20-29,31-36                |
|    |    | 19,30                      |
| 20 | 6  | 19-36                      |
| 21 | 4  | 1-3,10-15,19-36            |
|    |    | 4-9,16-18                  |
| 21 | 5  | 1-36                       |
| 21 | 6  | 4-9,16-21,28-33            |
| 22 | 3  | 1-3,10-15,22-27,34-36      |
| 22 | 4  | 1-4,9-16,21-28,33-36       |
|    |    | 5-8,17-20,29-32            |
| 22 | 5  | 1-20,22-24,29-30           |
|    |    | 21,25-26,31-36             |
| 23 | 3  | 1,12,13                    |
|    |    | 2,3,10,11,14,15,22-27      |
|    |    | 34-36                      |
| 23 | 4  | 2-4,6-11,14-18,20-29,31-36 |
|    |    | 1,5,12,13,19,30            |
| 24 | 4  | 2,4-9,16-18                |
|    |    | 1,3,10-15                  |

This Table represents a summation of work published in 1977 as a "Ranking of Wildlife Values on Federal Coal Lands". Robert W. Scott performed the work as a Division of Wildlife Resources employee under contract (No. 14-16-006-3125) for the U.S. Fish and Wildlife Service. Scott's procedure ranked habitat use areas as critical, high-priority, substantial and limited value for select individual species of high interest. After which the individual values were evaluated per legal section of land and a cumulative value was determined.

UMC 784.21; FISH AND WILDLIFE PLAN  
KAISER STEEL CORPORATION, SUNNYSIDE MINING PROJECT

Mitigation and Impact Avoidance Procedures General to All Wildlife

Utah Division of Wildlife Resources provides the following recommendations in order to minimize disturbances and impacts on wildlife and their habitats that could be impacted during developmental, operational and reclamation operations at the Company's mining project. The recommendations address how enhancement of the wildlife resource and their habitats as discussed in UMC 783.20 can be achieved. They are also consistent with the performance standards of UMC 817.97. In instances where it would be necessary to restore or could be beneficial to enhance or develop high value habitats for fish and wildlife, recommended plant materials and rates of application are provided as "Appendix B" (UMC 817.97 and UMC 817.111 through 817.117). This list should prove useful in meeting the additional requirements to be imposed upon the operator if the primary or secondary land use will be for wildlife habitats (UMC 817.97 d 9). Additionally, "Appendix C" represents a list of commercial sources for plant materials.

The project and adjacent areas are represented by eleven basic wildlife habitats which are inhabited on occasion and during different seasons of the year by about 296 species of vertebrate wildlife. The wildlife habitats and use areas for the "high interest" species from this group of wildlife have been ranked into four levels of importance. The most valuable to an individual species or ecological assemblage are the critical sites followed in respective importance by high-priority, substantial value and limited value sites. Each type of use area requires various and specific levels of protection from man's activities. Additionally, due to the variability of vegetation communities in each use area, various and specific technologies in site development will need to be evaluated for possible

mitigations, enhancements of wildland habitats or the required level of reclamation. It is recommended that all land clearing impacts be designed so that irregular shaped openings are created in contrast to openings that would have straight edges.

It is recommended that the Company make significant efforts to educate all employees associated with their coal handling operation of the intricate values of the wildlife resource associated with the project and adjacent areas and the local area. Each employee should be advised not to unnecessarily or without proper permits harass or take any wildlife. (Apprehension of wildlife violators has increased by nearly 250 percent during recent years in the region). It is especially important that wildlife not be harassed during winter periods, breeding seasons and early in the rearing process. Exploration should be limited as much as possible during these crucial periods.

During winter wildlife are always in a depleted condition. Unnecessary disturbance by man causes them to use up critical and limited energy reserves which, often times, results in mortality. In less severe cases, the fetus being carried by mammals may be aborted or absorbed by the animal, thus reducing reproductive success of a population.

During breeding seasons, disturbance by man can negatively affect the number of breeding territories for some species of wildlife. Disturbance can also interrupt courtship displays and preclude timely interactions between breeding animals. This could result in reduced reproductive success and ultimate reductions in population levels.

Early in the rearing process, young animals need the peace and tranquility normally afforded by remote wildlands. It is also during this crucial period that young animals gain the strength and ability to elude man and other predators. This allows the young animal to develop in relatively unstressed situations and to utilize habitats that are secure from predators. Disturbance by man can compromise

this situation and result in abandonment of the young by the female, increased accidents that result in mortality to young animals or increased natural predation. It is recommended that employees be cautioned against disturbing young animals or females with young if accidentally located.

Employees associated with coal handling operations should be instructed that when wildlife are encountered during routine work that they not stop vehicles for viewing purposes. Moving traffic is less disturbing to wildlife than traffic that stops or results in out-of-the-vehicle activities. If viewing is desirable, the vehicle should only be slowed, but not stopped.

Hunting and other state and federal wildlife regulations must be adhered to by sportsmen utilizing the project area.

#### Mitigation and Impact Avoidance Procedures for Aquatic Wildlife

There are no recommendations for a wildlife plan that would enhance the fisheries associated with the Company's operation.

If ultimate operations are planned or occur that could physically or chemically impact any perennial stream beyond the impact of mere crossings, detailed reclamation plans will be required. Permanent culvert crossings exceeding a width of eight feet must have a natural bottom and may need devices for reducing stream velocity so that fish migration will not be blocked. A reclamation plan for a stream or lake would have to provide for measurement of the physical characters of the water prior to disturbance. Such measurements should consider surface water information required in SMC 779.16, data on stream velocity, gradient, width, depth, pool-riffle ratio and substrata types.

Reclamation that would achieve development of a lake bed or stream channel similar in character to that which existed prior to disturbance should result in natural re-establishment of macroinvertebrates, macrophytes and a fish population. If merited, the Division could then introduce desired fishes into those waters. This would adequately mitigate for disturbance and temporary loss of aquatic resources. There would be no mitigation for displacement and possible loss of other

wildlife species dependent upon the aquatic wildlife as a prey source. It is believed that impacts on such species would not be significant.

It is also recommended that adequate precautions be taken to keep all forms of coal or other sediments from being inadvertently deposited along or within perennial stream channels. Similar precautions should be taken to preclude deposition of coal particles or sediments in or along other drainages from which the material could be transported during a precipitation event into a perennial stream. This would include blow-coal from haulage trucks, railroads or other transportation systems and storage piles. Control of larger coal particles from the above sources is equally important to control of fugitive dust. If needed, haulage vessels or storage sites should be covered, or the surface of the coal appropriately sprayed in order to solidify it against wind movement. Travel speeds of haulage vessels could be reduced so that coal is not allowed to leave the transportation system. The impacts of coal or other sediments on aquatic ecosystems are many and varied; therefore, sediments must be kept out of those systems.

Utah Division of Wildlife Resources reaffirms all of the recommendations in UMC 817.41 through 817.57 and UMC 817.126 for protecting the State's waters and their associated riparian and wetland zones along with the aquatic wildlife resource.

#### Mitigation and Impact Avoidance Procedures for Terrestrial Habitats

It is recommended that all wetland and riparian habitats be maintained. Roads and other facility developments should not destroy or degrade these limited, highly productive and unique habitats. Roads crossing through those areas should do so in a manner that is least damaging to the habitat. Wetlands and riparian habitats are ranked as being of critical value and are the most productive sites in terms of herbage and biota produced as compared to other local habitat types. It is probable that a majority of the vertebrate wildlife that inhabit the project area make some use of riparian or wetland areas.

It is important to note that roads and other surface facilities to be constructed should as far as practicable be placed at sites where they will not

compromise wildlife or their use areas. Also, surface facilities, including roads, should be screened if possible from wildlife use areas by vegetation or terrain.

In situations where wildland habitats have been or will be disturbed, reclamation is required. Also, there are sites where development or enhancement of wildland habitats through vegetation treatments and/or seedings and transplants of seedlings could benefit wildlife. "Appendix B" depicts the Division's recommendation for plant materials to be utilized for various wildlife habitats on wildland treatments that are intended to benefit wildlife. If circumstances arise where seed or seedling transplants for a recommended plant species are not available, suitable alternates are also recommended.

Seedling transplants from nursery stock as well as nearby rangelands would also be acceptable for some wildland treatments.

Appendix C represents an exhaustive list of commercial sources for plant materials for use in wildland treatments.

Temporary control of rodents may be required to ensure a successful rangeland treatment. It is recommended that the county agent be consulted in this area of concern. Poisoned oats are the most common and acceptable method for rodent control; however, only licensed persons may apply the treatment.

Currently, there are some new concepts in methodology for revegetation that are being successfully implemented in other parts of the nation and world. One promising method is a procedure where a large scoop removes, from a natural and stabilized site, a small area of earth intact with vegetation and subsurface soils for placement on a site to be restored. This same procedure can be utilized when disturbing pristine sites, except that the native vegetation is stored for use in latent reclamation. Another meritorious method for stimulating natural revegetation, in combination with other reclamation techniques, is to plan facility developments so that islands of natural, native vegetation remain. This will allow for natural vegetation to spread from the islands. These techniques can also be useful for

enhancement of poor quality sites that currently exist on the mine plan area.

Encapsulation of seed and fertilizer for several releases over a period of years after a single application is a new and possibly advantageous procedure. This technique along with soil stabilizing structures has been successfully used in South Africa. Dr. J. Van Wyk in the Department of Botany at Potchefstroom University in South Africa could provide additional information on this new technique.

There are also new specialized techniques coming to the forefront for stabilization of problem sites such as roadbanks and steep slopes. It is important that these sites be promptly and permanently revegetated in order to reduce siltation into local riverine systems. This will mitigate for damage to aquatic wildlife populations and habitats from siltation. Enhancement of existing problem sites or reclamation of disturbed sites can mitigate for salt loading of local river systems. It is believed that natural, nonpoint sources represent 50 percent of the salinity in the upper basin of the Colorado River system into which this mine plan area drains.

It is recommended the Company make numerous contacts with appropriate agencies, institutions and persons to ensure that enhancement or reclamation projects achieve the required degree of permanency, plant diversity, extent of cover and capability of regeneration to ensure plant succession. Generally speaking, seeding should be accomplished as late in the fall as possible. Seedling transplants need to be coordinated with local soil moisture conditions which are usually at optimum in the early spring just as the snow melts.

It is paramount that suitable vegetation be maintained and/or re-established if the life requirements of wildlife are to be satisfied in the postmining period. Success in this area of concern along with cessation of man's disturbances will likely result in a natural reinvasion and the resultant inhabitation by most wildlife species of an impacted site.

It is important to note that enhancement or reclamation projects that are

to benefit wildlife must be properly designed so that all the life requirements of the target species are considered in conjunction with forage. Water must be provided or be present and thermal cover along with escape and hiding cover has to be in abundance. Loafing areas and travelways between the many types of use areas must also be provided. In order to meet these goals, a considerable degree of consultation will be required between the Company and Utah Division of Wildlife Resources.

As a service and also to ensure that the needs of wildlife are met, the various expertism within the Division of Wildlife Resources are available to the Company for consultation. For the most part, Larry Dalton, Resource Analyst, for the Southeastern Regional office at 455 West Railroad Avenue in Price, Utah 84501 (phone 637-3310) will coordinate any needed contacts. Richard Stevens, Wildlife Biologist, at the Great Basin Research Center, Box 704, in Ephraim, Utah 84627 (phone 283-4441) is available for consultation and site specific analysis concerning species for vegetation plantings, timing and techniques to achieve the best results.

In instances where revegetation projects are to be planned over coal waste areas, heavy metal uptake by the plants must be evaluated. It is recommended that the Company initiate an appropriate long-term monitoring program to determine the magnitude and resolutions, if needed, for this problem.

It is recommended that persistent pesticides not be utilized on the project area. Other alternate pesticides or forms of control should be utilized.

All hazards associated with the project operation should be fenced or covered to preclude use by wildlife; of special concern would be sites having potential to entrap animals or toxic materials.

#### Mitigation and Impact Avoidance Procedures for Amphibians and Reptiles

Enhancement or development of habitats that provides a diversity of vegetation will benefit amphibians and reptiles. It is important to note that all of these species are protected by Utah law. Due to the myriad and myths that

surround these animals, it is urged that individual specimens not be destroyed. This is especially true for snakes since they are a valuable component of the ecosystem.

Snake dens are ranked as being of critical value to the population and are protected by law. If a den is located, it should be reported to the Utah Division of Wildlife Resources. Snake dens can be moved, but only with intensive efforts that may take a year or more (snakes are caught and removed in the spring and fall). Thus, construction of facility developments may take place in denning locations if there is sufficient lead time to relocate the occupants.

#### Mitigation and Impact Avoidance Procedures for Avifauna

It is recognizable that development and operation of a mining project will in some cases negatively impact many avian species through physical destruction of habitats and continual disturbance that makes other habitats unavailable or less desirable to an individual bird. It is also true that impacts that are negative to one species may be beneficial to another species. It is recommended that the Company plant native and/or ornamental berry producing shrubs around surface facilities. When mourning doves are a target species, sunflowers or blazing star should be planted. This will provide food and cover for many of the smaller species of birds, resulting in enhancement of their substantial value and high-priority habitats. This action would also mitigate for disturbances and destruction of avifauna habitats at other sites associated with project operations.

It is important to note that the nests of all avifauna (except the house sparrow, starling and ferral pigeon) when active and their eggs are protected by federal (Federal Migratory Bird Treaty Act) or state laws (Utah Code 23-17-1 and 23-17-2). All avifauna utilize a nest during their reproductive process. Dependent upon the species, some nests are well developed while others may be represented by only a scrape on the ground. These sites when being utilized are critical to maintenance of individual bird populations; each species has a

specific crucial time period in which the nest is occupied. It is during this crucial period that the nest must be protected from disturbance.

Riparian and wetland areas need to have complete protection from disturbance between mid-March and mid-June due to the crucial nesting season of waterfowl. Disturbance should be significantly limited from mid-June through mid-October in order to protect the high-priority habitat values for brooding, moulting and migrating waterfowl.

Several species of raptors frequent the project area. Their nests when active should not be disturbed and abandoned stick nests are never to be damaged. Every effort should be made to eliminate man's disturbance within visual sight or one-half kilometer radius of an active raptor nest. This distance would have to be increased to a one kilometer radius if the cause for disturbance were to originate within view and from above the nest. This effort is demanded in the instance of golden eagles and cliff nesting falcons since they are sensitive to disturbance and could abandon the nest. Termination of man's use of a site would not be required if eagles or falcons constructed their nest after mining had been initiated, since it would demonstrate the individual bird's willingness to tolerate mining activities and the associated disturbance by man.

Roost trees for eagles, if located, must not be disturbed or destroyed. Similarly, activities planned for high-priority concentration areas of eagles must be designed and implemented so that they are not of significant disturbance to the birds.

As a general comment, whenever active raptor nests are observed or roost trees for eagles located, they need to be reported to the Utah Division of Wildlife Resources and the U.S. Fish and Wildlife Service.

Design and construction of all electrical powerlines and other transmission facilities shall be designed in accordance with guidelines set forth in "Environmental Criteria for Electric Transmission System" published by the USDA and USDI in 1970 and/or the REA Bulletin 61-10 "Powerline Contacts by Eagles and Other

Large Birds". It is also recommended that placement of utility poles over flat or rolling terrain be planned so that they are out of view of roads or at least 300 meters away from any roads. This will lessen opportunity for illegal killing of these valuable birds, since the poles can serve as suitable hunting perches for raptors. In some instances poles can result in an extension of raptor hunting territories, which would represent a beneficial impact.

During the crucial period of December through February spruce-fir forests and aspen forests need to be protected from man's disturbance so that blue grouse and ruffed grouse will not be impacted. Destruction of these wildlife habitats at any time of the year need be minimized due to their value to wildlife.

During the spring period (mid-March through mid-June) care needs to be taken that male blue grouse are not disturbed or precluded from establishing breeding territories. Similar precautions need be taken for male ruffed grouse (March through May) in the area of drumming logs.

Agricultural lands associated with the project should be maintained under traditional agricultural practices and not converted to other uses. These lands are of critical and high-priority value to avifauna and a myriad of other wildlife dependent upon agricultural systems.

Mature trees with natural cavities and dead snags need to be protected for use by cavity nesting birds. Trees with such a character are ranked as being of critical value to cavity nesting birds. The project should be planned so that three such trees are left standing per acre within 500 feet of forest openings or water and two such trees per acre in dense forested areas.

#### Mitigation and Impact Avoidance Procedures for Mammals

The lodges, nests and dens of all mammals or roosts in the instance of bat like mammals represent a critical use area for maintenance of their individual populations. The crucial period for any species is when the lodge, den, nest or roost is occupied. Therefore, such sites for any mammal must be protected from disturbance during that period when it is being utilized.

Many species of mammals develop food caches in order to carry individual animals or family groups through period when they cannot forage. Such sites are of critical value to maintenance of their populations and if located should not be destroyed or subjected to regular disturbance by man.

It is important to realize that within natural ecosystems there exists a predator-prey relationship. One species of animal may represent a prey source for other species. Therefore, it is important that project operations be designed and implemented so as to not unnecessarily disturb or destroy any wildlife or their habitats.

Big game ungulates--mule deer, elk and bighorn sheep--each have seasonal use areas ranked as being of critical value to an individual herd. Such sites need to be protected from any of man's activities or developments that could result in destruction, loss or permanent occupancy of the site by man or his facility developments. If these types of impacts cannot be avoided the site must ultimately be reclaimed and revegetated. Also, critical valued areas need protection from disturbance during their appropriate crucial period.

High-priority valued use areas for all wildlife and particularly big game ungulates need to be protected from man's activities or facility developments. Actions that would result in loss or permanent occupancy of significant acreages (25 or more acres) of habitat are of special concern. In any event impacts to high-priority valued areas should be limited and ultimate reclamation planned. Many impacts can be avoided simply by precluding exploration, developmental or other activities during the period of time when a high interest specie is present.

Haulage of coal between the various mine projects and distribution points should be planned so that impacts to wildlife are lessened; of special concern is haulage of coal through wintering areas for big game. It is recommended that the Company develop coal haulage contracts that require personnel involved with coal haulage to use extreme caution so that accidental collisions between motor vehicles and big game are reduced. Without doubt, a reduction in speed across winter ranges would alleviate this problem during the period between November 1

and May 15 each year.

At present the most successful and cost effective technique for reducing deer-highway mortality is a system of warning reflectors. This system (manufactured by Strieter Corporation, 2100 Eighteenth Avenue, Rock Island Illinois 61201 and known as "Swareflex") is only of value at night time, but it is during darkness that most deer-highway mortality occurs. Strieter Corporation describes the effect of the reflector system as follows: "The headlights of approaching vehicles strike the wildlife reflectors which are installed on both sides of the road. Unnoticeable to the driver, these reflect red lights into the adjoining terrain and an optical warning fence is produced. Any approaching wildlife is [are] alerted and stops or returns to the safety of the countryside. Immediately after the vehicle has passed, the reflectors become inactive, thereby permitting the animals to cross safely".

Installation of a wildlife warning reflector system, a reduction in speed of coal-haulage trucks and other mine related traffic and increased awareness of wildlife values by mine associated employees should result in a reduction of deer-highway mortality problems. Such a reduction would represent satisfactory mitigation.

In instances where conveyors, slurry lines or any other structure having potential to be a barrier to big game movement is to be developed, passage structures must be provided. Generally speaking overpass and underpass type structures are recommended in order to allow passage of big game to habitats either side of any barrier. These crossings should be placed at the points to be identified from intensive study of big game movements in relation to the mine plan area. Such study would not be required if the structure was adequately elevated to allow uninhabited passage of big game along its entire length.

Underpasses should have a minimum clearance of three meters maintained across a span of at least five meters. Overpasses should be designed as a circular earthen ramp with the barrier bisecting the ramp into two equal halves as follows:

CHAPTER XI

CLIMATOLOGY AND AIR QUALITY

TABLE OF CONTENTS

|  | Page |
|--|------|
| 11.1 Scope                                       | 1    |
| 11.2 Methodology                                 | 1    |
| 11.3 Existing environment                        | 1    |
| 11.3.1 Precipitation                             | 1    |
| 11.3.2 Temperature                               | 2    |
| 11.3.3 Evaporation                               | 3    |
| 11.3.4 Relative humidity                         | 3    |
| 11.3.5 Wind                                      | 3    |
| 11.4 Effects of mining operations on air quality | 4    |
| 11.5 Climatological and air quality monitoring   | 5    |
| 11.6 Bibliography                                | 6    |
| List of Exhibits                                 | 7    |

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### 11.1 Scope

Regional and local climatological data has been derived respectively from governmental sources and from the Sunnyside weather station maintained by Kaiser Coal Corporation.

