

C/007/047 Incoming

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Carbon Resources, LLC
PO Box 954
Sandia Park, NM 87047
Telephone: (505) 286-1253

11 June, 2012

Mr. John Baza, Director
& Coal Program Personnel
Department of Natural Resources
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84116

RECEIVED

JUN 13 2012

DIV. OF OIL, GAS & MINING

Dear Mr. Baza & Coal Program Personnel,

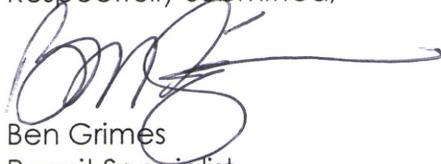
RE: SUBMISSION OF RESPONSE TO MINOR REVISIONS IDENTIFIED IN MEETING WITH JOE HELFRICH 1/9/12 AND IN AN EMAIL FROM JOE ON 1/17/12 FOR KINNEY NO. 2 MINE - PERMIT NO. C/007/0047

Accompanying this letter are C1 and C2 forms and revised MRP text and additional information to address minor revisions identified in a meeting with Mr Joe Helfrich on January 9, 2012, and in an email from Mr. Helfrich to Greg Hunt and myself dated January 17, 2012. Four copies of the revisions and additions are included.

Red-line strike-out versions of the text are included as well as final, "clean" copies of the same text pages. The C2 form identifies the revised pages, and the additions requested by Mr. Helfrich.

Please feel free to contact me, Ben Grimes at (435) 609-9416 with any questions regarding this submission.

Respectfully Submitted,



Ben Grimes
Permit Specialist

Attachments
CC: Greg Hunt

File in:

- Confidential
- Shelf
- Expandable

Date Folder

06/13/12 C/0070047

Incoming

APPLICATION FOR COAL PERMIT PROCESSING

RECEIVED

JUN 13 2012

DIV. OF OIL, GAS & MINING

Permit Change New Permit Renewal Exploration Bond Release Transfer

Permittee: Carbon Resources, LLC

Mine: Kinney No. 2 Mine

Permit Number:

C/007/0047

Title: Response to 5/2/11 Deficiencies Task ID#3779

Description, Include reason for application and timing required to implement:

Minor corrections to text and addition of AVF Study by Dr. Patrick Collins

Instructions: If you answer yes to any of the first eight questions, this application may require Public Notice publication.

- 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: _____ increase decrease.
2. Is the application submitted as a result of a Division Order? DO# _____
3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
4. Does the application include operations in hydrologic basins other than as currently approved?
5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
6. Does the application require or include public notice publication?
7. Does the application require or include ownership, control, right-of-entry, or compliance information?
8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
9. Is the application submitted as a result of a Violation? NOV # _____
10. Is the application submitted as a result of other laws or regulations or policies?

Explain: _____

- 11. Does the application affect the surface landowner or change the post mining land use?
12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
13. Does the application require or include collection and reporting of any baseline information?
14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
15. Does the application require or include soil removal, storage or placement?
16. Does the application require or include vegetation monitoring, removal or revegetation activities?
17. Does the application require or include construction, modification, or removal of surface facilities?
18. Does the application require or include water monitoring, sediment or drainage control measures?
19. Does the application require or include certified designs, maps or calculation?
20. Does the application require or include subsidence control or monitoring?
21. Have reclamation costs for bonding been provided?
22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
23. Does the application affect permits issued by other agencies or permits issued to other entities?
24. Does the application include confidential information and is it clearly marked and separated in the plan?

Please attach three (3) review copies of the application. If the mine is on or adjacent to Forest Service land please submit four (4) copies, thank you. (These numbers include a copy for the Price Field Office)

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Clay Wisdom C.F.O. 6-7-12 Signature (Right-click above choose certify then have notary sign below)

Subscribed and sworn to before me this 4th day of June, 2012

Notary Public: Elizabeth Ann Morantes, state of New Mexico

My commission Expires: Oct 20, 2015

Commission Number: _____

Address: 12127 N Hwy 14

City: Cedar Crest State: NM Zip: 87008

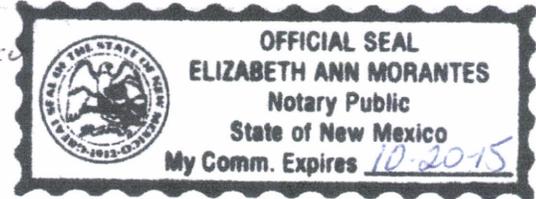


Table with 3 columns: For Office Use Only, Assigned Tracking Number, Received by Oil, Gas & Mining

be 8 ft. in the Hiawatha seam which is the only targeted mineable seam in the permit area. At the current time, the quality, market price, and effective cost of mining the type of coal that occurs in this area at thicknesses less than 5 feet renders such operations economically infeasible. If, however, future changes in mining technology or market conditions make it feasible to mine seams below the present 5 foot cut-off, mining plans may be modified to accommodate the resulting expanded mining operations.

R645-301-523 Mining Method

The mine plans and proposed mining methods described in this section reflect CR's detailed review and evaluation of all existing available geologic and coal quality data, consideration of related environmental factors such as hydrologic considerations. This broad base of relevant information was utilized to develop a number of conceptual mine plan alternatives which were then evaluated relative to consistency with CR's overall project objectives. These objectives include the following:

- Maximize recovery and utilization of the available coal resource
- Optimize coal production efficiency and economics
- Facilitate potential future development of nearby coal reserves
- Provide a safe, healthy, secure working environment
- Minimize potential adverse environmental impacts

Based on CR's detailed review and evaluation of possible alternative mining scenarios, the plans presented in this section were selected as the best combination of mine layout, mining method, and mine sequencing in order to achieve the noted objectives and provide for organized sequential mining operations.

Areas and Sequencing of Mine Development

~~The proposed mining operations will target recovery of remaining minable coal reserves contained in the Hiawatha coal seam. This coal seam and other seams in the area have been previously mined in the area with access to the seams from portals at the coal outcrop. Previous mining areas are delineated for each seam on both Map 5, Previous Mining Activities Map, and Map 15, Mine Plan Layout & Production Schedule Map. Target minable coal reserves identified in this plan reflect consideration of practical mineral ownership, geologic, environmental, and mining constraints which may limit access to and recovery of coal reserves which otherwise might be considered as recoverable reserves. Generally, the proposed coal extraction limits are shown on Map 15, Mine Plan Layout & Production Schedule Map exclude all previously mined areas, any areas where CR does not have existing rights to mine the coal. Proposed mining limits and the alignment of mine entries reflect consideration of those areas where historic mining removed the reserves and geological features that dictate mine layout and design. As indicated, considerable minable coal reserves remain in the area which can be effectively recovered while avoiding the existing abandoned mine workings. A maximum effective cover of approximately 1,000 feet exists in the permit boundary area and therefore there is no limit to coal recovery due to cover depth.~~

~~The proposed mine development and production sequence, as illustrated by Map 15, Mine Plan Layout & Production Schedule Map reflects orderly sequential development of available minable reserve areas, and the development/production requirements necessary to meet CR's current overall annual coal production targets. It should be noted that coal production requirements as outlined by Table 17, Projected Annual Coal Production, are based on current~~

~~marketing projections for the first permit term. Additional coal reserves east and south of the proposed permit boundary are controlled by CR as shown on Map 12, Regional Coal Ownership Map. These reserves are planned to be mined at a future date under a major permit revision completed as soon after the first permit approval as possible. The projected mine life is anticipated to be 20 years including the eastern and southern reserves controlled by CR. Unanticipated fluctuations in coal market demand and other factors may result in some variance between projected and actual annual and total production rates. At the time of the permit mid-term review and permit renewal, CR will re-evaluate coal production projections and make appropriate adjustments as necessary.~~

~~Proposed coal development and production is expected to occur as shown on Map 15, Mine Plan Layout & Production Schedule Map, and Table 17, Annual Coal Production. Ongoing engineering (mine and site design), permitting (permit revision work) for adjacent coal blocks and completion of any remaining backfill work in N13E Panels A and Panel B;~~

~~In simplified terms, mining will begin with the Hiawatha Seam (2011 through 2212).~~

Use and Conservation of Coal Resources

Maximum resource recovery has always been and will continue to be one of CR's primary objectives as a matter of sound resource management and efficient mining and economic practice. Conservation and maximum utilization of the available coal resource will involve mining to the minimum practical seam thickness and maximizing overall coal recovery consistent with sound engineering and mining practices.