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The Sunnyside Mines is an underground mine. Effect of the mining operation on air quality, if any, is confined to the surface operations. Most parking areas and roads are paved. The unpaved roads are treated with calcium chloride, potassium chloride or sprayed with water as required to control fugitive dust. While no air quality monitoring devices are in use, three units of coal-fired equipment are inspected periodically by the Utah State Department of Health, Bureau of Air Quality. There has not been any violation of air quality laws at the Sunnyside Mines to date.

### 11.2 Methodology

The U.S. Geological Survey's "Final Environmental Statement, Development of Coal Resources in Central Utah" (1979)<sup>(1)</sup> provides much useful climatological information for the region as well as for the B Canyon Mine property adjoining the Sunnyside Mines permit area.

Kaiser Coal set up a weather station at the Sunnyside Mines in March 1974. Climatological records have been subsequently kept.

Some climatological data was obtained from the National Weather Service in Salt Lake City.

### 11.3 Existing Environment

#### 11.3.1 Precipitation

The precipitation in the Sunnyside Mines permit area consists of occasional winter snows, with average annual accumulation of about one foot, and summer rains which generally occur during July, August, and September. Figure XI-1 Shows the mean annual precipitation for the Sunnyside area to be about sixteen inches.

Snow accumulation over the permit area varies greatly due to elevation and topographic exposure. At the mouth of Whitmore

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canyon (elevation 6750) snow accumulates from 0 to 21 inches during October through March. During the same period of time at the upper bathhouse (elevation 7280) the snow depth ranges from 0 to 50 inches (personal observation by D.C. Pearce, 1982, 1983, 1984). Significant daily snow accumulations are recorded at the Sunnyside NOAA weather station maintained by Kaiser Coal Corporation. Maximum monthly, mean maximum monthly and mean daily snow accumulations have been collected and calculated for years 1973 through 1983 to date and are presented below:

Snow Accumulation 1973-1983 (Inches)

|          | Maximum | Mean Maximum | Mean Daily |
|----------|---------|--------------|------------|
| October  | 6.50    | 1.35         | 0.73       |
| November | 6.00    | 1.69         | 0.28       |
| December | 14.00   | 4.42         | 1.73       |
| January  | 21.00   | 9.86         | 4.01       |
| February | 21.00   | 6.44         | 2.84       |
| March    | 15.00   | 5.30         | 0.60       |

Ground accumulations of snow are characterized by short duration due to melting or sublimation. This is shown by the mean daily snow accumulation values under 1 inch for October, November, and March.

The nearest NOAA station with similar conditions is in Price, Utah. A climatological summary with thirty year averages for precipitation is included as Table XI-3. Table XI-4 shows a summary with twenty-two year averages for the Sunnyside NOAA station. Sunnyside shows 2.21 inches more precipitation on average than the Price station. This is the result of higher elevation and closer proximity to the Book Cliffs. Table XI-1 has been updated and included in this section.

Table XI-1 is a compilation of precipitation data from the Sunnyside Mines weather station which covers the only period on record, from April 1974 through May 1980.

11.3.2 Temperature

The temperature at the Sunnyside Mine and surface facilities is typical of the semi-arid, western locales at surface elevation of 6,500 to 7,000 feet. Colder temperatures than those recorded would be encountered at the 9,000 foot elevations in the mountains above the mine.

## CHAPTER XI

Temperature data is available from general government studies and also from more detailed site observation at the Sunnyside weather station.

Significant average temperatures are shown below:

|                           | Temperature OF               |                                     |
|---------------------------|------------------------------|-------------------------------------|
|                           | <u>Sunnyside<br/>Records</u> | <u>Govt. Rep.<br/>(Generalized)</u> |
| Monthly Average - January | 22                           | 25                                  |
| - July                    | 69                           | 70                                  |
| Yearly Average            | 44 (5 years)                 |                                     |
| Extremes - High           | 96                           | 90                                  |
| - Low                     | -15                          | 0                                   |

Table XI-2 gives monthly figures from the Sunnyside weather station for the period of record (April 1974 through May 1980). The accompanying government charts, Figures XI-2 and XI-3, illustrate regional mean January minimum and July maximum temperature.

Table XI-3 gives twenty-two year temperature averages for the Sunnyside, Utah NOAA station. From the Sunnyside data the average start and end of the frost free growing season was found to be June 1 through October 17. This gives a mean frost free growing season of 141 days having a standard deviation of 22.2 days. Average monthly precipitation is shown on Figure XI-5.

### 11.3.3 Evaporation

The potential evaporation rates are shown in Table XI-5. The pan coefficient in this area to convert pan evaporation to lake as extracted from Technical Paper #37 of The National Weather Service is 0.69.

### 11.3.4 Relative Humidity

Data on relative humidity variations is unavailable. The area is considered semi-arid and the relative humidity is usually quite low.

## CHAPTER XI

### 11.3.5 Wind

The Sunnyside property lies near the intersection of the "Book and Roan Cliffs" and the "Castle Valley" air sub-basins of the Upper Colorado River Air Basin.

Nighttime airflow in the region is primarily drainage in character and generally follows river drainage systems (see Figure XI-4). Wind speeds induced by the descent of dense cold air are generally light. The daytime flow is strongly influenced by surface heating effects which result in mixing between the surface and upper flows. In the subject area there is a general air flow toward the north and northeast during the day and toward the southwest away from the high surface elevations during the night. Winds are light to moderate (below 20 MPH), although occasional high winds do occur.

Upper level winds, 1,600 feet or more above ground level, are generally from the southwest during most of the year. During the winter, air flow from the northeast is common.

Site specific wind data is not available in the Sunnyside area. Canyon topography dominates both wind direction and speed and would make any available data very site specific and not applicable to the total permit area. The winds high in the atmosphere tend to be strong but decrease toward the surface where obstructions and surface friction come into play. Thus, in the area, winds will tend to increase with increasing elevation. High ridges and plateaus will generally have stronger winds than the valleys and desert areas (E.A. Richardson 1980).

### 11.4 Effects of Mining Operations of Air Quality

Most of the region around the Sunnyside Mines permit area has been designated a Class II area for purposes of determination of significant air quality deterioration. Deterioration of the air quality is not expected during the permit period with the exception of short high wind periods when sand and smaller grained particles are picked up outside of the permit area and added to the air in the permit area.

The Sunnyside Mines is an underground mining operations. The coal is cleaned in a washing plant and no thermal drying of the coal is used. Any effect of the mining operation on air quality would be minimal and would be confined primarily to the surface facilities (see Plate III-1).

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Most of the parking areas and roads are paved. The main road through the property, the one most used, is a public road owned and maintained by the county. This road is partially paved. The haul road used by the refuse trucks is paved to the beginning of the disposal area. There are several access roads to portal and/or fan locations which receive limited usage, mainly for inspection purposes. Roads around the main complex are treated with calcium chloride, potassium chloride or sprayed with water to control fugitive dust as required during dry periods.

There are three units of coal-fired equipment in the surface facilities, namely,

(1) A coal-fired boiler located at the preparation plant which provides heat via steam lines to the preparation plant, warehouse, shop and changehouse. It also heats water for the bathhouse facilities. During the portion of the year when heating of the building is not required, this unit is shut down.

(2) The heating of water for the shower facilities is by a coal-fired boiler located at the preparation plant which provides heat via steam lines to the preparation plant, warehouse, shop and changehouse. It also heats water for the bathhouse facilities. During the portion of the year when heating of the building is not required, this unit is shut down.

(2) The heating of water for the shower facilities is by a coal-fired furnace located in the changehouse.

(3) Forge in the shop.

Kaiser Coal Corporation will continue its programs in the Sunnyside Mines permit area to comply with the requirements of the Clean Air Act and other applicable air quality laws and regulations as well as health and safety standards. There has not been any violation of air quality laws at this operation to date and it is expected to remain so in the future.

#### 11.5 Climatological and Air Quality Monitoring

Climatological monitoring is facilitated by the weather station installed by Kaiser Coal at the Sunnyside Mines during March 1974. It is located at 6,780 feet in elevation.

No air quality monitoring devices are in use at this operation. The three units of coal-fired equipment noted in Section 11.4 are inspected periodically by the Utah State Department of Health, Bureau of Air Quality. Air quality permits are not needed for old sources according to Monte Keller of the Bureau of Air Quality, Division of Environmental Health, Utah State Board of Health.

CHAPTER XI

11.6 Bibliography

- (1) "Final Environmental Statement, Development of Coal Resources in Central Utah." Part 1 - Regional Analysis. Part 2 Site Specific Analysis (Chapter on the B-Canyon Mine).  
Department of the Interior, U.S. Geological Survey (1979).
- (2) E.A. Richardson, South Lease Permit Application, Chapter XI, Climatology and Air Quality (1982).
- (3) Personal communication, Monte Keller, Bureau of Air Quality, Division of Environmental Health, Utah State Board of Health.

## CHAPTER XI

### LIST OF EXHIBITS

|        |      |  |
|--------|------|--|
| Figure | XI-1 | Mean annual precipitation in central Utah  |
| Figure | XI-2 | Mean minimum temperatures in January in central Utah   |
| Figure | XI-3 | Mean maximum temperatures in July in central Utah  |
| Figure | XI-4 | Streamlines for nighttime drainage air flow and typical daytime surface air flow in central Utah |
| Figure | XI-5 | Graph of monthly average precipitation, Sunnyside, Utah 1974-1982                                |
| Table  | XI-1 | Sunnyside monthly precipitation in inches  |
| Table  | XI-2 | Temperature - Sunnyside, Utah Weather Station  |
| Table  | XI-3 | Climatological summary, Price, Utah (1936-1980)  |
| Table  | XI-4 | Climatological summary, Sunnyside, Utah (1958-1980)  |
| Table  | XI-5 | Potential evaporation rates for Sunnyside, Utah  |

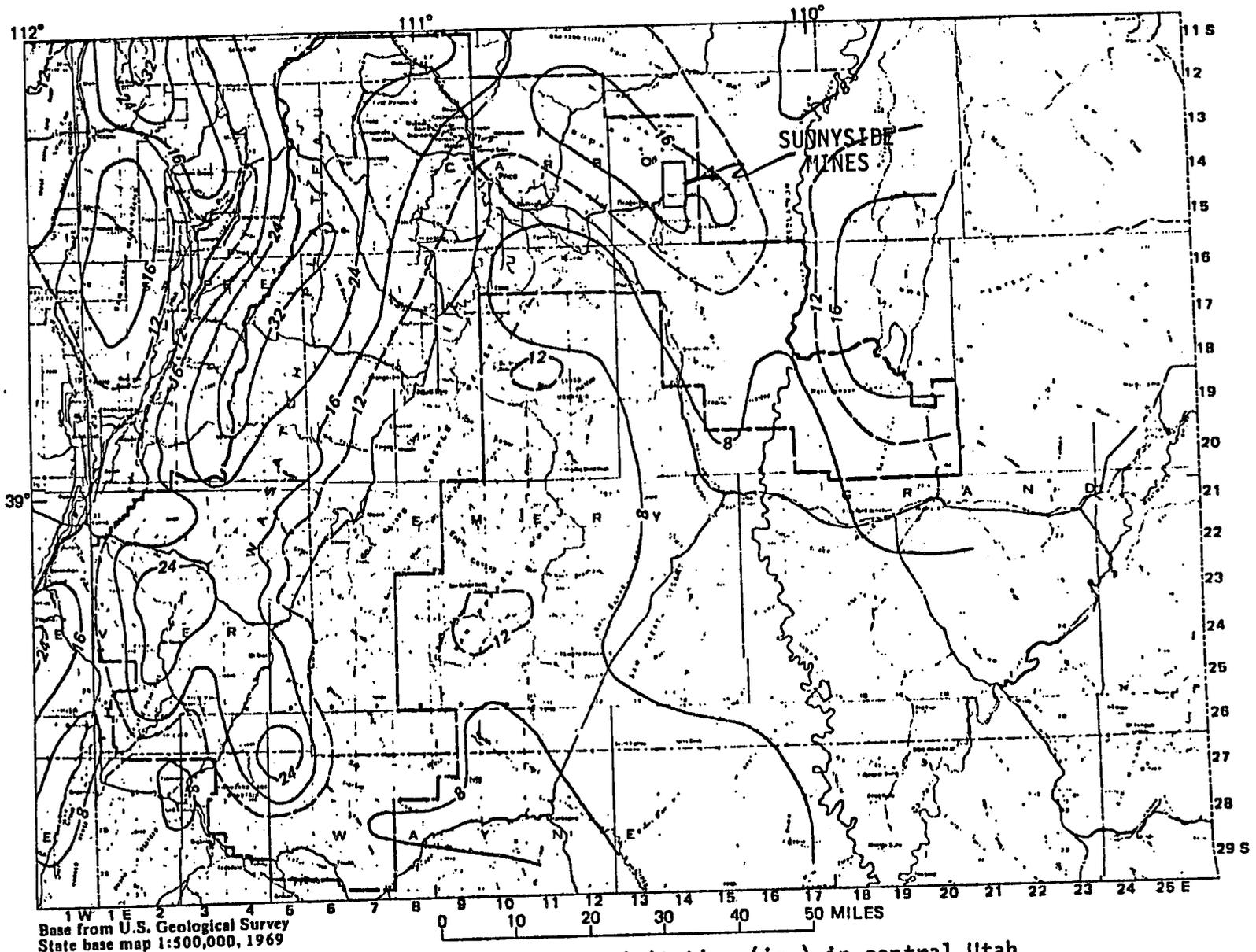


Figure XI-1 Mean annual precipitation (in.) in central Utah.

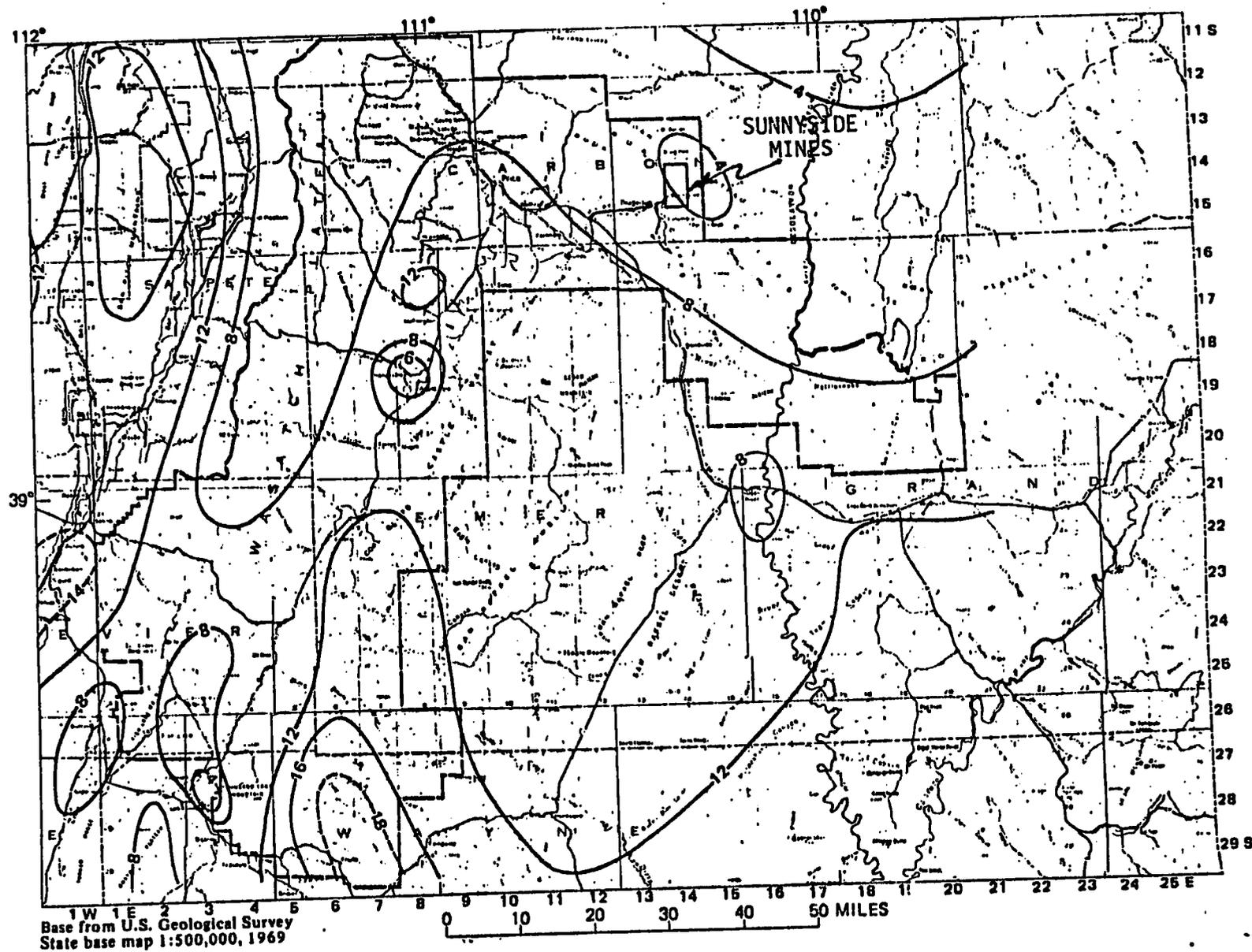


Figure XI-2 Mean minimum temperatures ( $^{\circ}$ F) in January in central Utah.

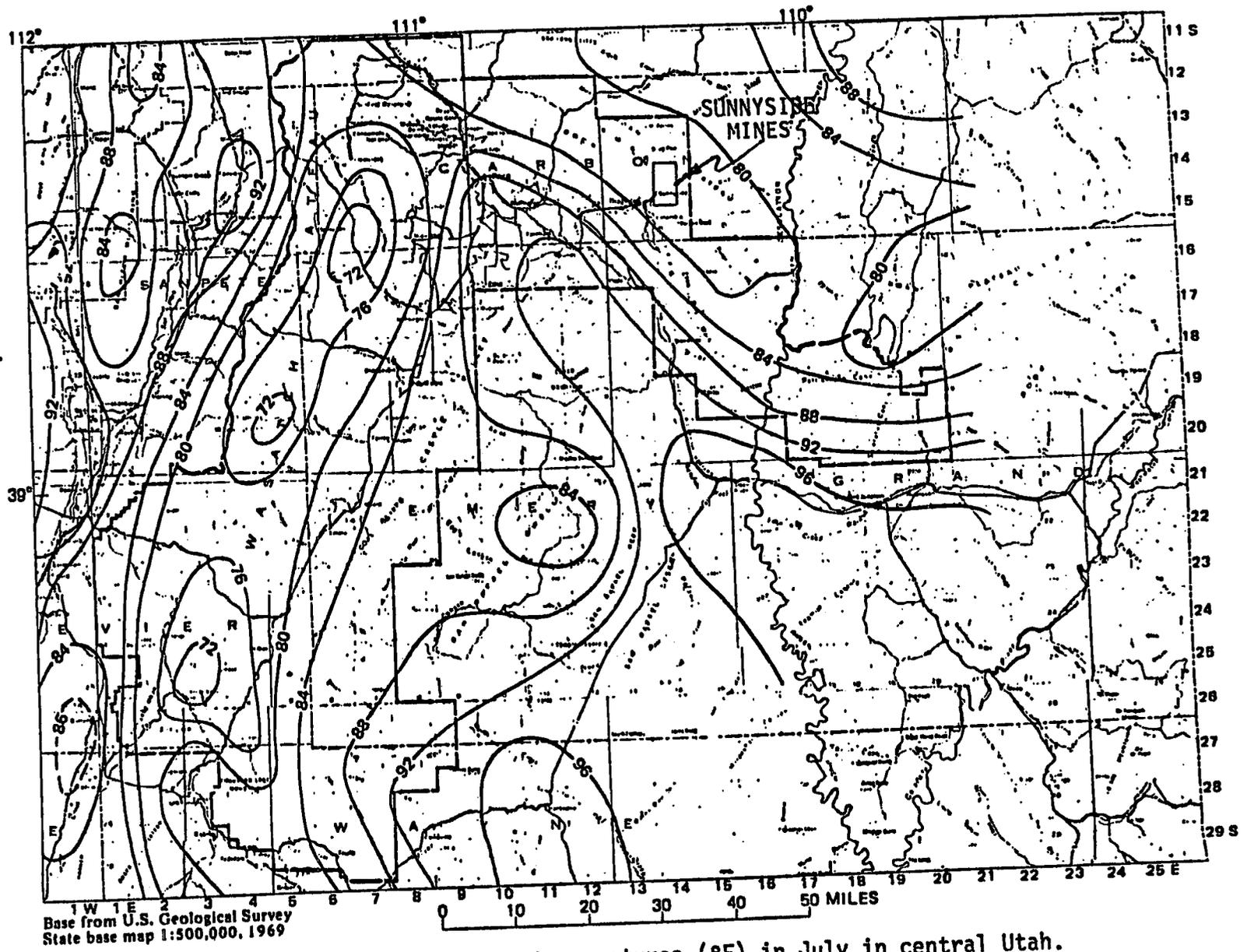


Figure XI-3 Mean maximum temperatures (°F) in July in central Utah.

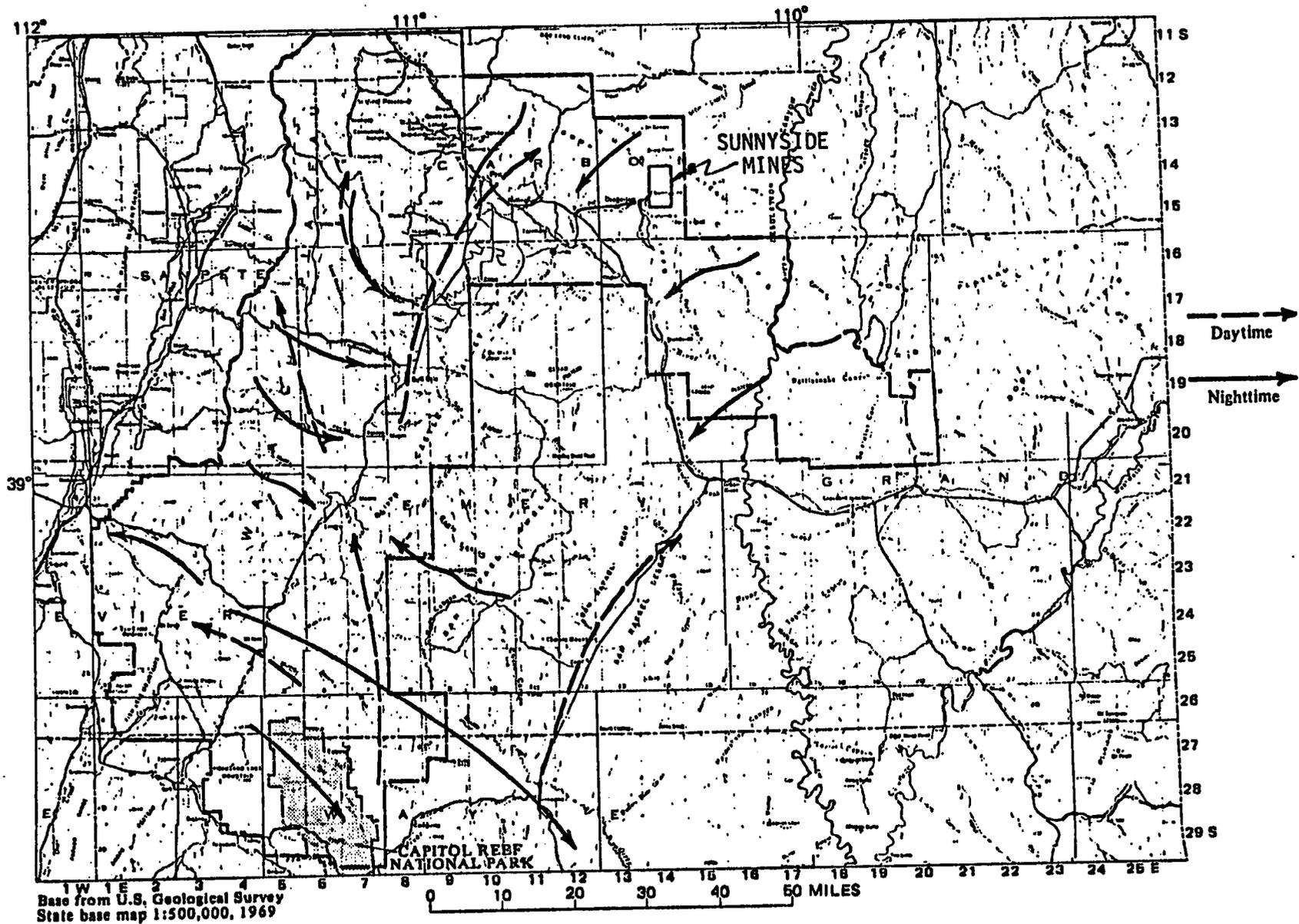
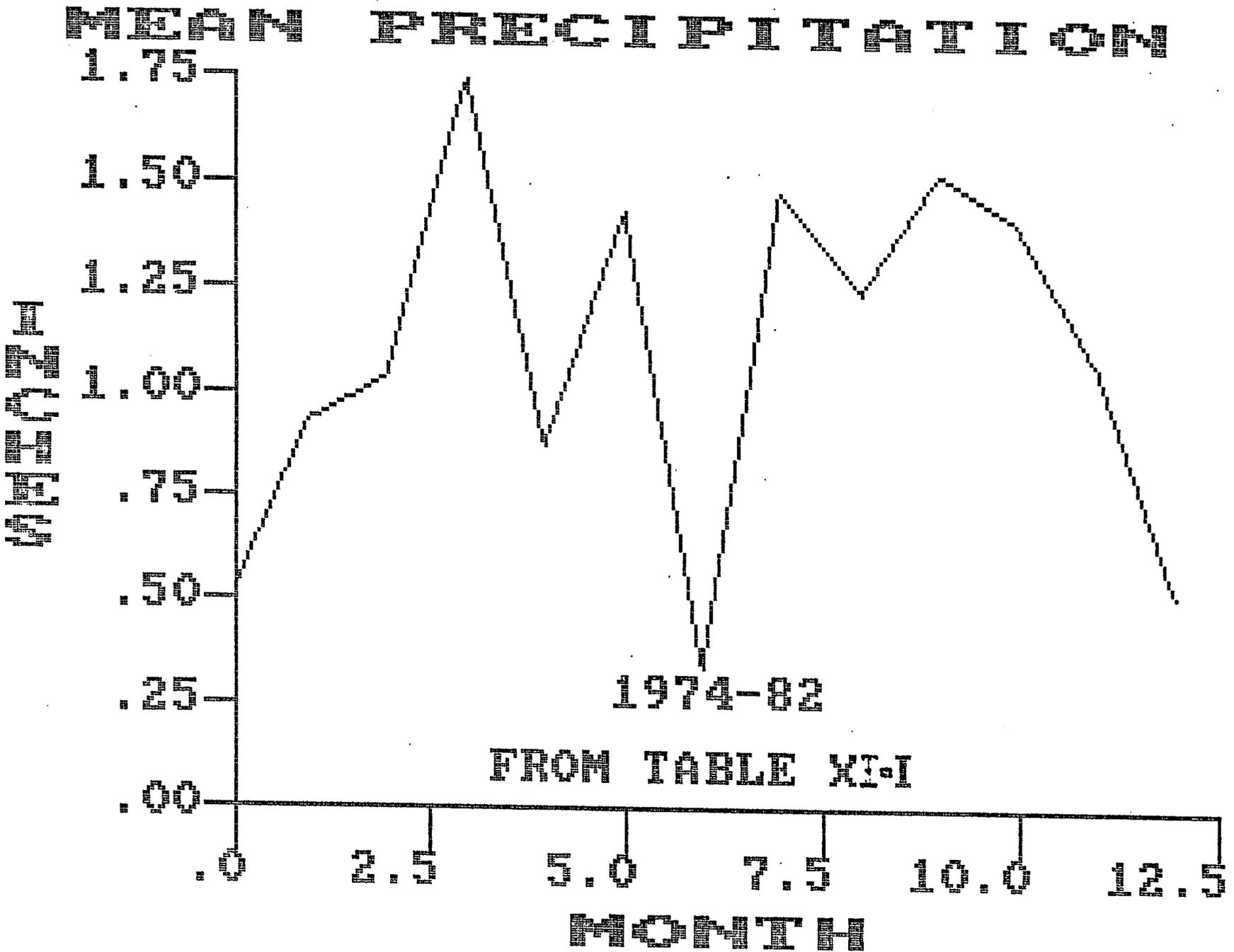


Figure XI-4 Streamlines for nighttime drainage air flow and typical daytime surface flow in central Utah (modified from AeroVironment, 1977).

Figure XI-5. Average monthly Sunnyside precipitation.



Chapter XI

Table XI-1

Precipitation - Sunnyside, Utah NOAA Station (Updated) (Inches)

| Month     | 1974  | 1975  | 1976 | 1977  | 1978  | 1979  | 1980  | 1981  | 1982  |
|-----------|-------|-------|------|-------|-------|-------|-------|-------|-------|
| January   |       | 0.76  | 0.07 | 0.58  | 2.07  | 1.05  | 1.67  | 0.10  | 1.23  |
| February  |       | 0.59  | 1.21 | 0.13  | 1.55  | 0.00  | 4.21  | 0.63  | 0.14  |
| March     |       | 2.22  | 0.75 | 0.06  | 2.80  | 2.90  | 1.25  | 1.55  | 2.46  |
| April     | 0.56  | 0.61  | 2.02 | 0.05  | 1.79  | 0.58  | 0.40  | 1.85  | 0.02  |
| May       | 0.00  | 1.84  | 2.08 | 1.49  | 0.91  | 0.83  | 1.50  | 2.95  | 1.35  |
| June      | 0.04  | 1.44  | 0.10 | 0.50  | 0.17  | 0.00  | 0.00  | 0.33  | 0.66  |
| July      | 2.12  | 3.05  | 0.43 | 2.09  | 0.89  | 0.00  | 2.49  | 1.46  | 0.73  |
| August    | 0.35  | 0.06  | 0.53 | 1.40  | 1.01  | 1.68  | 0.64  | 2.47  | 3.07  |
| September | 0.21  | 0.32  | 1.67 | 0.64  | 0.59  | 0.03  | 3.58  | 2.21  | 4.55  |
| October   | 4.03  | 0.40  | 0.00 | 1.58  | 0.90  | 0.65  | 1.99  | 2.07  | 0.92  |
| November  | 0.82  | 0.51  | 0.00 | 0.67  | 3.95  | 0.10  | 1.08  | 0.46  | 2.07  |
| December  | 0.53  | 0.66  | 0.00 | 0.43  | 1.33  | 0.57  | 0.01  | 0.56  | 0.74  |
| Water     |       |       |      |       |       |       |       |       |       |
| Year      | 16.32 | 10.43 | 6.94 | 14.46 | 13.25 | 17.06 | 16.63 | 18.30 |       |
| Annual    | 8.71  | 12.46 | 8.36 | 9.62  | 17.96 | 8.39  | 18.82 | 15.69 | 17.90 |

Table XI-2

Temperature - Sunnyside, Utah Weather Station (°F)

|                |           | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | AVG. |
|----------------|-----------|------|------|------|------|------|------|------|------|
| JAN            | Avg. High |      | 31   | 34   | 34   | 34   | 21   | 33   | 31   |
|                | Avg. Low  |      | 11   | 12   | 12   | 16   | 6    | 15   | 12   |
|                | Mean      |      | 21   | 23   | 23   | 25   | 14   | 24   |      |
| FEB            | Avg. High |      | 35   | 42   | 45   | 36   | 34   | 38   | 38   |
|                | Avg. Low  |      | 14   | 21   | 20   | 15   | 9    | 19   | 16   |
|                | Mean      |      | 24   | 32   | 32   | 26   | 22   | 28   |      |
| MAR            | Avg. High |      | 42   | 45   | 43   | 48   | 40   | 40   | 43   |
|                | Avg. Low  |      | 21   | 18   | 18   | 27   | 21   | 21   | 21   |
|                | Mean      |      | 32   | 32   | 30   | 37   | 30   | 30   |      |
| APR            | Avg. High | 55   | 47   | 55   | 60   | 53   | 55   | 52   | 54   |
|                | Avg. Low  | 26   | 25   | 31   | 34   | 32   | 29   | 30   | 29   |
|                | Mean      | 41   | 36   | 43   | 47   | 43   | 42   | 41   |      |
| MAY            | Avg. High | 70   | 59   | 67   | 61   | 61   | 64   | 59   | 64   |
|                | Avg. Low  | 40   | 34   | 41   | 38   | 36   | 39   | 36   | 38   |
|                | Mean      | 55   | 46   | 54   | 50   | 48   | 51   | 47   |      |
| JUN            | Avg. High | 83   | 70   | 76   | 82   | 75   | 77   | 77   | 77   |
|                | Avg. Low  | 51   | 43   | 44   | 53   | 47   | 47   | 46   | 48   |
|                | Mean      | 67   | 56   | 60   | 67   | 61   | 62   | 62   |      |
| JUL            | Avg. High | 82   | 83   | 81   | 82   | 83   | 85   | 83   | 83   |
|                | Avg. Low  | 54   | 56   | 53   | 56   | 54   | 54   | 54   | 54   |
|                | Mean      | 68   | 70   | 67   | 69   | 68   | 70   | 68   |      |
| AUG            | Avg. High | 82   | 81   | 80   | 81   | 80   | 78   | 80   | 80   |
|                | Avg. Low  | 51   | 51   | 52   | 55   | 52   | 51   | 50   | 52   |
|                | Mean      | 66   | 66   | 67   | 68   | 66   | 65   | 65   |      |
| SEP            | Avg. High | 73   | 73   | 72   | 73   | 71   | 73   | 71   | 73   |
|                | Avg. Low  | 44   | 45   | 48   | 44   | 44   | 44   | 46   | 45   |
|                | Mean      | 58   | 59   | 60   | 58   | 58   | 58   | 58   |      |
| OCT            | Avg. High | 61   | 60   | 59   | 62   | 64   | 60   | 58   | 61   |
|                | Avg. Low  | 39   | 32   | 33   | 37   | 39   | 33   | 36   | 35   |
|                | Mean      | 50   | 47   | 46   | 49   | 51   | 47   | 47   |      |
| NOV            | Avg. High | 44   | 45   | 50   | 46   | 44   | 36   | 47   | 44   |
|                | Avg. Low  | 25   | 21   | 26   | 25   | 26   | 17   | 27   | 23   |
|                | Mean      | 34   | 33   | 38   | 36   | 35   | 27   | 37   |      |
| DEC            | Avg. High | 33   | 36   | 39   | 39   | 27   | 36   | 45   | 35   |
|                | Avg. Low  | 12   | 16   | 15   | 19   | 9    | 16   | 26   | 14   |
|                | Mean      | 22   | 26   | 27   | 29   | 18   | 26   | 35   |      |
| Yr. Avg. Temp. |           |      | 43   | 43   | 47   | 45   | 43   | 45   |      |
| Temp. Extremes |           |      |      |      |      |      |      |      |      |
| High           |           |      | 89   | 91   | 89   | 92   | 96   | 90   |      |
| Low            |           |      | - 7  | - 4  | - 7  | -12  | -15  | 15   |      |

Chapter XI

Table XI-3

Climatological Summary Price, Utah 1936-1965

| Month     | Temperature (F) |               | Precipitation Totals (Inches) |      |
|-----------|-----------------|---------------|-------------------------------|------|
|           | Daily Maximum   | Daily Minimum | Greatest Daily                | Mean |
| January   | 37.1            | 11.0          | 0.67                          | 0.68 |
| February  | 42.3            | 17.4          | 0.80                          | 0.68 |
| March     | 51.6            | 25.2          | 0.97                          | 0.78 |
| April     | 63.8            | 34.2          | 0.66                          | 0.57 |
| May       | 74.1            | 42.9          | 1.45                          | 0.68 |
| June      | 83.6            | 50.0          | 1.47                          | 0.80 |
| July      | 90.6            | 56.7          | 1.05                          | 0.82 |
| August    | 88.2            | 55.3          | 1.03                          | 1.19 |
| September | 80.0            | 47.2          | 1.67                          | 1.13 |
| October   | 67.6            | 36.6          | 1.75                          | 0.99 |
| November  | 50.5            | 23.7          | 1.97                          | 0.56 |
| December  | 40.6            | 15.9          | 1.07                          | 0.89 |
| Annual    |                 |               |                               | 9.77 |

Table XI-4

Climatological Summary Sunnyside, Utah 1958-1980

| Month     | Temperature (F) |               | Precipitation Totals (Inches) |       |
|-----------|-----------------|---------------|-------------------------------|-------|
|           | Daily Maximum   | Daily Minimum | Greatest Daily                | Mean  |
| January   | 34.3            | 13.1          | 1.46                          | 0.80  |
| February  | 41.3            | 19.3          | 1.63                          | 0.90  |
| March     | 45.4            | 22.1          | 0.85                          | 1.08  |
| April     | 55.0            | 29.7          | 1.09                          | 0.94  |
| May       | 65.7            | 39.6          | 1.10                          | 1.07  |
| June      | 77.6            | 48.4          | 1.60                          | 0.84  |
| July      | 85.5            | 56.3          | 0.89                          | 1.08  |
| August    | 82.7            | 53.6          | 1.20                          | 1.27  |
| September | 73.5            | 45.7          | 1.24                          | 1.34  |
| October   | 60.9            | 35.6          | 1.25                          | 1.26  |
| November  | 47.0            | 24.6          | 0.91                          | 0.76  |
| December  | 37.3            | 16.2          | 0.84                          | 0.64  |
| Annual    |                 |               |                               | 11.98 |

Table XI-5Estimated Normal Months Pan Evaporation Totals

| Month     | Price<br>5500' | Sunnyside<br>6750' | Hiawatha<br>7230' |
|-----------|----------------|--------------------|-------------------|
| January   | 0.8            | 0.7                | 0.6               |
| February  | 1.7            | 1.5                | 1.4               |
| March     | 3.3            | 2.9                | 2.7               |
| April     | 6.0            | 5.2                | 4.9               |
| May       | 9.4            | 8.1                | 7.6               |
| June      | 10.9           | 9.4                | 8.8               |
| July      | 12.3           | 11.1               | 9.9               |
| August    | 10.9           | 9.4                | 8.8               |
| September | 8.2            | 7.1                | 6.6               |
| October   | 5.0            | 4.3                | 4.0               |
| November  | 1.7            | 1.5                | 1.4               |
| December  | 1.0            | 0.9                | 0.8               |
| Annual    | 71.2           | 62.1               | 57.5              |

CHAPTER XII

GEOTECHNICAL INFORMATION

TABLE OF CONTENTS

|   | Page |
|---|------|
| 12.1 Scope                                    | 1    |
| 12.2 Methodology                              | 1    |
| 12.3 Underground mine design                  | 1    |
| 12.3.1 Geotechnical tests and analysis        | 2    |
| 12.3.2 Coal pillar design                     | 2    |
| 12.3.3 Roof span design                       | 2    |
| 12.4 Surface subsidence effects of mining     | 2    |
| 12.5 Stability analysis of earthen structures | 3    |

## CHAPTER XII

### 12.1 Scope

The Sunnyside Mines coal property has been in continuous operation for over eighty years. During that time more than 55 million tons of coal have been produced.

Longwall mining which commenced in 1961 accounts for 65 to 80 percent of the production. Room and pillar mining and development work makes up for the balance.

Decades of experience have enabled the Sunnyside Mines to successfully protect over ten miles of slopes, raises and bleeder entries. Most of the underground operational plans, such as roof control, ventilation, etc., must be submitted to MSHA for approval.

A number of cooperative underground coal mining research projects have been undertaken with the U.S. Bureau of Mines, Geological Survey or the Department of Energy. Much geotechnical information has been gathered by these agencies.

Current and future mining is at depths of 1,200 to 2,500 feet. Damage to structures and diminution of renewable resource lands as a result of surface subsidence is not expected (see Chapter III).

The Whitmore Canyon Dam is the only earthen structure within the permit area. It was designed by Templeton, Linke and Associates of Salt Lake City which has the design data in its files and under the jurisdiction of the Utah State Engineer.

This dam and the associated Grassy Trail Reservoir are expected to remain after completion of mining to continue providing water to the cities of Sunnyside and East Carbon.

### 12.2 Methodology

Underground mine design is based on decades of successful coal mining experience at the Sunnyside Mines.