Proposed mining methods will result in extraction of minable coal reserves down to a minimum practical mining thickness of 5 feet which is below the lower limit for the continuous mining equipment which will be utilized. The average mining height in the permit area is expected to be 8 ft. in the Hiawatha seam which is the only targeted mineable seam in the permit area. At the current time, the quality, market price, and effective cost of mining the type of coal that occurs in this area at thicknesses less than 5 feet renders such operations economically infeasible. If, however, future changes in mining technology or market conditions make it feasible to mine seams below the present 5 foot cut-off, mining plans may be modified to accommodate the resulting expanded mining operations.

Mining Methods and Equipment

The Kinney No. 2 Mine will be an underground mine utilizing development mining methods for primary coal. No pillar extraction is planned for the first 5 year permit term. Both mine plans and the proposed mining methods are designed to maximize recovery of the minable coal resource while limiting dilution of the coal by unmarketable waste, and to optimize mining operations to achieve maximum operational efficiency while assuring safe operating conditions. CR has and will continue to use sound engineering judgment and proven mining techniques in designing the overall mine layout; selecting appropriate pillar sizing, entry widths, and entry height; and in selecting suitable mining and support equipment and systems.

The following criteria listed in order of importance have been used to design the mine openings, select the mining methods and to layout the mine workings:

Maximum Overall Ultimate Safe Recovery of Coal to determine the extraction rate and the width of the openings;
Provisions for expedient development and for the use of large shuttle cars (25 ton) for hauling

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Provisions for expedient development and for the use of large shuttle cars (25 ton) for hauling

Mine Openings

The proposed underground mining operations will require several mine openings which will provide underground access for personnel, equipment, and supplies; be utilized for conveyor haulage of both coal and limited quantities of underground development waste; and will serve as mine intake and return airways for ventilation of the underground mine workings. Mine openings required in conjunction with the currently proposed and anticipated future operations will include a 5 entry system.

Because the mine openings will provide long-term access for the proposed operations, they have been located and designed to facilitate effective access and assure long-term stability. As described in R645-301-520, General Description of Mine Construction and Development Activities, the mine portals will be developed in the Hiawatha Coal Seam using continuous miners and conventional room development (first mining) methods. The portal entries will be approximately 20 to 25 feet wide and 6 to 10 feet high. Appropriate sizing of the support pillars along with supplemental roof control, including roof bolts and other roof support systems, will provide for effective ground control and long-term stability of mine entries in the portal area.

The portal entries will be protected from potential rock fall hazards by steel portal structures on concrete foundations which will provide a full protective canopy on the manway and belt entry portals.

Maintenance of mine openings will involve regular inspections of the openings and surrounding surface areas, removal of any material or debris from the immediate area of the openings, and repair or replacement of ground control, protective structures, or other structures associated with the mine openings. Mine openings and the immediate surrounding areas will be kept clear of equipment, materials, and supplies, and no coal, mine waste, or potentially flammable materials will be placed or stored in the immediate vicinity.

Underground Development Waste (Mine Development Rock Waste)

Mine development, ongoing mining operations, and ancillary operations such as development of overcasts for mine ventilation and coal haulage will result in production of underground development waste including carbonaceous shale, weathered coal, floor clay, and parting material. Where it is operationally feasible to separate these material from the coal during development and mining, the underground development waste will be removed and handled separately from the coal. Where separation is not operationally feasible, underground development waste will be handled with the coal and will be removed in the surface facilities, separated from the coal product and thereby becoming coal processing waste and will be temporarily stockpiled until it can be sold as distressed coal and hauled off site. The area designated as temporary coal processing waste stockpile as shown on Map 13, Surface Facilities Map, is capable of containing approximately 3,900 tons of material. This material will be sold as a low quality coal product, distressed coal, to local coal preparation facilities, or will be deposited in other facilities permitted by the UDOGM.

Generally, the same mining equipment and haulage systems used for coal production will be used to remove and handle underground development waste, and coal processing waste as shown on Figure 41, Coal Waste Handling Scheme. Continuous miners, electric shuttle cars, and LHD scoops may be used to load and haul mine waste to the mine conveyor system. Normally underground development waste haulage will occur on a scheduled rock handling shift when the conveyor belt system will be cleared of coal. Typically, any development rock produce

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Mine Drainage Control and Dewatering

As described in both R645-301-724, Ground Water Information, and R645-301-522, General Description of Mine Plans, Mining Methods, and Related Design Requirements, potential mine inflows are expected to be minimal and there will be sufficient storage capacity in both the existing abandoned underground mine workings and in inactive working areas that transfer of mine drainage to the surface water system is unlikely.

526.100 Existing Mine Structures and Facilities

The only existing mine structures consist of a small stone, concrete and railroad tie mine fan building, a small concrete building used as a powder magazine, and several foundation structures. None of these structures will be used by the Kinney No. 2 Mine. These structures can be seen on Map 14, Mine Surface Facilities, Pre-Mining Topography Map.

526.116.1 Public Roads

One public road passes through the permit boundary. Utah Highway SR 96 passes through the northwest corner of the permit boundary and is adjacent to the operations area as can be seen on Map 13, Surface Facilities Map. This highway is within 100 feet of operations and public notice was offered during two public notice and comment periods. No comments were received regarding the highway and Kinney No. 2 Mine operations.

Discussions with the Utah Department of Transportation (UDOT) have been held and a preliminary plan for access to the mine has been presented and approved by UDOT. UDOT requires a standard intersection design that provides turn lanes into the mine site from both directions as well as through lanes and acceleration and deceleration lanes. The "Intersection Design Approval" is found in Exhibit 4, Other Permits. ~~Final modification of plans will be approved by UDOT prior to any work on the intersection. Before any highway work is done, DOGM will be presented with the UDOT approval.~~

526.210 Utility Installation and Support Facilities

The proposed mining and related operations will utilize new utility installations including electrical distribution, telephone, potable and raw water, and sewer systems. The proposed underground mining and related surface disturbance activities have been planned, designed, and will be conducted in a manner which minimizes the potential for damage or destruction of utility installations, or disruption of services provided by those utilities existing within the permit area unless otherwise approved by the owner of the utility.

Heat for the buildings will initially be provided by propane, and may be converted to more cost efficient natural gas if it becomes available.

All existing and proposed utility installations are shown on Map 13, Surface Facilities Map. It should be noted that all utilities either are or will be owned, constructed, operated, and maintained by the respective utility companies up to the actual point of service which in the case of electricity will be the main mine substation and in the case of telephone, potable water, and sewer service will be to the metering point which will be located at the mine permit boundary line.

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Monay Draw, Blue Seal Draw, Kinney Draw, Columbine Draw, and Jones Draw. Monay and Blue Seal Draws are located North of the Permit Boundary with the other three lying within the Permit Boundary. The other two Ephemeral Drainages are named on the USGS Scofield Quadrangle as Eagle Canyon and UP Canyon. Eagle Canyon is the northern-most of the seven drainages and UP Canyon is the southern-most of the seven with the five newly named Drainages positioned between. UP Canyon is South of the Permit Boundary and does not cross the Boundary at any part, while Eagle Canyon exits the mountain front North of the Permit Boundary, however, Eagle Canyon bends sharply southward and crosses a portion of the Permit Boundary on its East Side.

Baseline Surface Water Data were NOT collected from these Seven Drainages simply because there was NO WATER to collect. As part of an "Ephemeral Drainage Determination" Carbon Resources documented the absence of flowing water on 22 separate days spread over four years, and on one occasion photographed the absence of water in the four drainages that cross the Permit Boundary (Eagle Canyon, Kinney Draw, Columbine Draw, and Jones Draw). These photos together with an in-depth analysis of the drainages 3D geometry, geomorphic character, alluvial and vegetative material, and notably their position elevated above the water table is contained in Exhibit 20, Ephemeral Drainage Determination.

Drainages and Surface Water Bodies

Surface Water Occurrence

Significant runoff characteristics relative to both definition of baseline condition and evaluation of any potential mining related impacts include, peak flow rate, low flow rate, mean annual discharge rate, and any seasonal variations in flow. These runoff parameters will be defined through baseline monitoring for individual drainages at approved monitoring stations.

Mean annual discharge for Mud Creek, as measured from 1978-2007 at USGS station 09310700, Mid CRK BL WINTER QUARTERSCYN SCOFIELD, UT, is 16.9 CFS (12,260 ac-ft/yr). This station is located on Mud Creek just south of the town of Scofield, Utah and approximately 0.75 miles southwest of the proposed mine portals. A plot of USGS data is shown in Figure 167 Mud Creek Flows.