### 12.3 Underground Mine Design

The property encompasses three separate adjoining mines (see Plate III-4). Main haulage ways and air courses are driven down-dip and development panels are turned off to each side

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## CHAPTER XII

at intervals determined by the the type of mining to be employed.

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Development panels are driven along the strike of the seam and connected to pre-existing bleeders. A barrier pillar is left to protect the bleeder entries and extraction by room-and-pillar or longwall is begun.

### 12.3.1 Geotechnical Tests and Analysis

At the present time, there have not been any compressive coal strength tests conducted by Kaiser Coal Corporation. Future tests on coal samples taken throughout the mine will be available for inspection at the mine site.

A number of research projects have been conducted by the U.S. Geological Survey, the Bureau of Mines and the Department of Energy. The projects have been longwall shield design, single entry development, mountain bump activities, concrete cribs, flexible tailgate liner and methane drainage. Results of these programs are available from the Federal government.

### 12.3.2 Coal Pillar Design

Barrier pillars which are left to protect access haulage and ventilation entries are designed to withstand pressures created when adjacent panels are extracted. Widths of such pillars take into account the amount of overburden, type of overburden, thickness of coal and the pitch of the seam. Pillar widths range from 100 feet in areas of lite cover to 400 feet in areas of heavy cover and poor conditions.

### 12.3.3 Roof Span Design

Entries are normally driven eighteen feet in width so that after rib sloughage the width will not normally exceed twenty feet (see Section 3.3.1.6). Roof control practices are in accordance with MSHA requirements. Plans are updated and submitted to MSHA for approval every six months. These plans cover all active areas of the mine including entry development, room-and-pillar mining, longwall mining and any special situation not covered in previous plans. MSHA inspectors are in the mine daily to monitor compliance with roof control requirements and other regulations.

### 12.4 Surface Subsidence Effect of Mining

See Section 3.4 for surface subsidence effects of mining.

## CHAPTER XII

### 12.5 Stability Analysis of Earthen Structures

The only large earthen structure within the permit area is the Whitmore Canyon Dam (W3). The structure was designed by Templeton, Linke and Associates of Salt Lake City and was constructed by Utah Construction Company. The dam is under the jurisdiction of the State Engineer of Utah. Visual inspections by qualified personnel are made on weekly or shorter intervals as required. Annual inspections are made by the designer.

There are other earthen structures located in the permit area. The designs or stability analysis are found in Appendix

CHAPTER XIII

DESIGNS

TABLE OF CONTENTS

|  | Page |
|--|------|
| 13.1 Data for this chapter have been included<br>in other chapters | 1    |

## CHAPTER XIII

### 13.1 XIII Designs

Detailed designs relative to compliance with performance standards have been covered in the individual chapters. They will not be separately presented in this chapter.

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CHAPTER XIV  
CONSULTATION AND COORDINATION

TABLE OF CONTENTS

|  | Page |
|--|------|
| 14.1 Scope                                 | 1    |
| 14.2 Federal Consultation and Coordination | 1    |
| 14.3 State Consultation and Coordination   | 2    |
| 14.4 Local Consultation and Coordination   | 3    |
| 14.5 Other Consultation and Coordination   | 4    |

CHAPTER XIV

14.1 Scope

In putting together the permit application for the Sunnyside Mines, the primary consultation and coordination has been with the Division of Oil, Gas and Mining.

Additionally, consultation has been made with various Federal, State and County agencies to develop the necessary information.

Private consultants and one State consulting service have been engaged to help with field studies and writeups in areas in which Kaiser Steel does not have in-house expertise.

14.2 Federal Consultation and Coordination

- (a) Office of Surface Mining  
1020 - 15th Street  
Denver, CO 80202

Consultation on sedimentation pond design.

- (b) Bureau of Land Management  
900 North 700 East  
Price, UT 84501

Consultation on land-use and vegetation.

- (c) Soil Conservation Service  
Walker Band Building  
Price, UT 84501

Consultation on soil and vegetation resources.

- (d) Department of Agriculture, Forest Service  
Manti-LaSal Nation Forest  
599 W. Price River Drive  
Price, UT 84501

Consultation on vegetation.

CHAPTER XIV

- (e) National Weather Service  
Salt Lake City, Ut

Consultation on Climatological data.

- (f) Information or publications were also obtained from other Federal agencies including:

Mine Health and Safety Administration (MSHA)  
Environmental Protection Agency (EPA)  
Fish and Wildlife Service  
Bureau of Mines  
Geological Survey  
Department of Energy

14.3 State Consultation and Coordination

- (a) Division of Oil, Gas and Mining (DOG M)  
4241 State Office Building  
Salt Lake City, UT 84111

Consultation and coordination on general guidelines, fish and wildlife, vegetation, etc.

- (b) Division of Wildlife Resources  
445 West Railroad Avenue  
Price, UT 84501

Consultation on fish and wildlife resources.

- (c) State Forester  
Prison Road  
Draper, UT 84020

Consultation on vegetation resources.

- (d) Utah State Historic Preservation Office  
300 Rio Grande  
Salt Lake City, UT 84101

Consultation on historical and cultural resources.

CHAPTER XIV

- (e) Division of State History  
Consulting Services Branch, Antiquities Section  
300 Rio Grande  
Salt Lake City, UT 84101

Historical and cultural resources survey.

- (f) State Engineer  
231 East 400 South  
Salt Lake City, UT 84102

Information on water rights and jurisdiction on Whitmore Canyon Dam.

- (g) Utah State Department of Health  
Bureau of Air Quality  
Salt Lake City, UT

Consultation on air quality.

- (h) Utah State University  
Soils Laboratory  
Logan, ut 84322

Consultation on soils analysis.

14.4 Local Consultation and Coordination

- (a) Carbon County Recorder  
Court House Building  
Price, UT 84501

Surface and coal rights ownership.

- (b) Carbon County Surveyor  
Court House Building  
Price, UT 84501

Zoning ordinances.

CHAPTER XIV

14.5 Other Consultation and Coordination

- (a) Dr. Robert N. Winget  
Director, Aquatic Ecology Laboratory  
Brigham Young University  
Provo, UT 84602

Aquatic resource study.

- (b) Curt Jansen, Consulting Ecologist  
1130 McHugh Street  
Fort Collins, CO 80524

Compilation of Fish and Wildlife Resources chapter.

- (c) John T. Boyd Company  
Mining and Geological Engineers  
1860 Lincoln Street  
Denver, CO 80295

Revised the permit application for completeness and clarity,  
and assembled all the copies of the original permit.

CHAPTER XV

RESOURCE RECOVERY AND PROTECTION PLAN

TABLE OF CONTENTS

|   | Page |
|---|------|
| 15.1 (abridged) Resource recovery and protection plan | 1    |

JUN 12 1985

CHAPTER XV

15.1 Resource Recovery and Protection Plan  
(abridged)

DIVISION OF OIL  
GAS & MINING

A resource recovery and protection plan has been formulated for Federal coal leases held by Kaiser Coal Corporation's Sunnyside Mines in Sunnyside, Utah per CFR 211.10 (b). Format for the plan is a cross reference stating the applicable regulation and the location of the the material required by the regulation. The material required (unless confidential) will be in this document (RRPP), the Sunnyside Permit Application (SPA) or the Apparent Completeness Review (ACR). Material in the RRPP has been taken from the Mining Order Number One report, MSHA roof control plans, MSHA ventilation plans and other original sources.

Information in the resource recovery and protection plan on reserves, mining plans and lands needed for future expansion is considered confidential by Kaiser Coal Corporation. The full text of the RRPP has been submitted to the Bureau of Land Management (BLM) to comply with CFR 211.10 (b). Appendix I, Mining Order Number One and Appendix II, Maximum Economic Recovery and drawings not in the permit application are not included in this submission because they contain reserve data and other confidential information. Information not included will be indicated with an asterisk (\*).

211.10 (b)(1) Names, addresses, and telephone numbers of persons responsible for operations under the plan to whom notices and orders are to be delivered; names and addresses of operators /lessees; lease serial numbers; license serial numbers, if appropriate; and names and addresses of surface and subsurface coal or other mineral owners of record, if other than the United States.

|                         |  |
|-------------------------|--|
| Operators/lessees       | ACR, Book 1, Chapter II, UMC 782.13(a) (1-6)   |
| Lease Numbers           | SPA, Volume I, Chapter II, Section -<br>2.4(a) (1-5)<br>ACR, Book 1, Chapter II, Plate II-2<br>ACR, Book 1, Chapter II, Figure II-2,<br>Public Notice<br>SPA, Volume I, Chapter IV, Section -<br>4.3.2.2 |
| Surface Owners<br>II-1; | ACR, Book 1, Chapter II, Plate<br>ACR, Book 3, Chapter IV, UMC 783.22  |

CHAPTER XV

MSHA I.D. Numbers                      ACR, Book 1, Chapter II, UMC 782,19(8)

211.10 (b)(2) A general description of geologic conditions and mineral resources, with appropriate maps, within the area where mining is to be conducted.

Geologic Description                      SPA, Volume II, Chapter VI, Sections 6.1-6.5.1  
SPA, Volume II, Chapter VI, Plate VI-1,2,3  
SPA, Volume II, Chapter VI, Figures VI-2 and Table VI-1  
ACR, Book 4, Chapter VI, UMC 784.14(a)(2)-  
UMC 784.14(a)(2)(ii)  
ACR, Book 4, Chapter VI, Figures VI-1,2,3,4  
and 5

211.10 (b)(3)(i) Sufficient coal analysis to determine the quality of the minable reserve base in terms including, but not limited to, BTU content on an as-received basis, ash, moisture, sulphur, volatile matter, and fixed carbon content.

Coal Analysis                                      SPA, Volume II, Chapter VI, Section 6.5.4  
ACR, Book 2, Chapter III, Plate III-4  
General Mining Order Number 1 in Appendix I\*

211.10 (b)(3)(ii) The methods of mining and/or variation of methods, basic mining equipment and mining factors including, but not limited to, mining sequence, production rate, estimated recovery factors, stripping ratios, highwall limits, and number of acres to be affected.

Methods of Mining                                      SPA, Volume I, Chapter III, Section 3.3.1.3  
SPA, Volume I, Chapter III, Section 3.3.1.4

Equipment    SPA, Volume I, Chapter III, Section 3.3.4

Sequence and Rate                                      RRPP, Drawing B5-0050\*

CHAPTER XV

Recovery Factors SPA, Volume I, Chapter III, Section 3.3.3.1  
Surface Disturbance ACR, Book 1, Chapter III, Table III-24

211.10 (b)(3)(iii) An estimate of the coal reserve base, minable reserve base, and recoverable coal reserves for each Federal lease included in the resource recovery and protection plan. If the resource recovery and protection plan covers an LMU, recoverable coal reserves will also be reported for the non-Federal lands included in the resource recovery and protection plan.

Coal Reserves General Mining Order Number 1 in Appendix I\*  
RRPP, Drawing B5-0051 and B5-0052\*

211.10 (b)(3)(iv) The method of abandonment of operations proposed to protect that unmined recoverable coal reserves and other resources.

Abandonment ACR, Book 1, Chapter III, Appendix VI, Section 3.5.3  
ACR, Book 3, Plate III-18

Protection SPA, Volume I, Chapter III, Sections 3.3.2.1-3.3.2.4  
RRPP, Appendix II\*

211.10 (b)(4)(i) A plan map of the area to be mined showing the following:

- (A) Federal lease boundaries and serial numbers;
- (B) LUM boundaries, if applicable;
- (C) Surface improvements, and surface ownership and boundaries;
- (D) Coal outcrop showing dips and strikes; and,
- (E) Locations of existing and abandoned surface and underground mines.

Boundaries RRPP, Drawings B5-0051 and B5-0052\*

Improvements ACR, Book 2, Chapter III, Plates III-1, III-2 and III-3

CHAPTER XV

Ownership ACR, Book 1, Chapter II, Plates II-1 and II-2

Outcrops ACR, Book 2, Chapter III, Plate III-4

Locations of Mines RRPP, Drawing B5-0050\*  
211.10 (b)(4)(ii) Isopach maps of each coal bed to be mined and overburden and interburden.

Isopachs RRPP, Drawings B5-0054 and B5-0055\*

Overburden RRPP, Drawing B5-0051\*

Interburden RRPP, Drawing B5-0056\*

211.10 (b)(4)(iii) Typical structure cross sections showing all coal contained in the coal reserve base.

Cross Section ACR, Book 4, Chapter VI, Figure VI-4  
General Mining Order Number 1 in Appendix I\*

211.10 (b)(4)(v) General layout of proposed underground mine showing:

- (A) Planned sequence of mining by year for the first 5 years, thereafter in 5-year increments for the remainder of mine life;
- (B) Locations of shafts, slopes, main development entries and barrier pillars, panel development, bleeder entries, and permanent barrier pillars;
- (C) Locations of areas where pillars will be left and an explanation why these pillars will not be mined;
- (D) A sketch of a typical entry system for main development and panel development entries showing centerline distances between entries and crosscuts;
- (E) A sketch of typical panel recovery (e.g., room and pillar, longwall, or other mining method) showing, by numbering such mining, the sequence of development and retreat.

Sequence RRPP, Drawing B5-0050\*

Mine Map RRPP, Drawing B5-0050\*  
ACR, Book 2, Chapter III, Plate III-3

CHAPTER XV

|                    |  |
|--------------------|--|
| First Mining Areas | RRPP, Drawing B5-0050*   |
| Development System | RRPP, Drawings A5-0019A, A5-0018A*<br>RRPP, Drawings A5-0062, A5-0063, A5-0064 |
| Recovery System    | RRPP, Drawing A5-0004, A5-0021, A5-0091,<br>A5-0092 and A5-0016*               |

211.10 (b)(5) A general reclamation schedule for the life of the mine. This should not be construed as meaning duplication of a permit application in a permit application package under SMCRA. The resource recovery and protection plan may cross reference, as appropriate, a permit application submitted under SMCRA to fulfill this requirement.

|                      |   |
|----------------------|---|
| Reclamation Schedule | ACR, Book 1, Chapter III, Appendix<br>III-6 |
|----------------------|---|

211.10 (b)(7) Explanation of how MER of the Federal coal will be achieved for the Federal coal leases included in the resource recovery and protection plan. If a coal bed, or portion thereof, is not to be mined or is to be rendered unminable by the operation, the operator/lessee shall submit appropriate justification to the District Mining Supervisor for approval.

|     |                    |
|-----|--------------------|
| MER | RRPP, Appendix II* |
|-----|--------------------|

## CHAPTER X

### 10.6 Fish and Wildlife Monitoring

The water quality of Grassy Trail Creek will be monitored during the life of the mine. Corrective measures will be undertaken if parameters exceed limits set in National Standards if the cause is due to mining activity.

No other active monitoring programs are planned at this time.

|  |    |
|--|----|
| areas and revegetation   | 26 |
| 3.4.6 Protection of fish and wildlife                                      | 26 |
| 3.4.6.1 Protected impacts of mining on<br>fish and wildlife                | 26 |
| 3.4.6.2 Mitigating measures to be employed<br>to protect fish and wildlife | 27 |
| 3.4.7 Protection of air quality  | 27 |
| 3.4.7.1 Projected impacts of mining<br>on air quality                      | 27 |
| 3.4.7.2 Mitigating measures to be employed<br>to control air pollutants    | 27 |
| 3.4.7.3 Air quality monitoring plan  | 27 |
| 3.4.8 Subsidence   | 28 |
| 3.4.9 Waste disposal plans   | 31 |
| 3.4.9.1 Projected impacts of disposal<br>areas on the environment          | 31 |
| 3.4.9.2 Control measures to mitigate impacts                               | 32 |
| 3.5.1 Reclamation plan   | 33 |
| 3.5.1.1 Contemporaneous reclamation  | 33 |
| 3.5.1.2 Soil removal and storage   | 35 |
| 3.5.2 Final abandonment  | 38 |
| 3.5.3.1 Sealing of mine openings   | 38 |
| 3.5.3.2 Removal of surface structures                                      | 38 |
| 3.5.3.3 Disposition of dams, ponds and<br>diversions                       | 39 |
| 3.5.4 Backfilling and grading plans  | 40 |
| 3.4.5.1 Recontouring   | 40 |
| 3.4.5.2 Removal or reduction of highwalls                                  | 41 |
| 3.5.4.3 Terracing and erosion control                                      | 41 |

|         |  |     |
|---------|--|-----|
| 3.5.4.4 | Soil distribution and stabilization  | 42  |
| 3.5.5   | Revegetation plan  | 43  |
| 3.5.5.1 | Soil preparation   | 44  |
| 3.5.5.2 | Seeding and transplanting  | 44  |
| 3.5.5.3 | Mulching   | 46  |
| 3.5.5.4 | Management   | 46  |
| 3.5.5.5 | Monitoring   | 47  |
| 3.5.6   | Schedule of reclamation  | 47  |
| 3.5.6.1 | Detailed timetable   | 47  |
| 3.5.7   | Cost estimate for reclamation  | 48  |
| 3.5.7.1 | Cost estimate of each step of reclamation  | 50  |
| 3.5.7.2 | Statistical methodology  | 63  |
| 3.5.7.3 | Forecast of performance bond liability during permit term and forecast of liability for the life of the mine | 65  |
| 3.6     | Bibliography   | 66  |
| 3.7     | Pictures   | 70  |
|         | List of Exhibits   | 103 |

## CHAPTER IV

### LAND STATUS, LAND-USE AND POST-MINING LAND-USE

#### TABLE OF CONTENTS

|   | Page |
|---|------|
| 4.1 Scope   | 1    |
| 4.2 Methodology                                   | 1    |
| 4.3 Land Status                                   | 2    |
| 4.3.1 Surface Land Status/Mine Plan Area          | 2    |
| 4.3.1.1 Ownership                                 | 2    |
| 4.3.1.2 Surface Managing Authorities              | 2    |
| 4.3.1.3 Utility Corridors and Other Rights-of-Way | 2    |
| 4.3.1.4 Special Use Permits and Leases            | 3    |
| 4.3.2 Mineral Ownership/Mine Plan Area            | 3    |
| 4.3.2.1 Coal Ownership and Mines                  | 3    |
| 4.3.2.2 Coal Leases                               | 3    |
| 4.3.2.3 Mineral Ownership, Mines and Wells        | 3    |
| 4.4 Land-Use                                      | 3    |
| 4.4.1 Regional Land-Use                           | 3    |
| 4.4.2 Land-use in Mine Plan Area                  | 4    |
| 4.4.3 Land-use During Operations                  | 4    |
| 4.5 Post-mining Land-use                          | 5    |
| 4.6 Socioeconomic Considerations                  | 5    |
| 4.7 Bibliography                                  | 6    |
| List of Exhibits                                  | 7    |

## CHAPTER VI

### GEOLOGY

#### TABLE OF CONTENTS

|  | Page |
|--|------|
| 6.1 Scope  | 1    |
| 6.2 Methodology  | 1    |
| 6.3 Regional geologic framework  | 2    |
| 6.4 Geology of project vicinity  | 3    |
| 6.4.1 Stratigraphy   | 3    |
| 6.4.2 Structure  | 4    |
| 6.4.3 Coal geology   | 5    |
| 6.5 Geology of coal bed and adjustment                                   | 10   |
| 6.5.1 Exploration  | 10   |
| 6.5.2 Geology  | 10   |
| 6.5.3 Adjacent units   | 11   |
| 6.5.3.1 Rock characteristics, acid-toxic,<br>pyrite, clay and alkalinity | 12   |
| 6.5.4 Coal quality   | 13   |
| 6.6 Geologic effect of mining  | 13   |
| 6.6.1 Mining hazards   | 13   |
| 6.6.2 Surface hazards  | 14   |
| 6.6.3 Impacts of mining  | 14   |
| 6.6.3.1 Subsurface water   | 14   |
| 6.6.3.2 Toxic wastes   | 14   |
| 6.6.3.3 Subsidence   | 14   |
| 6.7 Bibliography   | 16   |