No historic monitoring information is available for the named and unnamed minor area drainages, most of which are dry over much of the year. In May 2005, in conjunction with development of the Kinney No. 2 Mine Project, Carbon Resources (CR) began monitoring Scofield Reservoir, Mud Creek, and Miller Canyon, the three major surface water sources in the mine vicinity. Ongoing monitoring will supplement existing data and provide a basis for definition of existing hydrologic baseline conditions. Surface water monitoring locations are shown on Map 10, Regional Water Quality. The water level in Scofield Reservoir can be seen in Figure 16 below. It should be noted that the Bureau of Reclamation records the lake level in North American Vertical Datum of 1929 (NAVD 29) elevations. The Top of Active Storage (7617.5 ft) shown in the table above is a NAVD 29 elevation. The elevations shown on the Y line of the graph are in North American Vertical Datum 1988 (NAVD 88), which is the datum used by the Kinney No. 2 Mine. The NAVD 88 use is mandated by Utah State Law for new projects such as the Kinney No. 2 Mine.

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Exhibit 4

**Archeological Clearance information is located
in the Confidential binder for the Kinney No 2
Mine at the Salt Lake City UDOGM office.**

Exhibit 8

“Nest 1541 Deterent Mitigation Plan With 3 Alternatives” plan information is located in the Confidential binder for the Kinney No. 2 Mine at the Salt Lake City UDOGM office.

Nest #1541 Mitigation Plan Kinney No. 2 Mine

Preface

A condition of receiving approval to conduct nesting deterrent actions at raptor nest #1541 is to mitigate. A few mitigation plans were discussed by the U.S. Fish and Wildlife Service, Utah Division of Wildlife Resources, Utah Division of Oil, Gas and Mining, and Carbon Resources representatives. These plans included Purple martin nesting boxes, Sage grouse lek enhancements, purchasing non-lead bullets or shells to help prevent raptor poisoning from lead bullets, and assisting a raptor rehabilitation specialist with costs. During a meeting with Joe Helfrich of the UDOGM and Leroy Mead of the UDWR on June 22, 2011 two of these alternatives were discussed along with an alternative of constructing Osprey nesting platforms. Considering the three alternatives discussed (Purple martin nest boxes, Osprey nesting platforms, and non-lead bullets/shells) it was decided that a proposal to mitigate using one or more of these alternatives would be proposed as a mitigation plan.

Carbon Resources has committed to and received approval for a total of \$3,000.00 for mitigation efforts. The final mitigation may include one or more of the alternatives discussed and presented here. Details presented to follow provide the basis for preparing cost estimates for each alternative. From the cost estimates, the agencies and Carbon Resources will select the alternative or alternatives to be constructed based on getting the most benefit from the money.

Mitigation Plan

Alternative 1 –

Install Purple martin nest boxes at the mine site and/or at other Scofield area locations. The other locations that we have considered are at Scofield Town property (town park, and cemetery); at the Utah State Park at Scofield Reservoir (two possible locations), and at private property locations in the Scofield area.

Carbon Resources commits to installing as many nesting boxes at the Kinney No. 2 Mine site as recommended by the UDOGM, UDWR, and the U.S. Fish and Wildlife Service. In addition Carbon Resources will coordinate with the UDOGM, UDWR and the U.S. Fish and Wildlife Service in finding other locations mentioned above. We believe that approval from Scofield Town will be possible since the town residents are very excited to see the mine operations start, and have been very cooperative. We also believe that locations at the Utah State Park at Scofield may be a good alternative.

Number of nest boxes

Commercially manufactured nest boxes are available for reasonable prices. (Refer to the materials accompanying this proposal at the end of the plan). One such nesting box is manufactured by S&K Manufacturing. They sell kits including everything needed for a complete installation. Their Combo American Barn - 12 Family Purple Martin Barn provides 12 ea. 6" x 9" compartments, mounted on a 12 foot tall pole. The compartments come with Starling proof openings, as well as perches. The pole comes with a pulley system for easy lowering of the barn for maintenance. The price of this model is \$130.00, therefore approximately 11 kits could be purchased with the \$3,000.00 commitment by Carbon Resources assuming an installation cost of \$130 each (11 x \$130.00/kit + \$130.00 X 11/installation). The number of nesting boxes may vary by manufacturer dictating the final number of boxes installed. Other nest boxes are also available. The final choice of nest boxes will be coordinated with the agencies involved.

Installation and maintenance

Carbon Resources will install and maintain the boxes for 10 years. Installation will be by manufacturers' and UDWR and UDOGM recommendations. If installed before site construction, they will be installed in areas that will not be used for mining facilities. Locations for the installations will be coordinated with the agencies mentioned above. Maintenance will also be done according to manufacturers' or Purple martin experts recommendations, or agencies recommendations. Several resources for Purple martin information has been found on the internet, copies of which are attached to this plan. (Refer to the materials at the end of this proposal for details on maintenance and Purple martin issues).

The option of having Scofield Town residents maintain nesting boxes at their property was also discussed and is a viable alternative. Carbon Resources will work with the agencies in accomplishing this alternative if it is chosen.

Alternative 2

Install Osprey nesting platforms in the Scofield area. Since Ospreys feed exclusively on fish it is assumed that the locations will need to be near Scofield Reservoir. Locations for the platforms will be selected by UDOGM and UDWR, with input from the U.S. Fish and Wildlife Service. The Utah State Park locations at Scofield Reservoir may be locations that are favorable, or other sites on private property can be pursued. The number of nest platforms constructed will depend ultimately on which alternative/s are chosen.

Design details and information on Osprey nesting platforms is included at the end of this proposal. A plethora of information is available on the internet; only a few of which are included with this proposal. Construction of the platforms is straight forward and can be accomplished by any reasonably qualified carpenter. Installation of the pole will be the biggest challenge, and will be accomplished by any necessary means depending on the locations chosen.

Alternative 3

Purchase and make available for sportsman's use non-lead bullets and or shotgun shells. Non-lead ammunition is becoming desirable and even required in some cases to help prevent lead poisoning of raptors from eating contaminated dead animals and birds. This ammunition will be made available by any reasonable means including having it available at the Pay and Pack convenience store in Scofield, or by other methods recommended by the UDWR and UDOGM. Carbon Resources has discussed this alternative with the owner (Jim Levanger) of the Pay and Pack store, who graciously volunteered to cooperate with the program. Jim recognizes the benefits of non-lead ammunition and also believes this program would be a good merchandising tool for his store.

Summary

Carbon Resources is excited about this mitigation opportunity and looks forward to working with the agencies to accomplish the plan. We commit to completing the mitigation plan during the 2011 construction season (normally by the end of October), or in a time frame determined and approved by the agencies.

Exhibit 17

The Cumulative Hydrologic Impact Assessment (CHIA) for the Kinney No. 2 Mine can be viewed on the UDOGM web site

<http://linux1.ogm.utah.gov/WebStuff/wwwroot/coal/chias.php>.

Exhibit 21

The following documents found in this Exhibit are located in the Confidential binder at the Salt Lake City UDOGM office:

SHPO Decision of No Adverse Effect

UDOGM Decision of No Adverse Effect

Montgomery Archeological Consultants Informational Letter

Map 2

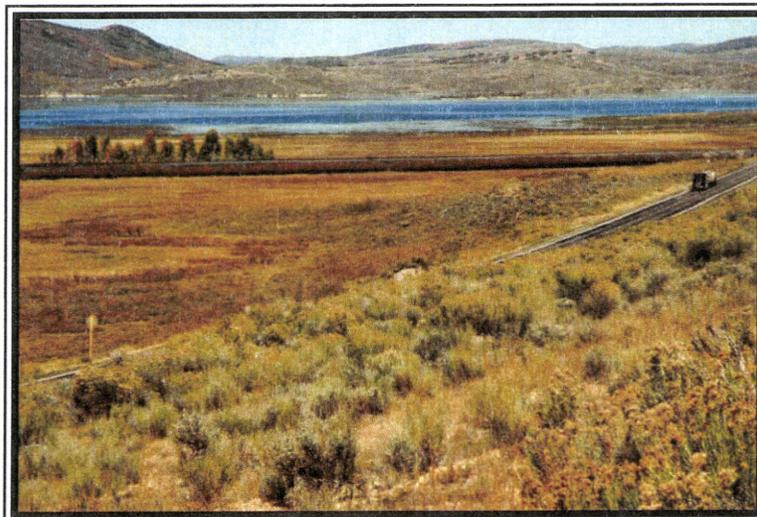
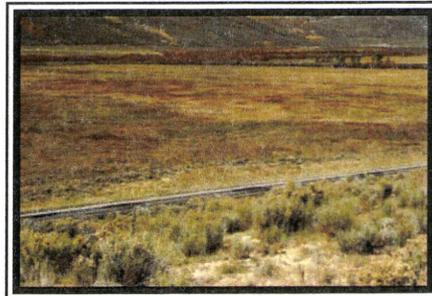
Map 2, Raptor Map is located in the Confidential binder for the Kinney no. 2 Mine in the UDOGM Salt Lake City office.

Exhibit 21

PERMIT DOCUMENTATION

**Vegetation In
The Alluvial Valley Floor Study Area
Adjacent To The Kinney No. 2 Mine 2012**

VEGETATION IN THE
ALLUVIAL VALLEY FLOOR
STUDY AREA
ADJACENT TO THE
KINNEY NO. 2 MINE SITE
2012



Views of the Study Area from the Proposed Kinney 2 Mine Site

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TABLE OF CONTENTS

INTRODUCTION	1
METHODS	2
Vegetation Studies	2
Aerial Photographs	2
RESULTS	3
DISCUSSION	3
SUMMARY & CONCLUSIONS	5
RESULTS TABLE	6
FIGURES (Color Photographs of the Study Areas)	8
MAP OF THE STUDY AREA	22

INTRODUCTION

An new coal mine has been proposed for development at the site where historical coal mining operations have been conducted. The new Kinney No. 2 Mine site is located in Carbon County, Utah just northeast of the town of Scofield. Elevation of the permit area ranges from approximately 7,700 to 8,600 ft above sea level, with most of the surface facilities proposed in the lower elevations of that range.

A Mining & Reclamation Plan (MRP) has been submitted to the State of Utah, Division of Oil Gas & Mining (DOGGM) as part of a permit application package. The permit application has been approved but subject to a few contingencies. One such contingency was to conduct a follow up study in an area adjacent to the mine site where there is a potential *Alluvial Valley Floor* (AVF). Chapter 9, "Special Categories", of the MRP provided maps and descriptions of the AVF area. Section "R645-302-320 Alluvial Valley Floors" of Chapter 9 identified two areas which were called "True AVF" and "Quasi AVF". DOGM requested follow up studies of the vegetation in both of these areas during the growing season of 2011. This document reports the findings for these field studies.

METHODS

Vegetation Studies

For the follow up study to the aforementioned Chapter 9 of the MRP, the following commitment was made.

Patrick Collins (Mt. Nebo Scientific) will conduct a vegetation field study during the 2011 field season. The study will provide qualitative data about the vegetation present in the potential AVF area including a description of the plant communities, species lists, general abundance and other relevant biological information regarding AVF's. Once the study is completed, Carbon Resources will provide Dr. Collins' final report to the Division to be inserted to the Kinney No. 2 Mining and Reclamation Plan.

The field work for this study was conducted in September 2011. The "True AVF", "Quasi AVF" and "Marsh" areas mentioned in that chapter were surveyed. The vegetation types were mapped in the field using color infrared (CIR) and standard color aerial photographs (see below). The dominant plant species in each community type were noted and have been included in this report. Finally, color photographs were taken onsite during the field investigations in each study area located within the boundaries of the AVF's.

Aerial Photographs

The following statement and commitment was also included in Chapter 9 of the MRP.

A search is currently being conducted for appropriate IR aerial photography by Carbon Resources. Depending on the availability, the following IR photographs will be used by Patrick Collins (Mt. Nebo Scientific) in conjunction with the aforementioned vegetation field study for the AVF analysis: (1) a series for photographs throughout the growing season covering the area, or (2) a late-spring/early summer and late-summer/early-fall combination, or (3) a growing season photograph (preferably late summer-early fall). If no existing appropriate color IR photographs are available, field studies that identify phreatophytes (plants that depend on ground water) will be used with standard color aerial photography for the AVF study. Once the aerial photography review and the field study are completed, a final report will be written and submitted to the Division for insertion the Kinney No. 2 Mining and Reclamation Plan.

Growing season aerial photographs used for the study included: CIR (1974, 2006, 2009) and standard color aerial photographs (2011); these were used in conjunction with field work conducted in September 2011.

RESULTS

A summary of the results of the field investigations has been provided in Table 1. The table shows: 1) plant community types within the *potential* AVF areas, 2) site numbers of the study areas (these sites are also shown on Map A), 3) figure numbers (the figures are color photographs of each study area), 4) dominant species found in the community types, 5) notes about each study area, and 6) a relative (qualitative) Moisture Index (an artificial index or professional judgment of the “wetness” of the given community based on plant species present and vigor of the plants late in the growing season).

DISCUSSION

The Department of the Interior, Office of Surface Mining (OSM), uses both technical and regulatory definitions to characterize AVF's. The objective of this study was to map and qualitatively describe the plant communities adjacent to the proposed new Kinney No. 2 Mine site that were depicted in the MRP as “True AVF” and “Quasi AVF”– but *not* to make a further determinations of their AVF status. That said, one of the geologic/hydrologic criteria used for identification of an AVF is the presence of groundwater that is sufficient for subirrigation in agricultural activities. Biologists often characterize the plant communities in the study area to make such determinations. For example, the presence of phreatophytes, hydrophytes or riparian vegetation suggests the existence of subirrigation in that area. Plants that are subirrigated are in

areas where the water is recharged by groundwater and not infiltration by precipitation events, surface runoff or snowmelt. Subirrigated plants usually have water available to them throughout the entire growing season and do not experience as much water-related stress as upland plants late in the growing season.

With the above in mind, CIR aerial photographs can provide information for the determination of subirrigation. If the photographs are taken late in the growing season and water from precipitation events, surface runoff and snowmelt has been depleted, high reflectivity shown in these photographs suggest water in the leaves which is a function of the water available to the rooting systems. That said, visiting the study site late in the growing season to identify those plant communities that remain green and vigorous and have not gone brown and dormant, along with identification of the plant species present in them, is similar to using CIR to make these determinations.

SUMMARY & CONCLUSIONS

Fieldwork was conducted that mapped and qualitatively described the plant communities adjacent to the proposed new Kinney No. 2 Mine site. These communities were located within the boundaries of the "True AVF" and "Quasi AVF" (terms from Kinney Mine's MRP, Chapter 9). Plant species present in a given community can help to determine the existence of subirrigation, an important attribute in AVF's. Species lists of the dominant plants present in the study areas were made. A relative "Moisture Index" (or qualitative assessment) was then assigned to each study area as determined by these species (i.e. the presence of phreatophytes, hydrophytes and riparian vegetation) and their vigor late in the growing season.

TABLE 1: Summary of results from fieldwork conducted in the potential AVF adjacent to the Kinney No. 2 Mine site.

COMMUNITY NAME (and Moisture Index)	SITE NO. (see also Map A)	FIGURE	DOMINANT SPECIES	NOTES
Vasey Sagebrush/ Rabbitbrush ^(a)	1	Figure 1	<p>SHRUBS <i>Artemisia tridentata</i> var. <i>vaseyana</i> <i>Chrysothamnus nauseosus</i> <i>Chrysothamnus viscidiflorus</i> <i>Symphoricarpos oreophilus</i></p> <p>FORBS <i>Eriogonum heracleoides</i> <i>Penstemon watsonii</i></p> <p>GRASSES <i>Elymus spicatus</i> <i>Poa fendleriana</i> <i>Poa pratensis</i> <i>Poa secunda</i></p>	This site is adjacent to the highway. It could have partially been created as result of previous road building activities because it did not seem to be a natural land form.
Silver Sagebrush/ Tall Oatgrass ^(b)	2	Figure 2	<p>SHRUBS <i>Artemisia cana</i></p> <p>FORBS <i>Carduus nutans</i></p> <p>GRASSES <i>Arrhenatherum elatius</i> <i>Elymus spicatus</i> <i>Elymus smithii</i> <i>Stipa nelsonii</i></p>	<p>Slightly lower elevation (5-7 ft) than Site 1. Closer to water table.</p> <p>Probably soil map unit 109 in the MRP.</p>
Wiregrass ^(c)	3 6 15	Figure 3 Figure 5 Figure 25	<p>FORBS <i>Achillea millefolium</i></p> <p>GRASSES/GRASS-LIKES <i>Agrostis stolonifera</i> <i>Carex nebrascensis</i> <i>Deschampsia caespitosa</i> <i>Juncus arcticus</i></p>	<p>Slightly lower elevation (2 ft) than Site 2 and closer to water table.</p> <p>Probably soil map unit 108 in the MRP.</p> <p>Nebraska sedge was the dominant in localized (wetter) areas in this community.</p> <p>Sites appear to be subirrigated and appear to be wetter than Site 4.</p>
Pasture/Meadow ^(b,c,d)	4 5 10 11 13	Figure 4 Figures 7, 8 Figures 12, 13 Figure 14 Figures 19, 20, 23, 24	<p>GRASSES/GRASS-LIKES <i>Carex</i> spp. <i>Dactylis glomeratus</i> <i>Deschampsia caespitosa</i> <i>Elymus cinereus</i> <i>Elymus smithii</i> <i>Juncus arcticus</i> <i>Lolium perenne</i> <i>Phleum pratensis</i> <i>Poa pratensis</i> <i>Poa secunda</i></p>	<p>Sites were sometimes dominated by different species. They appeared only slightly lower in elevation (1 ft) than Site 3; closer to water table.</p> <p>Many of these sites are often cut for hay (as seen in a 2006 CIR aerial photograph).</p>