List of Exhibits

18

## CHAPTER VII

### GROUND HYDROLOGY

#### TABLE OF CONTENTS

|   | Page |
|---|------|
| 7.1 Ground hydrology                                    | 1    |
| 7.1.1 Methodology                                       | 1    |
| 7.2.1 Existing groundwater resources                    | 1    |
| 7.1.2.2 Permit area groundwater hydrology               | 2    |
| 7.1.3 Groundwater development and mine dewatering       | 6    |
| 7.1.3.1 Water supply                                    | 6    |
| 7.1.4 Effects of mining operation on groundwater        | 8    |
| 7.5.1 Mitigation and control plan                       | 9    |
| 7.1.6 Groundwater monitoring plan                       | 10   |
| 7.2 Surface water hydrology                             | 10   |
| 7.2.0 Scope   | 10   |
| 7.2.1 Methodology                                       | 11   |
| 7.2.2 Existing surface water resources                  | 12   |
| 7.2.2.1 Regional surface water hydrology                | 12   |
| 7.2.2.2 Mine plan area surface water hydrology          | 13   |
| 7.2.3 Surface water development, control and diversions | 17   |
| 7.2.3.1 Water supply                                    | 17   |
| 7.2.3.2 Sedimentation control structures and diversions | 18   |
| 7.2.4 Effect of mining on surface water                 | 19   |
| 7.2.5 Mitigation and control plans                      | 20   |

|       |                                     |    |
|-------|-------------------------------------|----|
| 7.2.6 | Monitoring plan                     | 21 |
| 7.3   | Alluvial valley floor determination | 21 |
| 7.4   | Bibliography                        | 24 |

CHAPTER IX  
VEGETATION RESOURCES

TABLE OF CONTENTS

|  | Page |
|--|------|
| 9.1 Scope  | 1    |
| 9.2 Methodology  | 1    |
| 9.3 Existing resources                                     | 4    |
| 9.3.1 General site description                             | 4    |
| 9.3.2 Vegetation types                                     | 4    |
| 9.3.2.1 Cover data   | 5    |
| 9.3.2.2 Production data                                    | 5    |
| 9.3.2.3 Tree data  | 5    |
| 9.3.2.4 General description                                | 5    |
| 9.3.2.5 Species list                                       | 5    |
| 9.3.2.6 Total acres in mine plan area                      | 5    |
| 9.3.2.7 Total acres of vegetation types<br>to be disturbed | 6    |
| 9.3.2.8 Reference area supporting data                     | 6    |
| 9.4 Threatened and endangered species                      | 7    |
| 9.5 Effects of mining operation on vegetation              | 7    |
| 9.6 Mitigation and management                              | 7    |
| 9.6.1 Mitigation   | 7    |
| 9.7 Revegetation methods and justification                 | 8    |
| 9.8 Revegetation monitoring                                | 11   |
| 9.9 Bibliography   | 12   |
| List of Exhibits   | 15   |

## CHAPTER VIII

### SOIL RESOURCES

#### TABLE OF CONTENTS

|  | Page |
|--|------|
| 8.1 Scope  | 1    |
| 8.2 Methodology  | 1    |
| 8.3 Soil resource information of mine plan area  | 1    |
| 8.3.1 Soils identification   | 1    |
| 8.3.2 Soils description  | 2    |
| 8.3.3 Present and potential productivity<br>of existing soils                              | 2    |
| 8.4 Prime farmland investigation and<br>determination                                      | 2    |
| 8.5 Physical and chemical properties of soils<br>and results of analyses, tests and trials | 2    |
| 8.6 Use of selected overburden materials<br>or substitutes                                 | 3    |
| 8.7 Plans for removal, storage and<br>protection of soils                                  | 5    |
| 8.8 Plans for redistribution of soils  | 6    |
| 8.9 Nutrients and soil amendments  | 6    |
| 8.10 Effects of mining operations on soils,<br>nutrients and soil amendments to be used    | 7    |
| 8.11 Mitigation and control plans  | 7    |
| 8.12 Bibliography  | 8    |
| List of Exhibits   | 10   |

CHAPTER X

FISH AND WILDLIFE RESOURCES

TABLE OF CONTENTS

|   | Page |
|---|------|
| 10.1 Scope  | 1    |
| 10.2 Methodology                                      | 1    |
| 10.3 Existing fish and wildlife resources             | 2    |
| 10.3.1 Wildlife habitats in mine plan area            | 2    |
| 10.3.2 Wildlife                                       | 3    |
| 10.3.2.1 Aquatics                                     | 5    |
| 10.3.2.2 Mammals                                      | 6    |
| 10.3.2.3 Birds  | 9    |
| 10.3.2.4 Reptiles                                     | 10   |
| 10.3.3 Species of special interest                    | 11   |
| 10.3.3.1 Threatened and endangered species            | 11   |
| 10.3.3.2 Raptors                                      | 11   |
| 10.4 Effects of mining operation on fish and wildlife | 12   |
| 10.5 Mitigation and management plan                   | 13   |
| 10.6 Fish and wildlife monitoring                     | 14   |
| 10.7 Bibliography                                     | 16   |
| List of Exhibits                                      | 18   |

CHAPTER XI  
CLIMATOLOGY AND AIR QUALITY

TABLE OF CONTENTS

|  | Page |
|--|------|
| 11.1 Scope                                       | 1    |
| 11.2 Methodology                                 | 1    |
| 11.3 Existing environment                        | 1    |
| 11.3.1 Precipitation                             | 1    |
| 11.3.2 Temperature                               | 2    |
| 11.3.3 Evaporation                               | 3    |
| 11.3.4 Relative humidity                         | 3    |
| 11.3.5 Wind                                      | 3    |
| 11.4 Effects of mining operations on air quality | 4    |
| 11.5 Climatological and air quality monitoring   | 5    |
| 11.6 Bibliography                                | 6    |
| List of Exhibits                                 | 7    |

CHAPTER XII

GEOTECHNICAL INFORMATION

TABLE OF CONTENTS

|   | Page |
|---|------|
| 12.1 Scope                                    | 1    |
| 12.2 Methodology                              | 1    |
| 12.3 Underground mine design                  | 1    |
| 12.3.1 Geotechnical tests and analysis        | 2    |
| 12.3.2 Coal pillar design                     | 2    |
| 12.3.3 Roof span design                       | 2    |
| 12.4 Surface subsidence effects of mining     | 2    |
| 12.5 Stability analysis of earthen structures | 3    |

CHAPTER XIII

DESIGNS

TABLE OF CONTENTS

|  | Page |
|--|------|
| 13.1 Data for this chapter have been included<br>in other chapters | 1    |

CHAPTER XIV

CONSULTTION AND COORDINATION

TABLE OF CONTENTS

|  | Page |
|--|------|
| 14.1 Scope                                 | 1    |
| 14.2 Federal Consultation and Coordination | 1    |
| 14.3 State Consultation and Coordination   | 2    |
| 14.4 Local Consultation and Coordination   | 3    |
| 14.5 Other Consultation                    | 4    |

CHAPTER XV

RESOURCE RECOVERY AND PROTECTION PLAN

TABLE OF CONTENTS

|   | Page |
|---|------|
| 15.1 (abridged) Resource recovery and protection plan | 1    |

CHAPTER XVI  
B-CANYON REVISION  
 TABLE OF CONTENTS

|   | <u>PAGE NO.</u> |
|---|-----------------|
| LIST OF TABLES, MAPS, AND EXHIBITS.....                                   | iii             |
| INTRODUCTION.....   | 1               |
| Document Description.....   | 1               |
| Urgency.....  | 1               |
| Document Organization.....  | 2               |
| Document Scope.....   | 3               |
| Description of Revision Area and Operations.....                          | 4               |
| Summary of Environmental Impacts.....                                     | 6               |
| UMC 771.25 PERMIT FEES.....   | 8               |
| UMC 771.27 VERIFICATION OF APPLICATION.....                               | 9               |
| UMC 782.16 RELATIONSHIP TO AREAS DESIGNATED UNSUITABLE<br>FOR MINING..... | 10              |
| UMC 782.21 NEWSPAPER ADVERTISEMENT AND PROOF OF<br>PUBLICATION.....       | 11              |
| UMC 783.14 GEOLOGY DESCRIPTION.....                                       | 12              |
| UMC 783.15 GROUND WATER INFORMATION.....                                  | 13              |
| UMC 783.16 SURFACE WATER INFORMATION.....                                 | 21              |
| UMC 783.19 VEGETATION INFORMATION.....                                    | 22              |
| UMC 783.20 FISH AND WILDLIFE RESOURCES INFORMATION.....                   | 23              |
| UMC 783.22 LAND-USE INFORMATION.....                                      | 24              |
| UMC 783.27 PRIME FARMLAND INVESTIGATION.....                              | 25              |
| UMC 784.14 RECLAMATION PLAN: PROTECTION OF<br>HYDROLOGIC BALANCE.....     | 26              |
| UMC 784.20 SUBSIDENCE CONTROL PLAN.....                                   | 27              |
| UMC 784.21 FISH AND WILDLIFE PLAN.....                                    | 28              |
| UMC 784.24 TRANSPORTATION FACILITIES.....                                 | 29              |
| Belt Loading Station.....   | 29              |
| Conveyor Belts.....   | 29              |
| Conveyor Drives.....  | 30              |
| Transfer Points.....  | 30              |

*revised*  
9/13/88

CHAPTER XVI  
TABLE OF CONTENTS

|             |   | <u>PAGE NO.</u> |
|-------------|---|-----------------|
| UMC 784.25  | RETURN OF COAL PROCESSING WASTE TO<br>ABANDONED UNDERGROUND WORKINGS.....                   | 32              |
| UMC 817.41  | HYDROLOGIC BALANCE: GENERAL REQUIREMENTS...   | 33              |
| UMC 817.48  | HYDROLOGIC BALANCE: ACID-FORMING AND<br>TOXIC-FORMING MATERIALS.....                        | 34              |
| UMC 817.50  | HYDROLOGIC BALANCE: UNDERGROUND MINE ENTRY<br>AND ACCESS DISCHARGES.....                    | 35              |
| UMC 817.52  | HYDROLOGIC BALANCE: SURFACE AND GROUND<br>WATER MONITORING.....                             | 36              |
| UMC 817.59  | COAL RECOVERY.....  | 37              |
| UMC 817.71  | DISPOSAL OF EXCESS SPOIL AND UNDERGROUND<br>DEVELOPMENT WASTE:<br>GENERAL REQUIREMENTS..... | 38              |
| UMC 817.88  | COAL PROCESSING WASTE: RETURN TO<br>UNDERGROUND WORKINGS.....                               | 39              |
| UMC 817.97  | PROTECTION OF FISH, WILDLIFE, AND RELATED<br>ENVIRONMENTAL VALUES.....                      | 40              |
| UMC 817.121 | SUBSIDENCE CONTROL: GENERAL REQUIREMENT....   | 41              |
| UMC 817.122 | SUBSIDENCE CONTROL: PUBLIC NOTICE.....  | 42              |
| UMC 817.124 | SUBSIDENCE CONTROL: SURFACE OWNER<br>PROTECTION.....  | 43              |
| UMC 817.126 | SUBSIDENCE CONTROL: BUFFER ZONES.....   | 44              |

CHAPTER X  
FISH AND WILDLIFE RESOURCES

TABLE OF CONTENTS

|   | Page |
|---|------|
| 10.1 Scope  | 1    |
| 10.2 Methodology                                      | 1    |
| 10.3 Existing fish and wildlife resources             | 2    |
| 10.3.1 Wildlife habitats in mine plan area            | 2    |
| 10.3.2 Wildlife                                       | 3    |
| 10.3.2.1 Aquatics                                     | 5    |
| 10.3.2.2 Mammals                                      | 6    |
| 10.3.2.3 Birds  | 9    |
| 10.3.2.4 Reptiles                                     | 10   |
| 10.3.3 Species of special interest                    | 11   |
| 10.3.3.1 Threatened and endangered species            | 11   |
| 10.3.3.2 Raptors                                      | 11   |
| 10.4 Effects of mining operation on fish and wildlife | 12   |
| 10.5 Mitigation and management plan                   | 13   |
| 10.6 Fish and wildlife monitoring                     | 15   |
| 10.7 Bibliography                                     | 16   |
| List of Exhibits                                      | 18   |

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JUN 12 1985

DIVISION OF OIL  
GAS & MINING

CHAPTER X

10.1 Scope

Kaiser Coal's Sunnyside Mines has been in continuous operation for over eighty years. During the course of operation, approximately 244 acres (1.7 percent of the 14,475 acre permit area) was disturbed.

The focus of this chapter is the existing wildlife resources within the permit boundary, wildlife affected or potentially affected by the mining operations, and mitigation/management plans.

10.2 Methodology

The existence of Sunnyside Mines predates 30 CFR, 741 and the performance standards of 30 CFR, 817.97, the regulations pertaining to mining permits and wildlife information respectively. Thus, there are no pre-mine baseline data available for the permit area. Impact assessment is therefore subjective. Impacts to wildlife populations began eighty years ago with the first mining operations in Whitmore Canyon. Since that time, the welfare of wildlife has varied with changing climatic, seral, economic, social and technical conditions. The populations in and near the permit area have survived these changing conditions and are adapted to the present environment. Inventory type studies would provide data on status of these populations, but in view of the fact that no disturbance is planned during the five year permit period, the value of such studies is questionable. The goal of Sunnyside's wildlife program is to conserve wildlife through sound management techniques and monitoring methods. A recent aquatic study (Winget 1980) is the only information relevant to existing wildlife resources (aquatic fauna) within the permit boundary.

The purpose of the aquatic study was to collect adequate data to: 1) describe the condition of aquatic resources in Grassy Trail Creek; and 2) provide the baseline for preparing a management plan for said resources.

Aquatic macroinvertebrates were collected with a modified Surber sampler on three dates from selected stations above and below suspected impact points (see Figure VII-2, Chapter VII-Hydrology). Sediment sizes, chemical composition and water quality were determined for each stream section. Comparisons between physical/chemical measurements and aquatic macroinvertebrate community condition were used to indicate environmental impacts on aquatic resources.

## CHAPTER X

The information sources for the discussion of other wildlife resources are publications of the Utah Division of Wildlife Resources (UDWR), Final Environmental Statement, Development of Coal Resources in Central Utah, Department of the Interior, and UDWR report submitted to Kaiser on November 15, 1979 (see Appendix X-1).

### 10.3 Existing Fish and Wildlife Resources

Wildlife is a rather broadly defined term that includes many vertebrate as well as invertebrate species. For practical and economic reasons, it becomes necessary to concentrate on the most "important" species, which can be identified by using a predetermined set of criteria. The UDWR has defined high interest wildlife as 1) all game species, 2) any economically important species, 3) any species of special aesthetic, scientific or educational significance, and 4) all federally listed threatened or endangered species. Unless otherwise noted, the wildlife discussed in the following sections have been classified as high interest.

#### 10.3.1 Wildlife Habitats in Mine Plan Area

The habitats of major concern are those of high interest species. Because most terrestrial species use a variety of habitats during a lifetime, the discussion will begin with a general description of habitats found on the permit area.

The long axis of the permit area follows Whitmore Canyon in a northwest-southeast orientation (Plate X-1). Whitmore Canyon is flanked by West Ridge to the west and Patmos Ridge to the east. Elevations along the east-west section boundaries defined by the southern boundary of Section 29, R14E, T14S, are: Whitmore Canyon - 7000 feet, West Ridge - 8600 feet, Patmos Ridge - 9800 feet.

Vegetation types in the canyon bottom include riparian/cottonwood grove, riparian/willow, riparian-bulrush/sedge, and sagebrush/grass (see the vegetation Sections 9.3.2 and 9.3.2.5 for a description of vegetation types and scientific names of plants respectively).

The exposed south and west aspect slopes are dominated by xeric vegetation. The vegetation types are classified as: mountain brush, pinyon-juniper (PJ), PJ/grass. PJ/mountain brush, PJ/sagebrush

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CHAPTER X

DIVISION OF OIL  
GAS & MINING

and sagebrush/grass. The vegetation types found on the more protected north and east aspect slopes are classified as Douglas fir, Douglas fir/aspens, Douglas fir/mountain brush, Douglas fir/PJ and aspens. The sagebrush/grass vegetation type covers the exposed ridge tops.

A unique habitat is the rim-rock cliffs along the eastern boundary of the permit area at about 8200 feet elevation. The rock ledges are sites for raptor eyries and nests of other birds. The caves and crevasses provide roosting sites for bats. Cliff habitat is indicated on Plate X-1.

Grassy Trail Reservoir and Grassy Trail Creek in Whitmore Canyon (Plate X-1) are habitats for numerous aquatic species. The rainbow trout (see Table X-1 in the Appendix for scientific names) and brown trout are high interest species that inhabit the creek and reservoir respectively. The associated riparian zones provide habitats for many other species.

The UDWR has developed a classification system for habitat based primarily on two criteria, 1) the dependency of one or more species of wildlife on a habitat (The UDWR uses the phrase "wildlife use area") and 2) the amount of habitat available. The values from high dependency, limited habitat to low dependency, unlimited habitat are: crucial-critical, high-priority, substantial value, and limited value. The corresponding aquatic habitat value system is crucial-critical - Class 1 or 2, high-priority - Class 3, substantial value - Class 4 and limited value - Class 5 or 6.

Areas within the permit boundary have been designated by UDWR as high-priority for high interest species. Mule deer are most stressed during winter months when forage availability is low, thus winter habitat is high-priority. Winter habitat for deer is shown on Plate X-1.

High interest species whose habitat requirements are found on the permit area are listed in Table X-1.

### 10.3.2 Wildlife

The permit area for Kaiser Coal's Sunnyside Mine project encompasses a portion of the West Tavaputs Plateau in Carbon County, Utah. According to the UDWR (1978) 356 vertebrate species inhabit this region. The total is comprised of 13 fish, 5 amphibians, 14 reptiles, 244 birds and 80 mammals.

JUN 12 1985

## CHAPTER X

DIVISION OF OIL  
GAS & MINING

Many of the species that potentially occur on the permit area have some or all of the habitat requirements in the riparian zones associated with drainage bottoms, seeps, springs, wetlands and flood plains. In the permit area, the canyon bottomlands provide most of the riparian habitats and are most productive in terms of herbage produced and wildlife use. Historically, the bottomlands have also been the areas preferred for human land use activity.

In addition to mining, the major land use activities have been grazing, recreation and water development (Grassy Trail Reservoir). Forage available for grazing on the permit area is limited because of the steep canyon slopes. Therefore, grazing occurs primarily in the canyon bottoms. A plan was designed to protect bottomlands from overgrazing and to stimulate production by a rest-rotation grazing system.

This plan is presently being reviewed by the Soil Conservation Service and will be submitted to the Division for approval when it becomes available.

Presently, Kaiser Coal Corporation leases grazing rights to four operators who have 200-250 cattle on the permit area. Don Andrews, range conservationist with the Soil Conservation Service, conducted a range survey and his observation was "that the range was being properly used and there wasn't any signs of over stocking as of August 17, 1983" (SCS 1983).

Reseeded areas will be protected from livestock grazing by fencing. Fence specifications are height of top wire not more than forty inches and spacing of other wires at 16, 22 and 30 inches (J. Yoakum and W.P. Dasmann. 1969. Habitat management practices In Wildlife Management Techniques, ed. Robert H. Giles, Jr. The Wildlife Society, Washington, D.C. 623 pp). The forty inch height is easily jumped by deer and the spacing between wires prohibits twisting on legs.

New 5-year lease periods are proposed to allow more flexibility for grazing management. During the lease period operators and forage condition will be monitored for compliance with lease terms.

Low stocking rates and fence control are management techniques that will maintain forage production at optimum levels for the benefit of livestock and wildlife.

A rodeo arena is located in riparian habitat in Section 29, R14E, T14S. Recreational use of the arena is limited to warm weather months. Another recreational activity that occurs in the riparian habitat in Whitmore Canyon is a "put and take"

## CHAPTER X

fishery discussed in the following section.

Post-mining land use will continue to be wildlife, grazing, recreation and culinary water use in Grassy Trail Reservoir. The sites disturbed by mining activity will be reclaimed to wildlife and grazing uses.

### 10.3.2.1 Aquatics

The UDWR has stocked Grassy Trail Reservoir and Grassy Trail Creek with brown trout and rainbow trout respectively. Brown trout were stocked to control a nuisance population of tiger salamanders and the UDWR (1979) has reported success.

The brown and rainbow trouts are exotic game species that are of high interest to Utah. According to Larry Dalton, WDWR game biologist, (personal communication) rainbow trout are reproducing in the stream below Whitmore Reservoir. A section of the stream was sampled in 1983 and again in 1984 and the density average was 120 and 200 fish per mile of stream. Fishing in Grassy Trail Reservoir is presently prohibited because the water is used for culinary purposes.

The tiger salamander is a year long resident of the permit area. Grassy trail reservoir and Grassy Trail Creek are used as breeding and larva habitat during the period March - September. Riparian habitat along Grassy Trail Creek is used by the adult life form.