TABLE 1: Summary of results from fieldwork conducted in the potential AVF adjacent to the Kinney No. 2 Mine site.

	18	Figures 35, 36, 38	<i>Sitanion hystrix</i> <i>Triglochin maritima</i> FORBS <i>Aster ascendens</i> <i>Achillea millefolium</i> <i>Taraxacum officinale</i>	<p>Nebraska sedge was the dominant in localized (wetter) areas within these communities (i.e. Site 7).</p> <p>Each of the species shown at the left where dominate depending on the pasture/meadow site.</p> <p>Figure 24 shows an old ditch in Site 13.</p>
Nebraska Sedge ^(d)	7	Figure 6	GRASSES/GRASS-LIKES <i>Carex nebrascensis</i>	Area seems to be about the lowest area in the topography here.
Wiregrass/Forbs ^(b)	8 9	Figure 9 Figures 10, 11	FORBS <i>Achillea millefolium</i> <i>Aster ascendens</i> <i>Carduus nutans</i> <i>Sisymbrium altissimum</i> GRASSES/GRASS-LIKES <i>Juncus arcticus</i> <i>Poa pratensis</i>	<p>These areas appear slightly higher in elevation and therefore dryer (perhaps not, or less, subirrigated).</p> <p>Some "weedy" annuals and perennial forbs were common here.</p> <p>The noxious weed, musk thistle, was common in localized patches.</p>
Willow ^(d)	12	Figures 15,16, 17,18	SHRUBS <i>Salix boothii</i> <i>Salix exigua</i>	These willow communities were along Mud Creek and spread laterally where the water table was high.
Sedge/Rush ^(d)	14	Figures 21, 22, 37	GRASSES/GRASS-LIKES <i>Carex spp.</i> <i>Juncus spp.</i>	This is a spring channel that was easily seen on the aerial photographs.
Swamp ^(d)	16	Figures 26, 27, 28, 29, 30, 31, 32, 33	SHRUBS <i>Salix boothii</i> <i>Salix spp.</i>	This area was comprised mostly of water and willows; the water of the reservoir receding late in the growing season.
Wet Meadow ^(d)	17	Figure 34	FORBS <i>Ranunculus spp.</i> GRASSES/GRASS-LIKES <i>Carex spp.</i> <i>Juncus spp.</i> <i>Poa spp.</i>	This area was comprised mostly of grasses, rushes, sedges; then later in the season of bareground and annual forbs that come up as the water recedes.
<u>Relative Moisture Index</u> ^(a) Low ^(b) Medium ^(c) High ^(d) Very High				

FIGURES

COLOR PHOTOGRAPHS
OF THE
STUDY AREAS

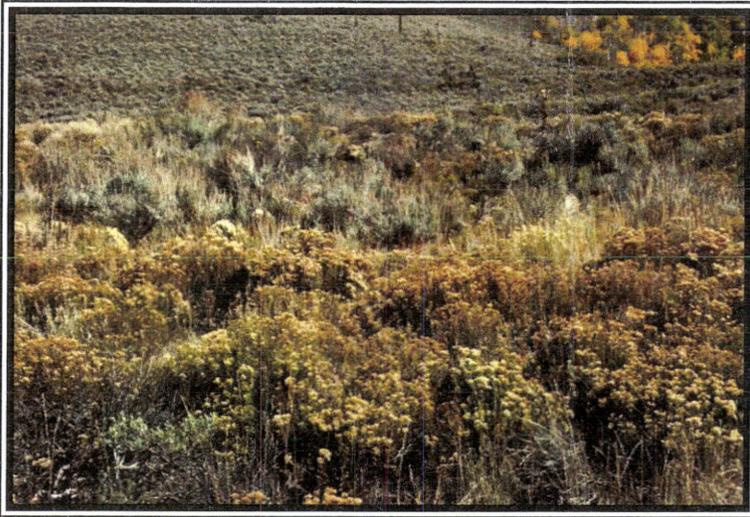


Figure 1

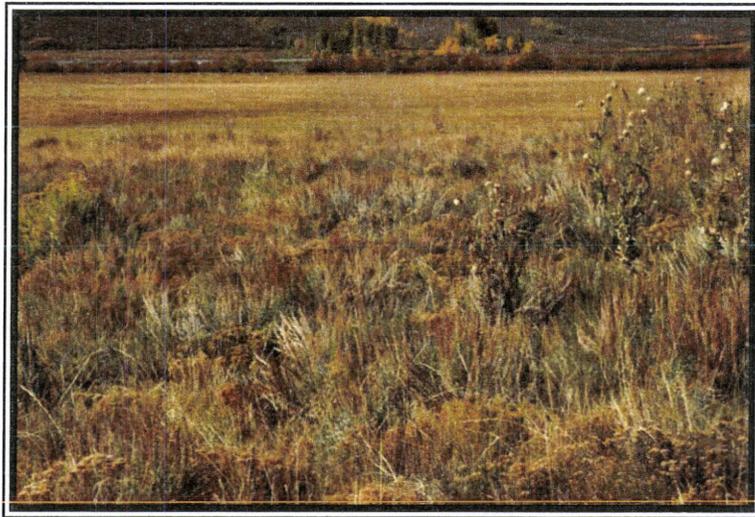


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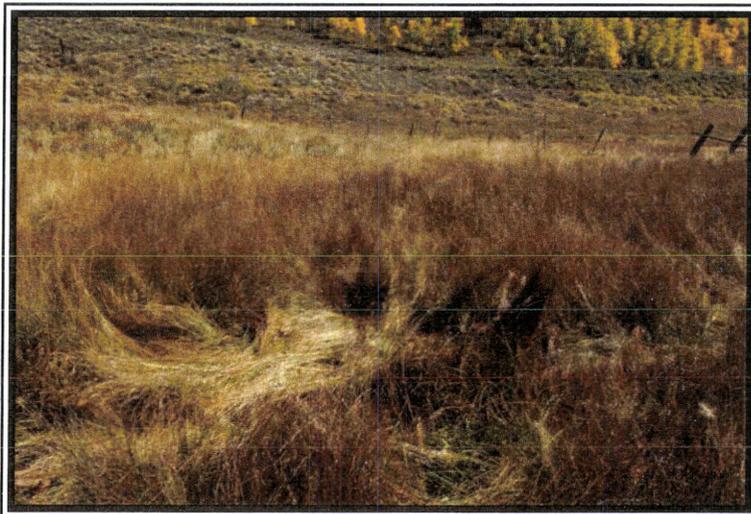