A three mile segment of Grassy Trail Creek below the reservoir (Plate X-1) is designated a Class 3 fishery (significant value) by the UDWR. The rainbow trout fishery is sustained on a put and take basis during seasons of adequate water flow. The remainder of Grassy Trail Creek and all other streams on the permit area have a limited value for sport fisheries and have been designated as Class 5 or Class 6. Class 6 streams are dewatered during portions of the year.

Aquatic macroinvertebrates were the organisms studied in the aquatic resource analysis of Grassy Trail Creek. According to Winget (1980), aquatic macroinvertebrates are generally much more susceptible to water-borne toxicants and other environmental stresses than are fish and other higher animals and for this reason they are excellent indicators of water resource condition.

Because the study was designed to address the potential impacts of mining activity on the aquatic environment of the Creek, the results are discussed in section 10.4.

## CHAPTER X

### 10.3.2.2 Mammals

There are seventeen high interest species listed in Table X-1 that potentially occur on the permit area. The total is comprised of three small game, six furbearers, four big game, one endangered, and three with none of the above classifications.

The permit area is year-round habitat for cottontail rabbits and snowshoe hare. Generally, 7000 feet is an elevational boundary with mountain cottontail preferring habitats above and desert cottontail preferring habitats below. The habitat requirements of the snowshoe hare are provided by the spruce-fir vegetation type. The population trends of the cottontails are stable while the trend of snowshoe hare is cyclic.

There are six beaver dams on Grassy Trail Creek in the Left Fork of Whitmore Canyon above the reservoir (Plate X-1). One beaver dam was observed in Water Canyon. Some of the dams appear in an active state of repair. Habitats of the other furbears occur on the permit area, but population densities are unknown. According to the UDWR (1978), the population trends of the beaver and striped skunk are increasing while that of mink is unknown and those of the furbears are stable.

The permit area is part of deer herd unit 27B - Range Creek. Herd unit 27B occupies the east half of Carbon County, part of the north side of Emery County, and the south side of Duchesne County for a total land area of 1,169,408 acres (Utah State Department of Fish and Game 1967). Whitmore Canyon is on the south side of the unit.

Unit 27B was included in range inventory investigations conducted in 1966 by the UDWR (then the Utah State Department of Fish and Game) to determine winter distribution patterns, range condition information and land ownership status. The distribution pattern observed was summer range on the West Tavaputs Plateau in the center of the unit and winter range at lower outlying elevations. The unit is 19 percent summer range and 49 percent winter range, during severe winters the range decreases to 31 percent. The permit area is in the Pinyon-Juniper-Mountain Brush-Grass vegetation type which comprises 34 percent of the normal winter range and 42 percent of the severe winter range (Utah State Department of Fish and Game 1967). The optimum winter range population of deer in unit 27B is 29,885 (Table X-2).

On the permit area, deer summer range is on West Ridge, Patmos Ridge and high country to the north and east. Winter

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DIVISION OF OIL  
GAS & MINING

CHAPTER X

range is at lower elevations than summer range (Plate X-1). With severe winters deer move down into Whitmore Canyon and west off West Ridge to the adjacent flat, P-J country.

According to UDWR, winter ranges are inhabited between November 1 and May 15 each year, depending on weather conditions. Snow accumulation at high elevations force deer to habitat where energy costs of thermoregulation are low. Whitmore Canyon and pediment slopes east of the permit area are considered winter range (Wildlife Map, Plate X-1). Climatological information provided in section 783.18 (Chapter XI) supports this statement. Records at the Sunnyside NOAA weather station located at the engineering building, elevation 1982, (6500 feet), show the greatest mean daily snow accumulation, 10.2 (4.01 inches), occurring in January. This is far below the reported 46 cm (1.5 feet) accumulation which precludes use of the range by deer (Gilbert et al., 1970; Hosely, 1956).

The chained areas on the pediment slopes east of the permit area have had a serious impact on wintering deer. Chaining was conducted by the Bureau of Land Management (BLM) using two caterpillar tractors pulling a 41 kg (90 pound) link chain between them. Two areas, Mud Springs, No. 88 and Mud Springs, No. 10 were chained in 1966. No. 88 was 778 ha (1922 acres) and No. 10 was 685 ha (1962 acres). Both areas were seeded with crested wheatgrass (Agropyron cristatum), fourwing saltbus (Atriplex canescens), and alfalfa (Medicago sativa). According to David Mills, wildlife biologist with the BLM (personal communication 18 August 1983), the chaining was a negative impact for the following fifteen years because no cover was left for escape or thermoregulation. Vegetation is now providing suitable cover and deer utilization is increasing. Data from pellet transect established in the chained areas in 1976 show that winter deer use from 1976-77 to 1979-80 has trended upwards (UDWR 1980).

Published data are available on big game management unit. The permit area is approximately 1 percent of unit 27B and it may not be representative of the unit in terms of deer density. However, for the purposes of this discussion, it is assumed that data published on unit 27B is more representative of the permit area than data published on any other herd unit.

The health of a deer herd is largely dependent on the quality of habitat relative to animal density (carry capacity). An approximation of the status of 27B can be discerned by comparing selected data of certain management units (Table X-3). Unit 27A adjoins 27B, unit 19 had a high buck harvest, success ratio and above average fawn doe ratio, unit 30B had a low buck harvest and has a comparatively small deer range and unit 29B has a comparatively large deer range. A comparison of these data

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JUN 12 1985

CHAPTER X

DIVISION OF OIL  
GAS & MINING

requires that all variables relative to the hunt be held equal, i.e. weather conditions, hunter access to unit, hunter distribution on unit, etc.

Fawns per 100 does are an indicator of herd health. The Density Index (DI) as used here is an indicator of carrying capacity. The carrying capacity is proportional to the DI value. The log of the range area was used to make the index more sensitive to hunter success. The most productive unit, 19, also has the highest DI. Unit 27A was the least productive and has the lowest DI. The second lowest DI was unit 27B, which would indicate that the region has a relatively low carrying capacity for deer.

Since 1976, both the hunter success and the fawn/100 doe ratio have declined in unit 27B, although the latter ratio was lower in 1978 than 1979 (UDWR 1980a).

The nearest elk management unit is the Book Cliffs-Unit 21, which is 40 miles east of the permit area. This unit has a low population of elk and considerable forage availability. The UDWR recognized the opportunity for herd expansion and released 50 animals during the winter of 1979-80. An additional 50 animals are to be released during the 1980-81 winter period (UDWR 1980b).

Although the permit area contains habitat suitable for elk, no elk have been observed there is potential for elk in the Book Cliff herd to expand their range to the permit area, but this would take many years and favorable conditions.

The cougar received protection as a game animal on February 15, 1967. Harvest data has been reported by deer management units and unit 27B ranks fourth with a total harvest of 51 animals for the years 1972 to 1979 (UDWR 1980c). This indicates that the permit area probably contains habitat suitable for cougars and than cougars may be present.

The black bear received protection as a game animal at the same time as the cougar. The total harvest reported by the UDWR (1980d) for the years 1969-79, also for deer management unit 27B, was 25 animals, the third highest reported. It is also probable that there is suitable black bear habitat and some animals on the permit area.

The muskrat, kit fox, and bobcat are other high interest species that could occur on the permit area. Because of the lack of suitable habitat, the kit fox is the least likely to be found. The endangered black-footed ferret is discussed in Section 10.3.3.1.

## CHAPTER X

### 10.3.2.3 Birds

Of the 244 bird species that potentially occur in the region, 51 are high interest species with preferred habitat on the permit area. The 51 are comprised of 29 species of migratory game birds, 13 raptors, 5 small game (upland birds) and 4 migratory birds of high federal interest. Eight of the raptors are also of high federal interest. The 51 species are listed and classified in Table X-1.

The 29 species of migratory game birds are comprised of 27 waterfowl, the American Coot, and the Mourning Dove. Grassy Trail Reservoir provides habitat for waterfowl and American Coot. The lack of agriculture land in the vicinity precludes use by geese or dabbling ducks on a yearlong basis.

Mourning Doves nest in pinyon-juniper and riparian habitats near water sources. These components are found in any canyon bottomland on the permit area. Hunting of Mourning Doves occurs on a very limited basis.

Five species of small game bird species are listed as occurring on the permit area, however probability of occurrence varies because of availability of key habitat components. Blue Grouse utilize Douglas fir habitat types during winter months. During spring and summer months they migrate to sagebrush, pinyon-juniper or shrubland habitat.

Ruffed Grouse generally prefer habitat within 0.25 miles of water. Aspen forests are important during winter months, because staminate buds are a food source.

The occurrence of California Quail is marginal while sage grouse are improbable. Chukar prefer open, rocky areas associated with desert scrub or shrubland habitats but have been observed at the mouth of Slaughter Canyon and near the refuse dump. Sage grouse require open expanses of low growth-form sage brush for leks. These habitat characteristics are generally lacking on the permit area.

The Great Blue Heron, Long-billed Curlew, Black Swift and Western Bluebird are migratory birds of high federal interest. According to UDWR, there are no rookeries of the Great Blue Heron due to the absence of preferred nesting habitat. However, Grassy Trail Reservoir is feeding habitat so Heron are occasional visitors.

Long-billed Curlews prefer grasslands as breeding habitat and thus would probably not be found on the permit area. Grassy

## CHAPTER X

Trail Reservoir provides feeding habitat during migrations.

The Black Swift is a summer resident of West Tavaputs Plateau. Cliffs and tallus slopes are preferred habitat, but nesting is usually associated with moist ledged or crevices near or behind waterfalls. No nesting habitat occurs on the permit area.

The Western Bluebird is an uncommon summer resident of the region. It is a cavity nester with no particular preference for habitat type. Any cavity trees on the permit area is potential nesting habitat.

### 10.3.2.4 Reptiles

The Utah milk snake is a yearlong resident of the permit area. Riparian habitat found along Grassy Trail Creek and side canyon bottomlands are preferred habitat. The milk snake is furtive due to its nocturnal habitats. No milk snakes or their dens have been observed on the permit area.

## CHAPTER X

### 10.3.3 Species of Special Significance

#### 10.3.3.1 Threatened and Endangered Species

**Mammals:** The black-footed ferret is on the Federal List of Endangered and Threatened Wildlife and Plants (50 CFR 1711). There is a strong association of ferrets with prairie dog towns because the prairie dog is a primary prey species and its burrows are used as ferret dens.

A potential range of the ferret is the pediment slopes southwest of the permit area (Hinkley 1970, Scott et al. 1977, both cited in USDI 1979). Two whitetailed prairie dog towns are known to occur on the permit area, section 6 (R14E, T15S) in the southwest corner (Plate X-1). The town on the southwest-southeast quarter section boundary is in an abandoned cemetery and contains ten active burrows. No ferrets or ferret sign have been observed, but only reconnaissance surveys have been conducted. The nearest probable ferret sighting was about two miles northwest of Woodside on Highway 6, about eighteen miles south of the permit area (Scott et al. 1977, cited in USDI 1979). The date of this sighting is not known.

A recent unconfirmed sighting of a black-footed ferret is documented in Carbon County, eastern 1/2 section 10, T15S, R13E, according to Phil Garcia, conservation office, Utah Division of Wildlife Resources on 02-10-80.

The applicant will notify the Division of any future occurrence of threatened or endangered species or golden eagles on the permit area.

#### 10.3.3.2 Raptors

Raptors are considered species of special significance because of their rareness and because they are indicators of toxicants in the environment. The permit area contains nesting and/or hunting habitat of thirteen raptors. The bald eagle and peregrine falcon are on the Federal List of Endangered and Threatened Wildlife and Plants (50 CFR 17.11).

The permit area is considered winter range of bald eagles (UDWR 1979). Food supply is probably the most critical feature of the biology of wintering bald eagles (Steenhof 1978). The feeding habitats vary with the season and region; eagles in the Great Basin rely mostly on avian and mammalian carrion (Murphy 1975, cited by Steenhof 1978). Eagles prefer fish (including fish carrion) when it is available.

## CHAPTER X

Roost trees are an important part of bald eagle habitat. There are no known roost trees on the permit area. The nearest roost tree observed by Boner et al. (1977, cited in USDI 1979) was three miles southwest of Mounds, which is about seventeen miles southwest of the permit area.

The peregrine has been sighted in the region, but no active eyries have been identified (USDI 1979). The sighting nearest the permit area was about two miles north of Mounds (Boner et al. 1977, cited in USDI 1979). The peregrine usually lives in open country around rock cliffs overlooking or at least within one mile of streams or rivers; an abundance of birds for food supply must be within hunting range.

The burrowing owl is a raptor that has special nesting requirements. They commonly use prairie dog burrows as nest sites. The prairie dog towns on the permit area will not be disturbed without consultation with DOGM and UDWR.

### 10.4 Effects of Mining Operation on Fish and Wildlife

Development of Sunnyside Mines has resulted in the disturbance of approximately 287.36 acres (see Section 9.3.2.7 for a breakdown of vegetation types). Disturbed areas are indicated on Plate III-1. The construction and present mine use of roads and bridges causes sedimentation of Grassy Trail Creek. The species that have been potentially impacted by mine development and continued operation are listed in Table X-1. The list includes 9 fish, 4 amphibians, 12 reptiles, 63 birds and 33 mammals. Although each species listed was potentially affected, the number of species actually affected is probably a small percentage of the total, because of the relatively small area disturbed.

The ongoing mining operations have altered the environments of local aquatic and terrestrial faunal communities. Impacts of operations include noise pollution, air pollution, vehicular collisions of roads, and sedimentation of Grassy Trail Creek.

The results of aquatic resource analysis study (Winget 1980) show that water quality in Grassy Trail Creek above the mine discharge is adequate for most aquatic species, except for questionable levels of nickel, zinc and oil and grease. Water quality below the mine discharge shows considerable degradation: increases in conductivity, TDS, alkalinity, chloride, nitrate, phosphate, sulfate, sodium and oil and grease. There was an increase in sediment fines proceeding downstream; however, there was no evidence of toxicity type impacts chemical analyses

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## CHAPTER X

nor biological community investigations provided any data that indicated a heavy metal problem in Grassy Trail Creek (see Section 7.2.4).

Generally, there was very little biotic community difference between Stations UPGTR, GTC-02; Station GTC-AP showed moderate impact related changes, caused more by physical stress than chemical; Station GTC-03 showed severe stress reactions with indications of both physical and chemical stresses; and Station GTC-05 community exhibited similar responses as at Station GTC-03 but with evidence of limited recovery (see Figure VII-2). Fine sediments and oil and grease were apparently the major factors affecting Grassy Trail Creek.

It should be pointed out that mine waters contribute greater than 90 percent of total stream flow. Without mine water, Grassy Trail Creek would be near intermittent part of the year during most years.

### 10.5 Mitigation and Management Plans

Some impacts of the construction and operation of the ventilation fans are unavoidable. Where possible, mitigations will be achieved by minimizing these impacts and after the impacts, restoration to pre-impact conditions.

Dozing will be restricted to the minimum amount necessary for the shaft sites, power transmission lines and road upgrading. Upgrading the roads will be carried out according to current road building standards.

All disturbed sites no longer needed for mining operations are being reclaimed according to current reclamation standards. The reclamation techniques and seed mixtures used are designed to achieve a post-mining land use of wildlife and grazing. The Sunnyside topography consists of steep canyon slopes and undulating bottomlands. Revegetation of small areas in this rugged topography will create natural, scattered plant groupings which will optimize edge effects. No special plant groupings are planned for small acreages. Reforestation will occur by natural succession and shrubs will be broadcast or drill seeded.

All revegetated areas will create induced and/or inherent edges. Induced edges are a result of various adjacent successional stages of the same community. Inherent edges occur where two different communities meet, e.g., where mountain brush on a slope abuts sage/grass vegetation on a valley floor. On the largest areas of disturbance, a mosaic of induced edges will

## CHAPTER X

develop where revegetated areas adjoin non-mined areas and older reclaimed areas planted with crested wheatgrass.

The potential for optimizing the edge effect through vegetation groupings at Sunnyside is limited. The amount of edge is determined by length, width and configuration. Although boundaries of many disturbed areas are long, they are also very regular and narrow, thus restricting the potential to create more edge. Additionally, because most areas are small in size, habitat richness and variation of configuration is restricted (Thomas et al, 1979). The value to wildlife of plant species being used for reclamation is discussed in Section 9.7.

For the most part, Sunnyside Mine operations have developed without consideration of potential impacts on wildlife. However, impacts on wildlife have been avoided during the course of operations even though wildlife may not have been the motivation. For example, during the early stages of operations, when mining was under lower cover near Grassy Trail Creek, pillars were left to protect surface structures and streams (Section 3.3.2.2 for further discussion of subsidence see Sections 3.4.8 and 6.6.3.3).

The ongoing operations have altered the environments of local aquatic and terrestrial faunal communities. Unless problems arise, the environments will continue in their altered state until mining operations cease.

The riparian habitat along Grassy Trail Creek is a primary concern for wildlife protection. During the course of mine development, facilities were constructed within 100 feet of the stream. Most of the construction occurred at the mine site in Section 32 (Plate X-1). The riparian habitat that remains is marked with buffer zone sign (4) posted between the upper mine entrance to a point below the lower mine workings (SW1/4 Section 32).

Water discharged into Grassy Trail Creek must meet NPDES effluent criteria. Different water quality parameters are being monitored on a monthly, quarterly and semi-annual basis at six check points along the creek (Chapter VII, Permit Application).

All mine employees will receive the UDWR wildlife educational program during annual refresher safety training. The program consists of slides and a tape explaining wildlife value and how the individual can help protect wildlife resources.