Figure 3



Figure 4

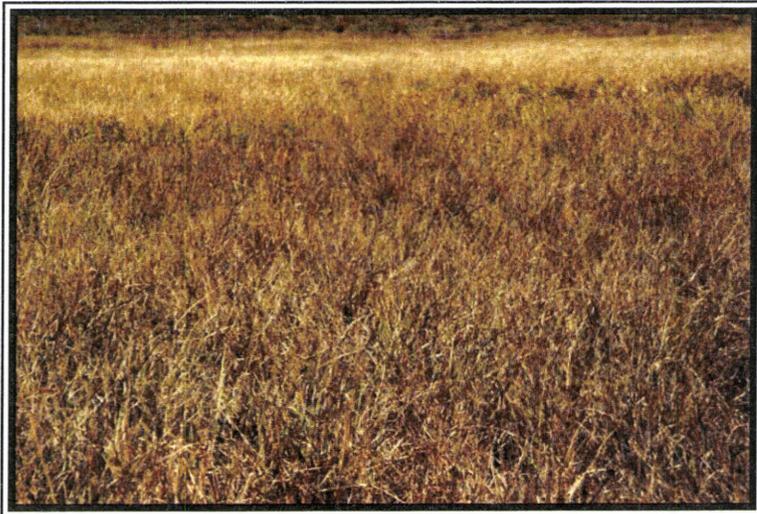


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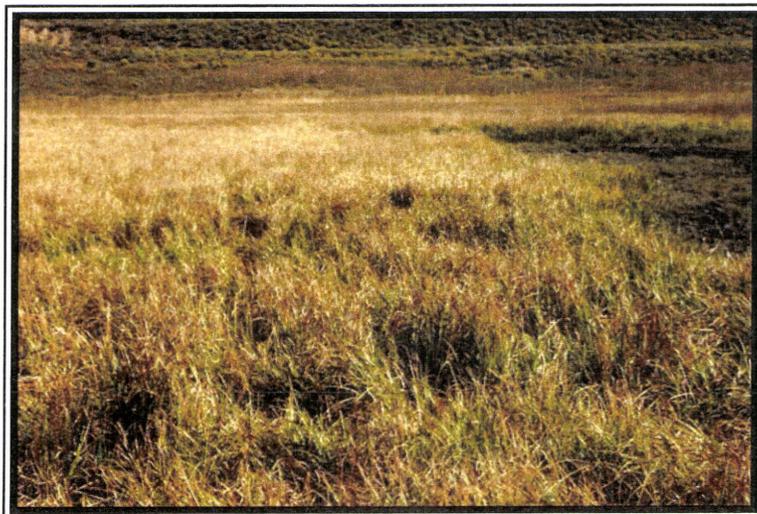


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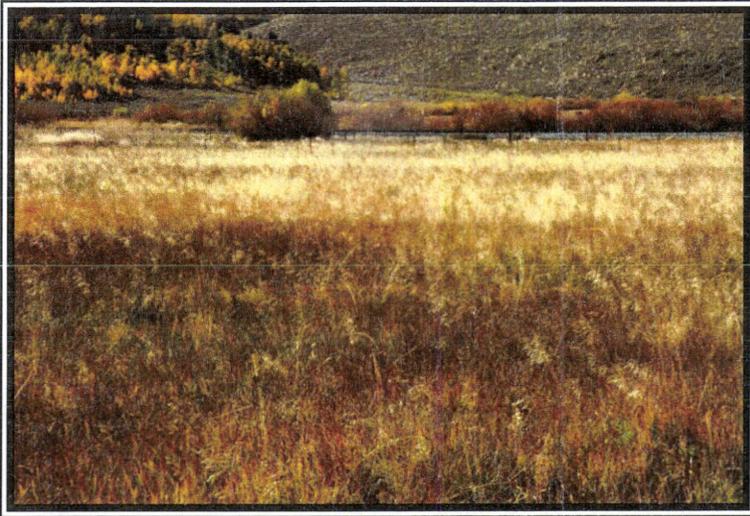


Figure 7



Figure 8



Figure 9



Figure 10

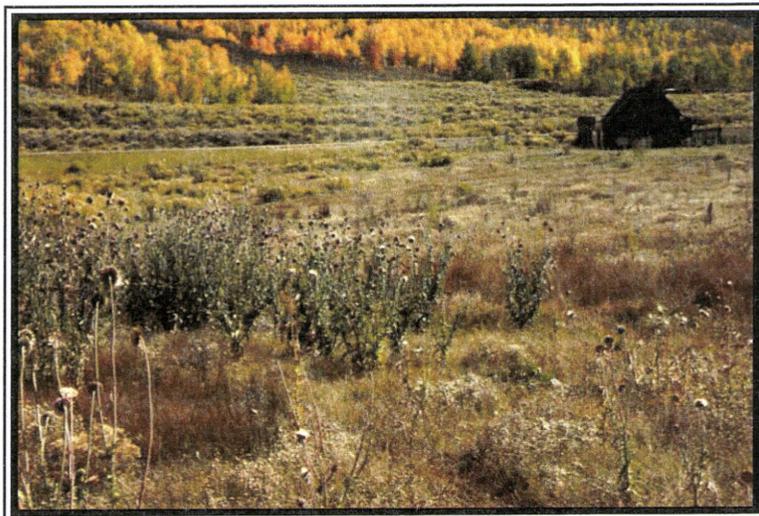


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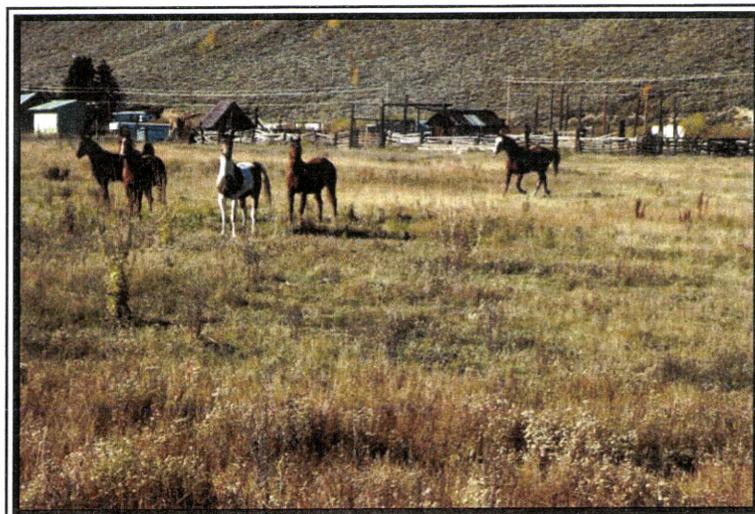


Figure 12



Figure 13



Figure 14

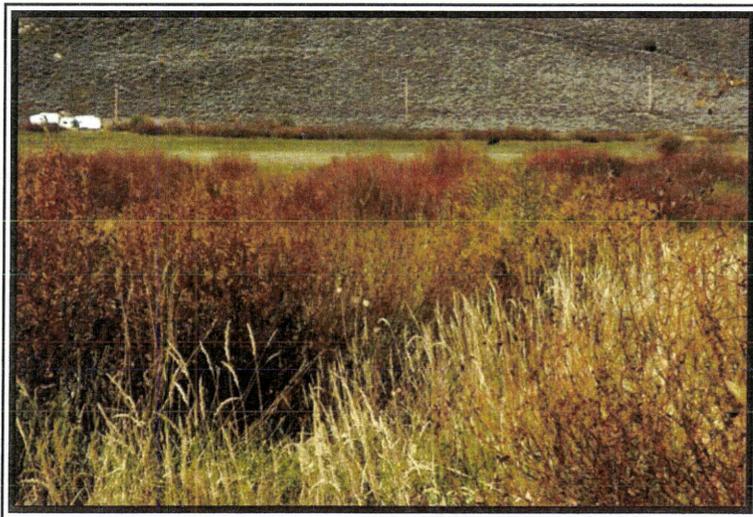


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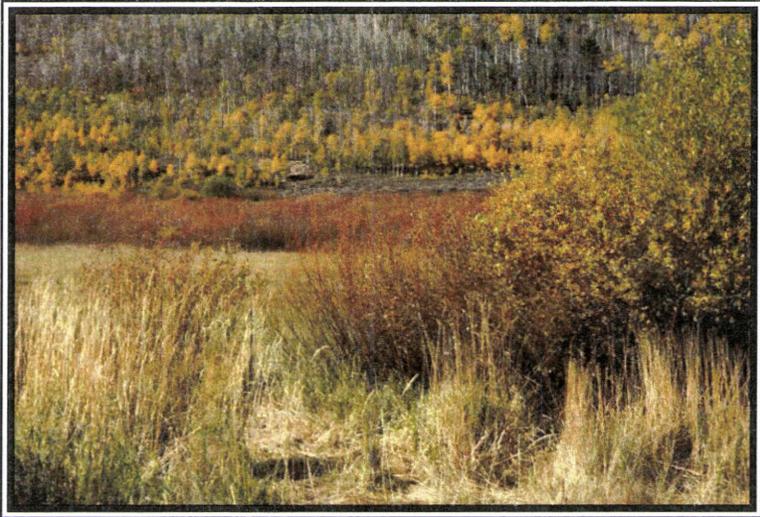


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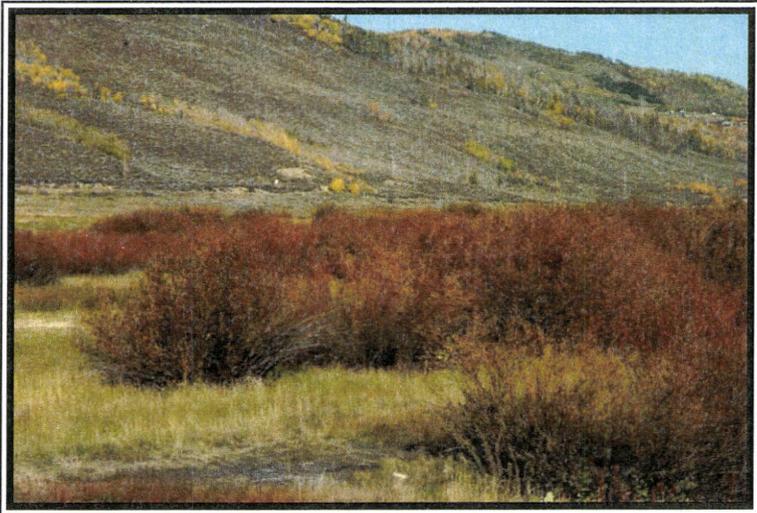


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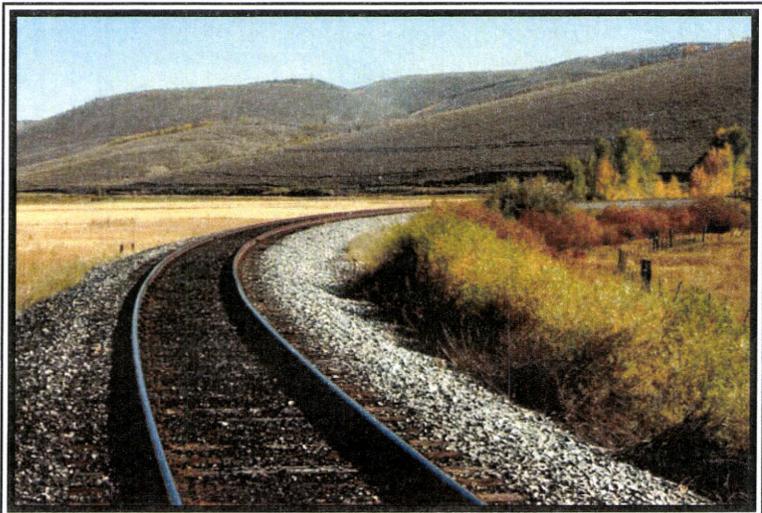


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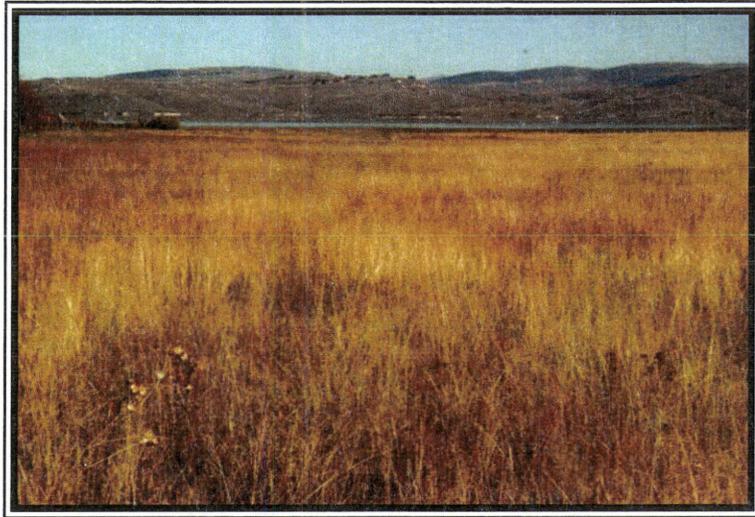


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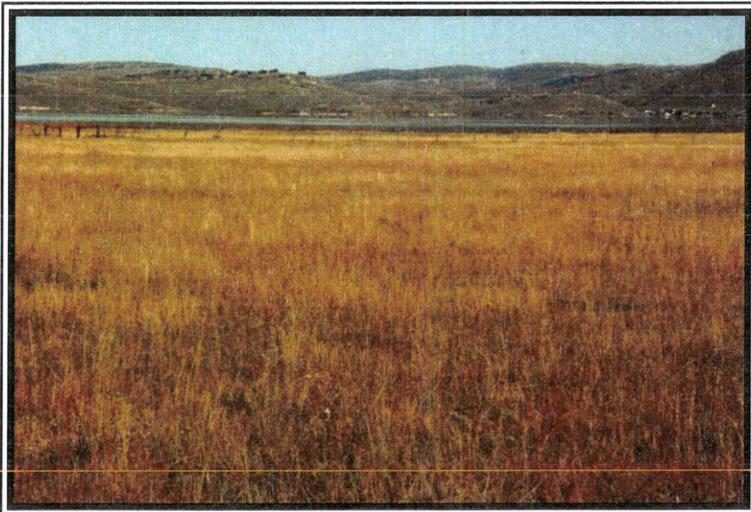


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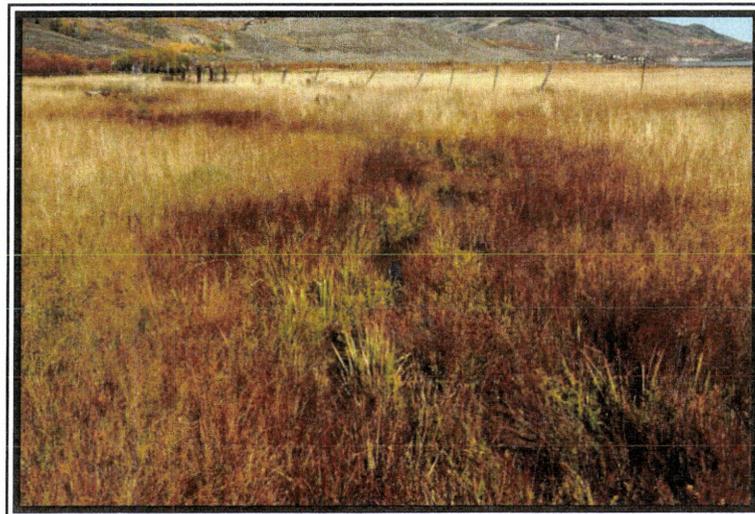


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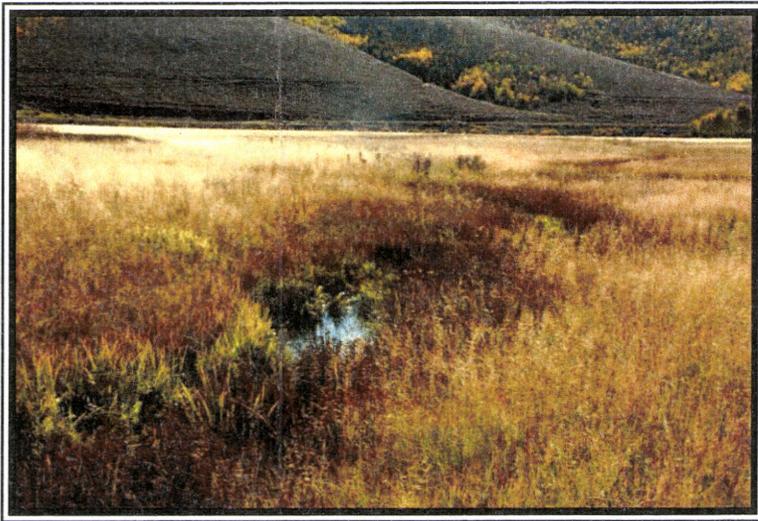


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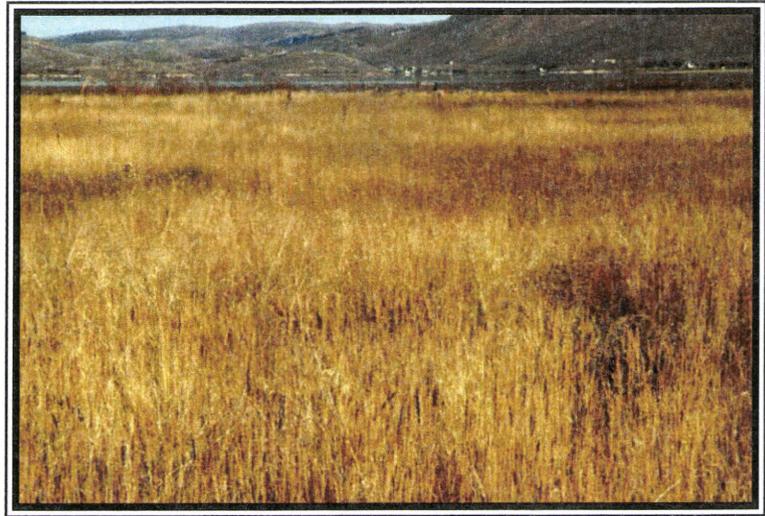