The applicant will avoid the use of persistent pesticides in the permit area during underground coal mining and reclamation activities unless approved by the Division.

|  |    |
|--|----|
| areas and revegetation   | 26 |
| 3.4.6 Protection of fish and wildlife                                      | 26 |
| 3.4.6.1 Protected impacts of mining on<br>fish and wildlife                | 26 |
| 3.4.6.2 Mitigating measures to be employed<br>to protect fish and wildlife | 27 |
| 3.4.7 Protection of air quality  | 27 |
| 3.4.7.1 Projected impacts of mining<br>on air quality                      | 27 |
| 3.4.7.2 Mitigating measures to be employed<br>to control air pollutants    | 27 |
| 3.4.7.3 Air quality monitoring plan  | 27 |
| 3.4.8 Subsidence   | 28 |
| 3.4.9 Waste disposal plans   | 31 |
| 3.4.9.1 Projected impacts of disposal<br>areas on the environment          | 31 |
| 3.4.9.2 Control measures to mitigate impacts                               | 32 |
| 3.5.1 Reclamation plan   | 33 |
| 3.5.1.1 Contemporaneous reclamation  | 33 |
| 3.5.1.2 Soil removal and storage   | 35 |
| 3.5.2 Final abandonment  | 38 |
| 3.5.3.1 Sealing of mine openings   | 38 |
| 3.5.3.2 Removal of surface structures                                      | 38 |
| 3.5.3.3 Disposition of dams, ponds and<br>diversions                       | 39 |
| 3.5.4 Backfilling and grading plans  | 40 |
| 3.4.5.1 Recontouring   | 40 |
| 3.4.5.2 Removal or reduction of highwalls                                  | 41 |
| 3.5.4.3 Terracing and erosion control                                      | 41 |

|         |   |     |
|---------|---|-----|
| 3.5.4.4 | Soil distribution and stabilization   | 42  |
| 3.5.5   | Revegetation plan   | 43  |
| 3.5.5.1 | Soil preparation  | 44  |
| 3.5.5.2 | Seeding and transplanting   | 44  |
| 3.5.5.3 | Mulching  | 46  |
| 3.5.5.4 | Management  | 46  |
| 3.5.5.5 | Monitoring  | 47  |
| 3.5.6   | Schedule of reclamation   | 47  |
| 3.5.6.1 | Detailed timetable  | 47  |
| 3.5.7   | Cost estimate for reclamation   | 48  |
| 3.5.7.1 | Cost estimate of each step of<br>reclamation  | 50  |
| 3.5.7.2 | Statistical methodology   | 63  |
| 3.5.7.3 | Forecast of performance bond<br>liability during permit term and<br>forecast of liability for the life<br>of the mine | 65  |
| 3.6     | Bibliography  | 66  |
| 3.7     | Pictures  | 70  |
|         | List of Exhibits  | 103 |

## CHAPTER IV

### LAND STATUS, LAND-USE AND POST-MINING LAND-USE

#### TABLE OF CONTENTS

|   | Page |
|---|------|
| 4.1 Scope   | 1    |
| 4.2 Methodology                                   | 1    |
| 4.3 Land Status                                   | 2    |
| 4.3.1 Surface Land Status/Mine Plan Area          | 2    |
| 4.3.1.1 Ownership                                 | 2    |
| 4.3.1.2 Surface Managing Authorities              | 2    |
| 4.3.1.3 Utility Corridors and Other Rights-of-Way | 2    |
| 4.3.1.4 Special Use Permits and Leases            | 3    |
| 4.3.2 Mineral Ownership/Mine Plan Area            | 3    |
| 4.3.2.1 Coal Ownership and Mines                  | 3    |
| 4.3.2.2 Coal Leases                               | 3    |
| 4.3.2.3 Mineral Ownership, Mines and Wells        | 3    |
| 4.4 Land-Use                                      | 3    |
| 4.4.1 Regional Land-Use                           | 3    |
| 4.4.2 Land-use in Mine Plan Area                  | 4    |
| 4.4.3 Land-use During Operations                  | 4    |
| 4.5 Post-mining Land-use                          | 5    |
| 4.6 Socioeconomic Considerations                  | 5    |
| 4.7 Bibliography                                  | 6    |
| List of Exhibits                                  | 7    |

## CHAPTER VI

### GEOLOGY

#### TABLE OF CONTENTS

|  | Page |
|--|------|
| 6.1 Scope  | 1    |
| 6.2 Methodology  | 1    |
| 6.3 Regional geologic framework  | 2    |
| 6.4 Geology of project vicinity  | 3    |
| 6.4.1 Stratigraphy   | 3    |
| 6.4.2 Structure  | 4    |
| 6.4.3 Coal geology   | 5    |
| 6.5 Geology of coal bed and adjustment                                   | 10   |
| 6.5.1 Exploration  | 10   |
| 6.5.2 Geology  | 10   |
| 6.5.3 Adjacent units   | 11   |
| 6.5.3.1 Rock characteristics, acid-toxic,<br>pyrite, clay and alkalinity | 12   |
| 6.5.4 Coal quality   | 13   |
| 6.6 Geologic effect of mining  | 13   |
| 6.6.1 Mining hazards   | 13   |
| 6.6.2 Surface hazards  | 14   |
| 6.6.3 Impacts of mining  | 14   |
| 6.6.3.1 Subsurface water   | 14   |
| 6.6.3.2 Toxic wastes   | 14   |
| 6.6.3.3 Subsidence   | 14   |
| 6.7 Bibliography   | 16   |

List of Exhibits

18

## CHAPTER VII

### GROUND HYDROLOGY

#### TABLE OF CONTENTS

|   | Page |
|---|------|
| 7.1 Ground hydrology                                    | 1    |
| 7.1.1 Methodology                                       | 1    |
| 7.2.1 Existing groundwater resources                    | 1    |
| 7.1.2.2 Permit area groundwater hydrology               | 2    |
| 7.1.3 Groundwater development and mine dewatering       | 6    |
| 7.1.3.1 Water supply                                    | 6    |
| 7.1.4 Effects of mining operation on groundwater        | 8    |
| 7.5.1 Mitigation and control plan                       | 9    |
| 7.1.6 Groundwater monitoring plan                       | 10   |
| 7.2 Surface water hydrology                             | 10   |
| 7.2.0 Scope   | 10   |
| 7.2.1 Methodology                                       | 11   |
| 7.2.2 Existing surface water resources                  | 12   |
| 7.2.2.1 Regional surface water hydrology                | 12   |
| 7.2.2.2 Mine plan area surface water hydrology          | 13   |
| 7.2.3 Surface water development, control and diversions | 17   |
| 7.2.3.1 Water supply                                    | 17   |
| 7.2.3.2 Sedimentation control structures and diversions | 18   |
| 7.2.4 Effect of mining on surface water                 | 19   |
| 7.2.5 Mitigation and control plans                      | 20   |

|       |                                     |    |
|-------|-------------------------------------|----|
| 7.2.6 | Monitoring plan                     | 21 |
| 7.3   | Alluvial valley floor determination | 21 |
| 7.4   | Bibliography                        | 24 |

CHAPTER IX  
VEGETATION RESOURCES

TABLE OF CONTENTS

|  | Page |
|--|------|
| 9.1 Scope  | 1    |
| 9.2 Methodology  | 1    |
| 9.3 Existing resources                                     | 4    |
| 9.3.1 General site description                             | 4    |
| 9.3.2 Vegetation types                                     | 4    |
| 9.3.2.1 Cover data   | 5    |
| 9.3.2.2 Production data                                    | 5    |
| 9.3.2.3 Tree data  | 5    |
| 9.3.2.4 General description                                | 5    |
| 9.3.2.5 Species list                                       | 5    |
| 9.3.2.6 Total acres in mine plan area                      | 5    |
| 9.3.2.7 Total acres of vegetation types<br>to be disturbed | 6    |
| 9.3.2.8 Reference area supporting data                     | 6    |
| 9.4 Threatened and endangered species                      | 7    |
| 9.5 Effects of mining operation on vegetation              | 7    |
| 9.6 Mitigation and management                              | 7    |
| 9.6.1 Mitigation   | 7    |
| 9.7 Revegetation methods and justification                 | 8    |
| 9.8 Revegetation monitoring                                | 11   |
| 9.9 Bibliography   | 12   |
| List of Exhibits   | 15   |

## CHAPTER VIII

### SOIL RESOURCES

#### TABLE OF CONTENTS

|  | Page |
|--|------|
| 8.1 Scope  | 1    |
| 8.2 Methodology  | 1    |
| 8.3 Soil resource information of mine plan area  | 1    |
| 8.3.1 Soils identification   | 1    |
| 8.3.2 Soils description  | 2    |
| 8.3.3 Present and potential productivity<br>of existing soils                              | 2    |
| 8.4 Prime farmland investigation and<br>determination                                      | 2    |
| 8.5 Physical and chemical properties of soils<br>and results of analyses, tests and trials | 2    |
| 8.6 Use of selected overburden materials<br>or substitutes                                 | 3    |
| 8.7 Plans for removal, storage and<br>protection of soils                                  | 5    |
| 8.8 Plans for redistribution of soils  | 6    |
| 8.9 Nutrients and soil amendments  | 6    |
| 8.10 Effects of mining operations on soils,<br>nutrients and soil amendments to be used    | 7    |
| 8.11 Mitigation and control plans  | 7    |
| 8.12 Bibliography  | 8    |
| List of Exhibits   | 10   |

CHAPTER X

FISH AND WILDLIFE RESOURCES

TABLE OF CONTENTS

|   | Page |
|---|------|
| 10.1 Scope  | 1    |
| 10.2 Methodology                                      | 1    |
| 10.3 Existing fish and wildlife resources             | 2    |
| 10.3.1 Wildlife habitats in mine plan area            | 2    |
| 10.3.2 Wildlife                                       | 3    |
| 10.3.2.1 Aquatics                                     | 5    |
| 10.3.2.2 Mammals                                      | 6    |
| 10.3.2.3 Birds  | 9    |
| 10.3.2.4 Reptiles                                     | 10   |
| 10.3.3 Species of special interest                    | 11   |
| 10.3.3.1 Threatened and endangered species            | 11   |
| 10.3.3.2 Raptors                                      | 11   |
| 10.4 Effects of mining operation on fish and wildlife | 12   |
| 10.5 Mitigation and management plan                   | 13   |
| 10.6 Fish and wildlife monitoring                     | 14   |
| 10.7 Bibliography                                     | 16   |
| List of Exhibits                                      | 18   |

CHAPTER XI  
CLIMATOLOGY AND AIR QUALITY

TABLE OF CONTENTS

|   | Page |
|---|------|
| 11.1 Scope  | 1    |
| 11.2 Methodology                                    | 1    |
| 11.3 Existing environment                           | 1    |
| 11.3.1 Precipitation                                | 1    |
| 11.3.2 Temperature                                  | 2    |
| 11.3.3 Evaporation                                  | 3    |
| 11.3.4 Relative humidity                            | 3    |
| 11.3.5 Wind   | 3    |
| 11.4 Effects of mining operations on air<br>quality | 4    |
| 11.5 Climatological and air quality monitoring      | 5    |
| 11.6 Bibliography                                   | 6    |
| List of Exhibits                                    | 7    |

CHAPTER XII

GEOTECHNICAL INFORMATION

TABLE OF CONTENTS

|   | Page |
|---|------|
| 12.1 Scope                                    | 1    |
| 12.2 Methodology                              | 1    |
| 12.3 Underground mine design                  | 1    |
| 12.3.1 Geotechnical tests and analysis        | 2    |
| 12.3.2 Coal pillar design                     | 2    |
| 12.3.3 Roof span design                       | 2    |
| 12.4 Surface subsidence effects of mining     | 2    |
| 12.5 Stability analysis of earthen structures | 3    |

CHAPTER XIII

DESIGNS

TABLE OF CONTENTS

|  | Page |
|--|------|
| 13.1 Data for this chapter have been included<br>in other chapters | 1    |

CHAPTER XIV

CONSULTTION AND COORDINATION

TABLE OF CONTENTS

|  | Page |
|--|------|
| 14.1 Scope                                 | 1    |
| 14.2 Federal Consultation and Coordination | 1    |
| 14.3 State Consultation and Coordination   | 2    |
| 14.4 Local Consultation and Coordination   | 3    |
| 14.5 Other Consultation                    | 4    |

CHAPTER XV

RESOURCE RECOVERY AND PROTECTION PLAN

TABLE OF CONTENTS

|  | Page |
|--|------|
| 15.1 (abridged) Resource recovery and protection<br>plan | 1    |

CHAPTER XVI  
B-CANYON REVISION  
 TABLE OF CONTENTS

|   | <u>PAGE NO.</u> |
|---|-----------------|
| LIST OF TABLES, MAPS, AND EXHIBITS.....                                   | iii             |
| INTRODUCTION.....   | 1               |
| Document Description.....   | 1               |
| Urgency.....  | 1               |
| Document Organization.....  | 2               |
| Document Scope.....   | 3               |
| Description of Revision Area and Operations.....                          | 4               |
| Summary of Environmental Impacts.....                                     | 6               |
| UMC 771.25 PERMIT FEES.....   | 8               |
| UMC 771.27 VERIFICATION OF APPLICATION.....                               | 9               |
| UMC 782.16 RELATIONSHIP TO AREAS DESIGNATED UNSUITABLE<br>FOR MINING..... | 10              |
| UMC 782.21 NEWSPAPER ADVERTISEMENT AND PROOF OF<br>PUBLICATION.....       | 11              |
| UMC 783.14 GEOLOGY DESCRIPTION.....                                       | 12              |
| UMC 783.15 GROUND WATER INFORMATION.....                                  | 13              |
| UMC 783.16 SURFACE WATER INFORMATION.....                                 | 21              |
| UMC 783.19 VEGETATION INFORMATION.....                                    | 22              |
| UMC 783.20 FISH AND WILDLIFE RESOURCES INFORMATION.....                   | 23              |
| UMC 783.22 LAND-USE INFORMATION.....                                      | 24              |
| UMC 783.27 PRIME FARMLAND INVESTIGATION.....                              | 25              |
| UMC 784.14 RECLAMATION PLAN: PROTECTION OF<br>HYDROLOGIC BALANCE.....     | 26              |
| UMC 784.20 SUBSIDENCE CONTROL PLAN.....                                   | 27              |
| UMC 784.21 FISH AND WILDLIFE PLAN.....                                    | 28              |
| UMC 784.24 TRANSPORTATION FACILITIES.....                                 | 29              |
| Belt Loading Station.....   | 29              |
| Conveyor Belts.....   | 29              |
| Conveyor Drives.....  | 30              |
| Transfer Points.....  | 30              |

*revised*  
9/13/88

CHAPTER XVI  
TABLE OF CONTENTS

|             |   | <u>PAGE NO.</u> |
|-------------|---|-----------------|
| UMC 784.25  | RETURN OF COAL PROCESSING WASTE TO<br>ABANDONED UNDERGROUND WORKINGS.....                   | 32              |
| UMC 817.41  | HYDROLOGIC BALANCE: GENERAL REQUIREMENTS...   | 33              |
| UMC 817.48  | HYDROLOGIC BALANCE: ACID-FORMING AND<br>TOXIC-FORMING MATERIALS.....                        | 34              |
| UMC 817.50  | HYDROLOGIC BALANCE: UNDERGROUND MINE ENTRY<br>AND ACCESS DISCHARGES.....                    | 35              |
| UMC 817.52  | HYDROLOGIC BALANCE: SURFACE AND GROUND<br>WATER MONITORING.....                             | 36              |
| UMC 817.59  | COAL RECOVERY.....  | 37              |
| UMC 817.71  | DISPOSAL OF EXCESS SPOIL AND UNDERGROUND<br>DEVELOPMENT WASTE:<br>GENERAL REQUIREMENTS..... | 38              |
| UMC 817.88  | COAL PROCESSING WASTE: RETURN TO<br>UNDERGROUND WORKINGS.....                               | 39              |
| UMC 817.97  | PROTECTION OF FISH, WILDLIFE, AND RELATED<br>ENVIRONMENTAL VALUES.....                      | 40              |
| UMC 817.121 | SUBSIDENCE CONTROL: GENERAL REQUIREMENT....   | 41              |
| UMC 817.122 | SUBSIDENCE CONTROL: PUBLIC NOTICE.....  | 42              |
| UMC 817.124 | SUBSIDENCE CONTROL: SURFACE OWNER<br>PROTECTION.....  | 43              |
| UMC 817.126 | SUBSIDENCE CONTROL: BUFFER ZONES.....   | 44              |

CHAPTER X  
FISH AND WILDLIFE RESOURCES

TABLE OF CONTENTS

|   | Page |
|---|------|
| 10.1 Scope  | 1    |
| 10.2 Methodology                                      | 1    |
| 10.3 Existing fish and wildlife resources             | 2    |
| 10.3.1 Wildlife habitats in mine plan area            | 2    |
| 10.3.2 Wildlife                                       | 3    |
| 10.3.2.1 Aquatics                                     | 5    |
| 10.3.2.2 Mammals                                      | 6    |
| 10.3.2.3 Birds  | 9    |
| 10.3.2.4 Reptiles                                     | 10   |
| 10.3.3 Species of special interest                    | 11   |
| 10.3.3.1 Threatened and endangered species            | 11   |
| 10.3.3.2 Raptors                                      | 11   |
| 10.4 Effects of mining operation on fish and wildlife | 12   |
| 10.5 Mitigation and management plan                   | 13   |
| 10.6 Fish and wildlife monitoring                     | 15   |
| 10.7 Bibliography                                     | 16   |
| List of Exhibits                                      | 18   |

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DIVISION OF OIL  
GAS & MINING

CHAPTER X

10.1 Scope

Kaiser Coal's Sunnyside Mines has been in continuous operation for over eighty years. During the course of operation, approximately 244 acres (1.7 percent of the 14,475 acre permit area) was disturbed.

The focus of this chapter is the existing wildlife resources within the permit boundary, wildlife affected or potentially affected by the mining operations, and mitigation/management plans.

10.2 Methodology

The existence of Sunnyside Mines predates 30 CFR, 741 and the performance standards of 30 CFR, 817.97, the regulations pertaining to mining permits and wildlife information respectively. Thus, there are no pre-mine baseline data available for the permit area. Impact assessment is therefore subjective. Impacts to wildlife populations began eighty years ago with the first mining operations in Whitmore Canyon. Since that time, the welfare of wildlife has varied with changing climatic, seral, economic, social and technical conditions. The populations in and near the permit area have survived these changing conditions and are adapted to the present environment. Inventory type studies would provide data on status of these populations, but in view of the fact that no disturbance is planned during the five year permit period, the value of such studies is questionable. The goal of Sunnyside's wildlife program is to conserve wildlife through sound management techniques and monitoring methods. A recent aquatic study (Winget 1980) is the only information relevant to existing wildlife resources (aquatic fauna) within the permit boundary.

The purpose of the aquatic study was to collect adequate data to: 1) describe the condition of aquatic resources in Grassy Trail Creek; and 2) provide the baseline for preparing a management plan for said resources.

Aquatic macroinvertebrates were collected with a modified Surber sampler on three dates from selected stations above and below suspected impact points (see Figure VII-2, Chapter VII-Hydrology). Sediment sizes, chemical composition and water quality were determined for each stream section. Comparisons between physical/chemical measurements and aquatic macroinvertebrate community condition were used to indicate environmental impacts on aquatic resources.

## CHAPTER X

The information sources for the discussion of other wildlife resources are publications of the Utah Division of Wildlife Resources (UDWR), Final Environmental Statement, Development of Coal Resources in Central Utah, Department of the Interior, and UDWR report submitted to Kaiser on November 15, 1979 (see Appendix X-1).

### 10.3 Existing Fish and Wildlife Resources

Wildlife is a rather broadly defined term that includes many vertebrate as well as invertebrate species. For practical and economic reasons, it becomes necessary to concentrate on the most "important" species, which can be identified by using a predetermined set of criteria. The UDWR has defined high interest wildlife as 1) all game species, 2) any economically important species, 3) any species of special aesthetic, scientific or educational significance, and 4) all federally listed threatened or endangered species. Unless otherwise noted, the wildlife discussed in the following sections have been classified as high interest.

#### 10.3.1 Wildlife Habitats in Mine Plan Area

The habitats of major concern are those of high interest species. Because most terrestrial species use a variety of habitats during a lifetime, the discussion will begin with a general description of habitats found on the permit area.

The long axis of the permit area follows Whitmore Canyon in a northwest-southeast orientation (Plate X-1). Whitmore Canyon is flanked by West Ridge to the west and Patmos Ridge to the east. Elevations along the east-west section boundaries defined by the southern boundary of Section 29, R14E, T14S, are: Whitmore Canyon - 7000 feet, West Ridge - 8600 feet, Patmos Ridge - 9800 feet.

Vegetation types in the canyon bottom include riparian/cottonwood grove, riparian/willow, riparian-bulrush/sedge, and sagebrush/grass (see the vegetation Sections 9.3.2 and 9.3.2.5 for a description of vegetation types and scientific names of plants respectively).

The exposed south and west aspect slopes are dominated by xeric vegetation. The vegetation types are classified as: mountain brush, pinyon-juniper (PJ), PJ/grass. PJ/mountain brush, PJ/sagebrush

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CHAPTER X

DIVISION OF OIL  
GAS & MINING

and sagebrush/grass. The vegetation types found on the more protected north and east aspect slopes are classified as Douglas fir, Douglas fir/aspen, Douglas fir/mountain brush, Douglas fir/PJ and aspen. The sagebrush/grass vegetation type covers the exposed ridge tops.

A unique habitat is the rim-rock cliffs along the eastern boundary of the permit area at about 8200 feet elevation. The rock ledges are sites for raptor eyries and nests of other birds. The caves and crevasses provide roosting sites for bats. Cliff habitat is indicated on Plate X-1.

Grassy Trail Reservoir and Grassy Trail Creek in Whitmore Canyon (Plate X-1) are habitats for numerous aquatic species. The rainbow trout (see Table X-1 in the Appendix for scientific names) and brown trout are high interest species that inhabit the creek and reservoir respectively. The associated riparian zones provide habitats for many other species.

The UDWR has developed a classification system for habitat based primarily on two criteria, 1) the dependency of one or more species of wildlife on a habitat (The UDWR uses the phrase "wildlife use area") and 2) the amount of habitat available. The values from high dependency, limited habitat to low dependency, unlimited habitat are: crucial-critical, high-priority, substantial value, and limited value. The corresponding aquatic habitat value system is crucial-critical - Class 1 or 2, high-priority - Class 3, substantial value - Class 4 and limited value - Class 5 or 6.

Areas within the permit boundary have been designated by UDWR as high-priority for high interest species. Mule deer are most stressed during winter months when forage availability is low, thus winter habitat is high-priority. Winter habitat for deer is shown on Plate X-1.

High interest species whose habitat requirements are found on the permit area are listed in Table X-1.

### 10.3.2 Wildlife

The permit area for Kaiser Coal's Sunnyside Mine project encompasses a portion of the West Tavaputs Plateau in Carbon County, Utah. According to the UDWR (1978) 356 vertebrate species inhabit this region. The total is comprised of 13 fish, 5 amphibians, 14 reptiles, 244 birds and 80 mammals.

JUN 12 1985

## CHAPTER X

DIVISION OF OIL  
GAS & MINING

Many of the species that potentially occur on the permit area have some or all of the habitat requirements in the riparian zones associated with drainage bottoms, seeps, springs, wetlands and flood plains. In the permit area, the canyon bottomlands provide most of the riparian habitats and are most productive in terms of herbage produced and wildlife use. Historically, the bottomlands have also been the areas preferred for human land use activity.

In addition to mining, the major land use activities have been grazing, recreation and water development (Grassy Trail Reservoir). Forage available for grazing on the permit area is limited because of the steep canyon slopes. Therefore, grazing occurs primarily in the canyon bottoms. A plan was designed to protect bottomlands from overgrazing and to stimulate production by a rest-rotation grazing system.

This plan is presently being reviewed by the Soil Conservation Service and will be submitted to the Division for approval when it becomes available.

Presently, Kaiser Coal Corporation leases grazing rights to four operators who have 200-250 cattle on the permit area. Don Andrews, range conservationist with the Soil Conservation Service, conducted a range survey and his observation was "that the range was being properly used and there wasn't any signs of over stocking as of August 17, 1983" (SCS 1983).

Reseeded areas will be protected from livestock grazing by fencing. Fence specifications are height of top wire not more than forty inches and spacing of other wires at 16, 22 and 30 inches (J. Yoakum and W.P. Dasmann. 1969. Habitat management practices In Wildlife Management Techniques, ed. Robert H. Giles, Jr. The Wildlife Society, Washington, D.C. 623 pp). The forty inch height is easily jumped by deer and the spacing between wires prohibits twisting on legs.

New 5-year lease periods are proposed to allow more flexibility for grazing management. During the lease period operators and forage condition will be monitored for compliance with lease terms.

Low stocking rates and fence control are management techniques that will maintain forage production at optimum levels for the benefit of livestock and wildlife.

A rodeo arena is located in riparian habitat in Section 29, R14E, T14S. Recreational use of the arena is limited to warm weather months. Another recreational activity that occurs in the riparian habitat in Whitmore Canyon is a "put and take"

## CHAPTER X

fishery discussed in the following section.

Post-mining land use will continue to be wildlife, grazing, recreation and culinary water use in Grassy Trail Reservoir. The sites disturbed by mining activity will be reclaimed to wildlife and grazing uses.

### 10.3.2.1 Aquatics

The UDWR has stocked Grassy Trail Reservoir and Grassy Trail Creek with brown trout and rainbow trout respectively. Brown trout were stocked to control a nuisance population of tiger salamanders and the UDWR (1979) has reported success.

The brown and rainbow trouts are exotic game species that are of high interest to Utah. According to Larry Dalton, WDWR game biologist, (personal communication) rainbow trout are reproducing in the stream below Whitmore Reservoir. A section of the stream was sampled in 1983 and again in 1984 and the density average was 120 and 200 fish per mile of stream. Fishing in Grassy Trail Reservoir is presently prohibited because the water is used for culinary purposes.

The tiger salamander is a year long resident of the permit area. Grassy trail reservoir and Grassy Trail Creek are used as breeding and larva habitat during the period March - September. Riparian habitat along Grassy Trail Creek is used by the adult life form.

A three mile segment of Grassy Trail Creek below the reservoir (Plate X-1) is designated a Class 3 fishery (significant value) by the UDWR. The rainbow trout fishery is sustained on a put and take basis during seasons of adequate water flow. The remainder of Grassy Trail Creek and all other streams on the permit area have a limited value for sport fisheries and have been designated as Class 5 or Class 6. Class 6 streams are dewatered during portions of the year.

Aquatic macroinvertebrates were the organisms studied in the aquatic resource analysis of Grassy Trail Creek. According to Winget (1980), aquatic macroinvertebrates are generally much more susceptible to water-borne toxicants and other environmental stresses than are fish and other higher animals and for this reason they are excellent indicators of water resource condition.

Because the study was designed to address the potential impacts of mining activity on the aquatic environment of the Creek, the results are discussed in section 10.4.

## CHAPTER X

### 10.3.2.2 Mammals

There are seventeen high interest species listed in Table X-1 that potentially occur on the permit area. The total is comprised of three small game, six furbearers, four big game, one endangered, and three with none of the above classifications.

The permit area is year-round habitat for cottontail rabbits and snowshoe hare. Generally, 7000 feet is an elevational boundary with mountain cottontail preferring habitats above and desert cottontail preferring habitats below. The habitat requirements of the snowshoe hare are provided by the spruce-fir vegetation type. The population trends of the cottontails are stable while the trend of snowshoe hare is cyclic.

There are six beaver dams on Grassy Trail Creek in the Left Fork of Whitmore Canyon above the reservoir (Plate X-1). One beaver dam was observed in Water Canyon. Some of the dams appear in an active state of repair. Habitats of the other furbears occur on the permit area, but population densities are unknown. According to the UDWR (1978), the population trends of the beaver and striped skunk are increasing while that of mink is unknown and those of the furbears are stable.

The permit area is part of deer herd unit 27B - Range Creek. Herd unit 27B occupies the east half of Carbon County, part of the north side of Emery County, and the south side of Duchesne County for a total land area of 1,169,408 acres (Utah State Department of Fish and Game 1967). Whitmore Canyon is on the south side of the unit.

Unit 27B was included in range inventory investigations conducted in 1966 by the UDWR (then the Utah State Department of Fish and Game) to determine winter distribution patterns, range condition information and land ownership status. The distribution pattern observed was summer range on the West Tavaputs Plateau in the center of the unit and winter range at lower outlying elevations. The unit is 19 percent summer range and 49 percent winter range, during severe winters the range decreases to 31 percent. The permit area is in the Pinyon-Juniper-Mountain Brush-Grass vegetation type which comprises 34 percent of the normal winter range and 42 percent of the severe winter range (Utah State Department of Fish and Game 1967). The optimum winter range population of deer in unit 27B is 29,885 (Table X-2).

On the permit area, deer summer range is on West Ridge, Patmos Ridge and high country to the north and east. Winter

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DIVISION OF OIL  
GAS & MINING

CHAPTER X

range is at lower elevations than summer range (Plate X-1). With severe winters deer move down into Whitmore Canyon and west off West Ridge to the adjacent flat, P-J country.

According to UDWR, winter ranges are inhabited between November 1 and May 15 each year, depending on weather conditions. Snow accumulation at high elevations force deer to habitat where energy costs of thermoregulation are low. Whitmore Canyon and pediment slopes east of the permit area are considered winter range (Wildlife Map, Plate X-1). Climatological information provided in section 783.18 (Chapter XI) supports this statement. Records at the Sunnyside NOAA weather station located at the engineering building, elevation 1982, (6500 feet), show the greatest mean daily snow accumulation, 10.2 (4.01 inches), occurring in January. This is far below the reported 46 cm (1.5 feet) accumulation which precludes use of the range by deer (Gilbert et al., 1970; Hosely, 1956).

The chained areas on the pediment slopes east of the permit area have had a serious impact on wintering deer. Chaining was conducted by the Bureau of Land Management (BLM) using two caterpillar tractors pulling a 41 kg (90 pound) link chain between them. Two areas, Mud Springs, No. 88 and Mud Springs, No. 10 were chained in 1966. No. 88 was 778 ha (1922 acres) and No. 10 was 685 ha (1962 acres). Both areas were seeded with crested wheatgrass (Agropyron cristatum), fourwing saltbus (Atriplex canescens), and alfalfa (Medicago sativa). According to David Mills, wildlife biologist with the BLM (personal communication 18 August 1983), the chaining was a negative impact for the following fifteen years because no cover was left for escape or thermoregulation. Vegetation is now providing suitable cover and deer utilization is increasing. Data from pellet transect established in the chained areas in 1976 show that winter deer use from 1976-77 to 1979-80 has trended upwards (UDWR 1980).

Published data are available on big game management unit. The permit area is approximately 1 percent of unit 27B and it may not be representative of the unit in terms of deer density. However, for the purposes of this discussion, it is assumed that data published on unit 27B is more representative of the permit area than data published on any other herd unit.

The health of a deer herd is largely dependent on the quality of habitat relative to animal density (carry capacity). An approximation of the status of 27B can be discerned by comparing selected data of certain management units (Table X-3). Unit 27A adjoins 27B, unit 19 had a high buck harvest, success ratio and above average fawn doe ratio, unit 30B had a low buck harvest and has a comparatively small deer range and unit 29B has a comparatively large deer range. A comparison of these data

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CHAPTER X

DIVISION OF OIL  
GAS & MINING

requires that all variables relative to the hunt be held equal, i.e. weather conditions, hunter access to unit, hunter distribution on unit, etc.

Fawns per 100 does are an indicator of herd health. The Density Index (DI) as used here is an indicator of carrying capacity. The carrying capacity is proportional to the DI value. The log of the range area was used to make the index more sensitive to hunter success. The most productive unit, 19, also has the highest DI. Unit 27A was the least productive and has the lowest DI. The second lowest DI was unit 27B, which would indicate that the region has a relatively low carrying capacity for deer.

Since 1976, both the hunter success and the fawn/100 doe ratio have declined in unit 27B, although the latter ratio was lower in 1978 than 1979 (UDWR 1980a).

The nearest elk management unit is the Book Cliffs-Unit 21, which is 40 miles east of the permit area. This unit has a low population of elk and considerable forage availability. The UDWR recognized the opportunity for herd expansion and released 50 animals during the winter of 1979-80. An additional 50 animals are to be released during the 1980-81 winter period (UDWR 1980b).

Although the permit area contains habitat suitable for elk, no elk have been observed there is potential for elk in the Book Cliff herd to expand their range to the permit area, but this would take many years and favorable conditions.

The cougar received protection as a game animal on February 15, 1967. Harvest data has been reported by deer management units and unit 27B ranks fourth with a total harvest of 51 animals for the years 1972 to 1979 (UDWR 1980c). This indicates that the permit area probably contains habitat suitable for cougars and than cougars may be present.

The black bear received protection as a game animal at the same time as the cougar. The total harvest reported by the UDWR (1980d) for the years 1969-79, also for deer management unit 27B, was 25 animals, the third highest reported. It is also probable that there is suitable black bear habitat and some animals on the permit area.

The muskrat, kit fox, and bobcat are other high interest species that could occur on the permit area. Because of the lack of suitable habitat, the kit fox is the least likely to be found. The endangered black-footed ferret is discussed in Section 10.3.3.1.

## CHAPTER X

### 10.3.2.3 Birds

Of the 244 bird species that potentially occur in the region, 51 are high interest species with preferred habitat on the permit area. The 51 are comprised of 29 species of migratory game birds, 13 raptors, 5 small game (upland birds) and 4 migratory birds of high federal interest. Eight of the raptors are also of high federal interest. The 51 species are listed and classified in Table X-1.

The 29 species of migratory game birds are comprised of 27 waterfowl, the American Coot, and the Mourning Dove. Grassy Trail Reservoir provides habitat for waterfowl and American Coot. The lack of agriculture land in the vicinity precludes use by geese or dabbling ducks on a yearlong basis.

Mourning Doves nest in pinyon-juniper and riparian habitats near water sources. These components are found in any canyon bottomland on the permit area. Hunting of Mourning Doves occurs on a very limited basis.

Five species of small game bird species are listed as occurring on the permit area, however probability of occurrence varies because of availability of key habitat components. Blue Grouse utilize Douglas fir habitat types during winter months. During spring and summer months they migrate to sagebrush, pinyon-juniper or shrubland habitat.

Ruffed Grouse generally prefer habitat within 0.25 miles of water. Aspen forests are important during winter months, because staminate buds are a food source.

The occurrence of California Quail is marginal while sage grouse are improbable. Chukar prefer open, rocky areas associated with desert scrub or shrubland habitats but have been observed at the mouth of Slaughter Canyon and near the refuse dump. Sage grouse require open expanses of low growth-form sage brush for leks. These habitat characteristics are generally lacking on the permit area.

The Great Blue Heron, Long-billed Curlew, Black Swift and Western Bluebird are migratory birds of high federal interest. According to UDWR, there are no rookeries of the Great Blue Heron due to the absence of preferred nesting habitat. However, Grassy Trail Reservoir is feeding habitat so Heron are occasional visitors.

Long-billed Curlews prefer grasslands as breeding habitat and thus would probably not be found on the permit area. Grassy

## CHAPTER X

Trail Reservoir provides feeding habitat during migrations.

The Black Swift is a summer resident of West Tavaputs Plateau. Cliffs and tallus slopes are preferred habitat, but nesting is usually associated with moist ledged or crevices near or behind waterfalls. No nesting habitat occurs on the permit area.

The Western Bluebird is an uncommon summer resident of the region. It is a cavity nester with no particular preference for habitat type. Any cavity trees on the permit area is potential nesting habitat.

### 10.3.2.4 Reptiles

The Utah milk snake is a yearlong resident of the permit area. Riparian habitat found along Grassy Trail Creek and side canyon bottomlands are preferred habitat. The milk snake is furtive due to its nocturnal habitats. No milk snakes or their dens have been observed on the permit area.

## CHAPTER X

### 10.3.3 Species of Special Significance

#### 10.3.3.1 Threatened and Endangered Species

**Mammals:** The black-footed ferret is on the Federal List of Endangered and Threatened Wildlife and Plants (50 CFR 1711). There is a strong association of ferrets with prairie dog towns because the prairie dog is a primary prey species and its burrows are used as ferret dens.

A potential range of the ferret is the pediment slopes southwest of the permit area (Hinkley 1970, Scott et al. 1977, both cited in USDI 1979). Two whitetailed prairie dog towns are known to occur on the permit area, section 6 (R14E, T15S) in the southwest corner (Plate X-1). The town on the southwest-southeast quarter section boundary is in an abandoned cemetery and contains ten active burrows. No ferrets or ferret sign have been observed, but only reconnaissance surveys have been conducted. The nearest probable ferret sighting was about two miles northwest of Woodside on Highway 6, about eighteen miles south of the permit area (Scott et al. 1977, cited in USDI 1979). The date of this sighting is not known.

A recent unconfirmed sighting of a black-footed ferret is documented in Carbon County, eastern 1/2 section 10, T15S, R13E, according to Phil Garcia, conservation office, Utah Division of Wildlife Resources on 02-10-80.

The applicant will notify the Division of any future occurrence of threatened or endangered species or golden eagles on the permit area.

#### 10.3.3.2 Raptors

Raptors are considered species of special significance because of their rareness and because they are indicators of toxicants in the environment. The permit area contains nesting and/or hunting habitat of thirteen raptors. The bald eagle and peregrine falcon are on the Federal List of Endangered and Threatened Wildlife and Plants (50 CFR 17.11).

The permit area is considered winter range of bald eagles (UDWR 1979). Food supply is probably the most critical feature of the biology of wintering bald eagles (Steenhof 1978). The feeding habitats vary with the season and region; eagles in the Great Basin rely mostly on avian and mammalian carrion (Murphy 1975, cited by Steenhof 1978). Eagles prefer fish (including fish carrion) when it is available.

## CHAPTER X

Roost trees are an important part of bald eagle habitat. There are no known roost trees on the permit area. The nearest roost tree observed by Boner et al. (1977, cited in USDI 1979) was three miles southwest of Mounds, which is about seventeen miles southwest of the permit area.

The peregrine has been sighted in the region, but no active eyries have been identified (USDI 1979). The sighting nearest the permit area was about two miles north of Mounds (Boner et al. 1977, cited in USDI 1979). The peregrine usually lives in open country around rock cliffs overlooking or at least within one mile of streams or rivers; an abundance of birds for food supply must be within hunting range.

The burrowing owl is a raptor that has special nesting requirements. They commonly use prairie dog burrows as nest sites. The prairie dog towns on the permit area will not be disturbed without consultation with DOGM and UDWR.

### 10.4 Effects of Mining Operation on Fish and Wildlife

Development of Sunnyside Mines has resulted in the disturbance of approximately 287.36 acres (see Section 9.3.2.7 for a breakdown of vegetation types). Disturbed areas are indicated on Plate III-1. The construction and present mine use of roads and bridges causes sedimentation of Grassy Trail Creek. The species that have been potentially impacted by mine development and continued operation are listed in Table X-1. The list includes 9 fish, 4 amphibians, 12 reptiles, 63 birds and 33 mammals. Although each species listed was potentially affected, the number of species actually affected is probably a small percentage of the total, because of the relatively small area disturbed.

The ongoing mining operations have altered the environments of local aquatic and terrestrial faunal communities. Impacts of operations include noise pollution, air pollution, vehicular collisions of roads, and sedimentation of Grassy Trail Creek.

The results of aquatic resource analysis study (Winget 1980) show that water quality in Grassy Trail Creek above the mine discharge is adequate for most aquatic species, except for questionable levels of nickel, zinc and oil and grease. Water quality below the mine discharge shows considerable degradation: increases in conductivity, TDS, alkalinity, chloride, nitrate, phosphate, sulfate, sodium and oil and grease. There was an increase in sediment fines proceeding downstream; however, there was no evidence of toxicity type impacts chemical analyses

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## CHAPTER X

nor biological community investigations provided any data that indicated a heavy metal problem in Grassy Trail Creek (see Section 7.2.4).

Generally, there was very little biotic community difference between Stations UPGTR, GTC-02; Station GTC-AP showed moderate impact related changes, caused more by physical stress than chemical; Station GTC-03 showed severe stress reactions with indications of both physical and chemical stresses; and Station GTC-05 community exhibited similar responses as at Station GTC-03 but with evidence of limited recovery (see Figure VII-2). Fine sediments and oil and grease were apparently the major factors affecting Grassy Trail Creek.

It should be pointed out that mine waters contribute greater than 90 percent of total stream flow. Without mine water, Grassy Trail Creek would be near intermittent part of the year during most years.

### 10.5 Mitigation and Management Plans

Some impacts of the construction and operation of the ventilation fans are unavoidable. Where possible, mitigations will be achieved by minimizing these impacts and after the impacts, restoration to pre-impact conditions.

Dozing will be restricted to the minimum amount necessary for the shaft sites, power transmission lines and road upgrading. Upgrading the roads will be carried out according to current road building standards.

All disturbed sites no longer needed for mining operations are being reclaimed according to current reclamation standards. The reclamation techniques and seed mixtures used are designed to achieve a post-mining land use of wildlife and grazing. The Sunnyside topography consists of steep canyon slopes and undulating bottomlands. Revegetation of small areas in this rugged topography will create natural, scattered plant groupings which will optimize edge effects. No special plant groupings are planned for small acreages. Reforestation will occur by natural succession and shrubs will be broadcast or drill seeded.

All revegetated areas will create induced and/or inherent edges. Induced edges are a result of various adjacent successional stages of the same community. Inherent edges occur where two different communities meet, e.g., where mountain brush on a slope abuts sage/grass vegetation on a valley floor. On the largest areas of disturbance, a mosaic of induced edges will

## CHAPTER X

develop where revegetated areas adjoin non-mined areas and older reclaimed areas planted with crested wheatgrass.

The potential for optimizing the edge effect through vegetation groupings at Sunnyside is limited. The amount of edge is determined by length, width and configuration. Although boundaries of many disturbed areas are long, they are also very regular and narrow, thus restricting the potential to create more edge. Additionally, because most areas are small in size, habitat richness and variation of configuration is restricted (Thomas et al, 1979). The value to wildlife of plant species being used for reclamation is discussed in Section 9.7.

For the most part, Sunnyside Mine operations have developed without consideration of potential impacts on wildlife. However, impacts on wildlife have been avoided during the course of operations even though wildlife may not have been the motivation. For example, during the early stages of operations, when mining was under lower cover near Grassy Trail Creek, pillars were left to protect surface structures and streams (Section 3.3.2.2 for further discussion of subsidence see Sections 3.4.8 and 6.6.3.3).

The ongoing operations have altered the environments of local aquatic and terrestrial faunal communities. Unless problems arise, the environments will continue in their altered state until mining operations cease.

The riparian habitat along Grassy Trail Creek is a primary concern for wildlife protection. During the course of mine development, facilities were constructed within 100 feet of the stream. Most of the construction occurred at the mine site in Section 32 (Plate X-1). The riparian habitat that remains is marked with buffer zone sign (4) posted between the upper mine entrance to a point below the lower mine workings (SW1/4 Section 32).

Water discharged into Grassy Trail Creek must meet NPDES effluent criteria. Different water quality parameters are being monitored on a monthly, quarterly and semi-annual basis at six check points along the creek (Chapter VII, Permit Application).

All mine employees will receive the UDWR wildlife educational program during annual refresher safety training. The program consists of slides and a tape explaining wildlife value and how the individual can help protect wildlife resources.

The applicant will avoid the use of persistent pesticides in the permit area during underground coal mining and reclamation activities unless approved by the Division.