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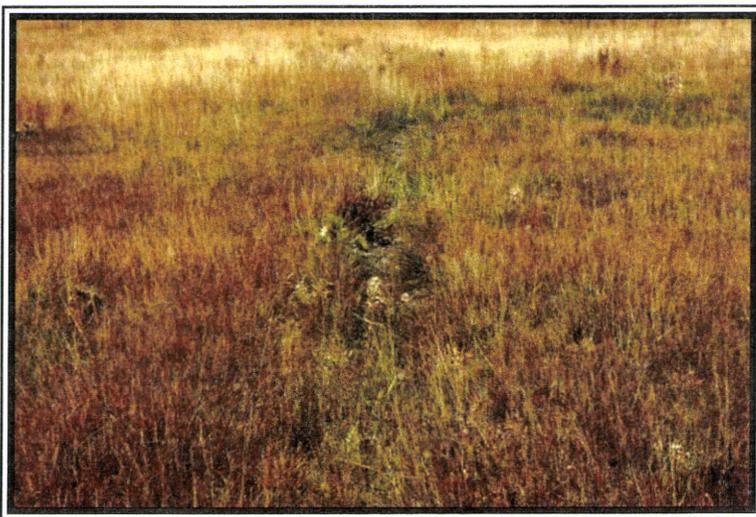


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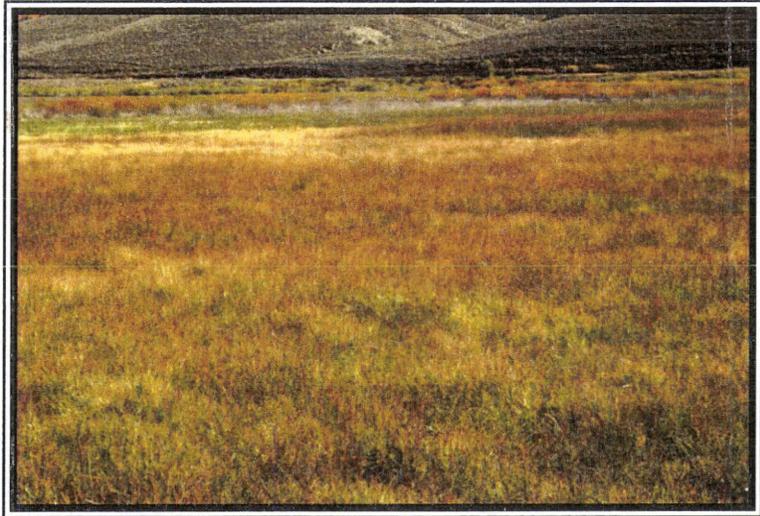


Figure 25



Figure 26

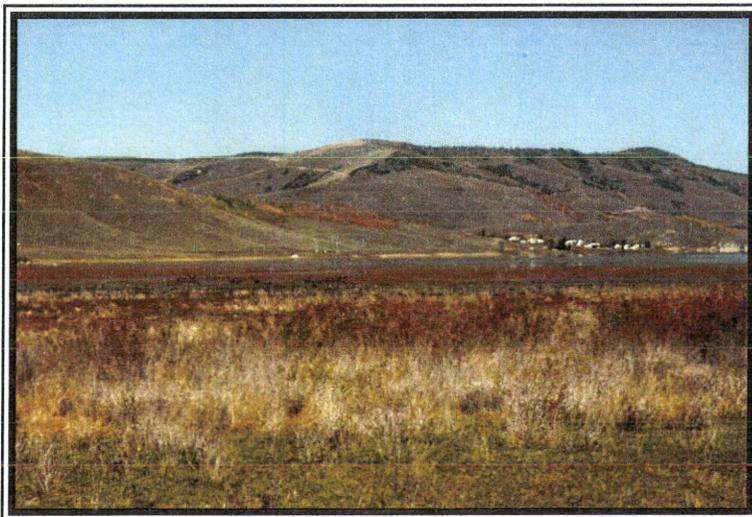


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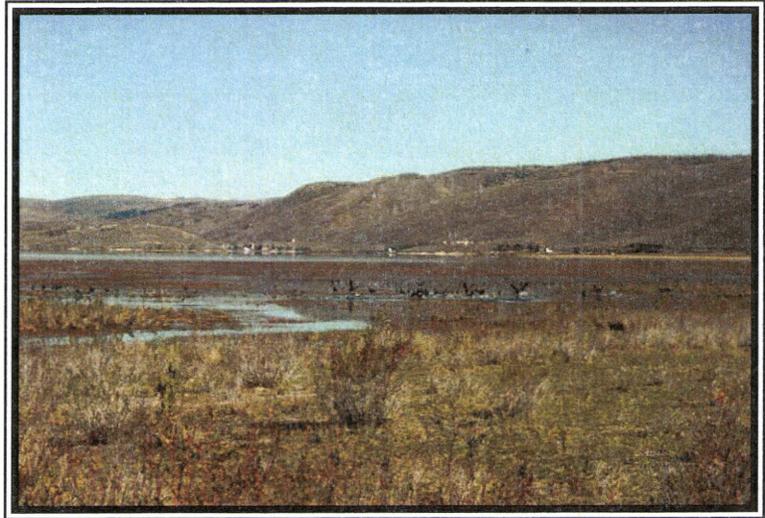


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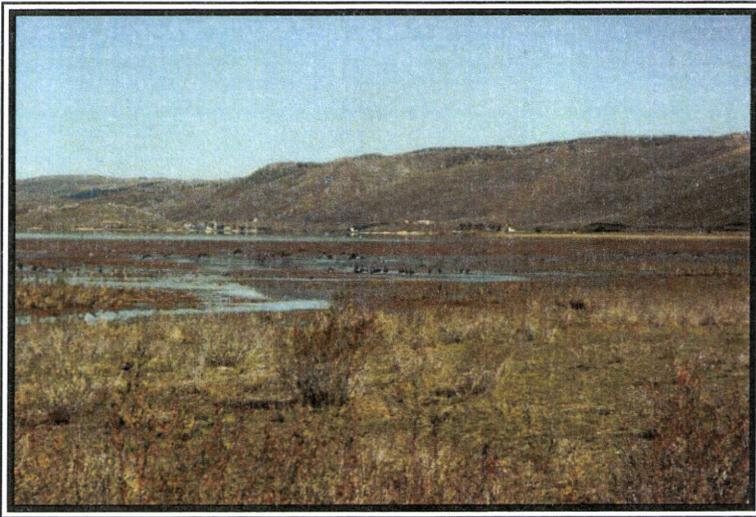


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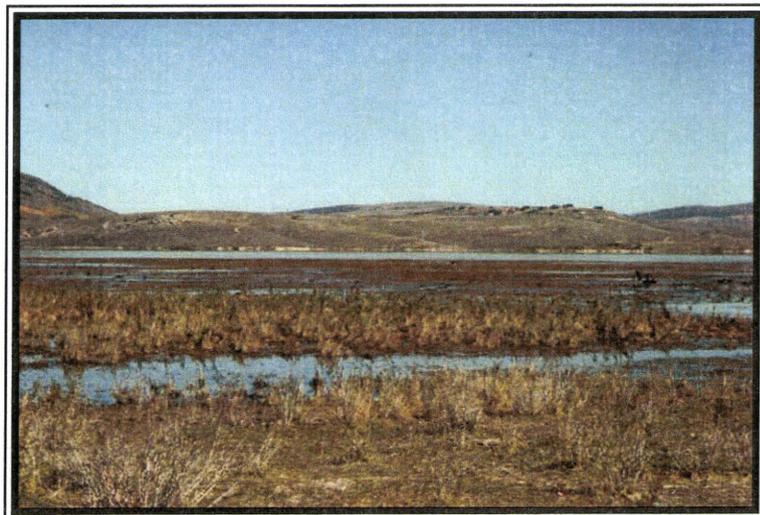


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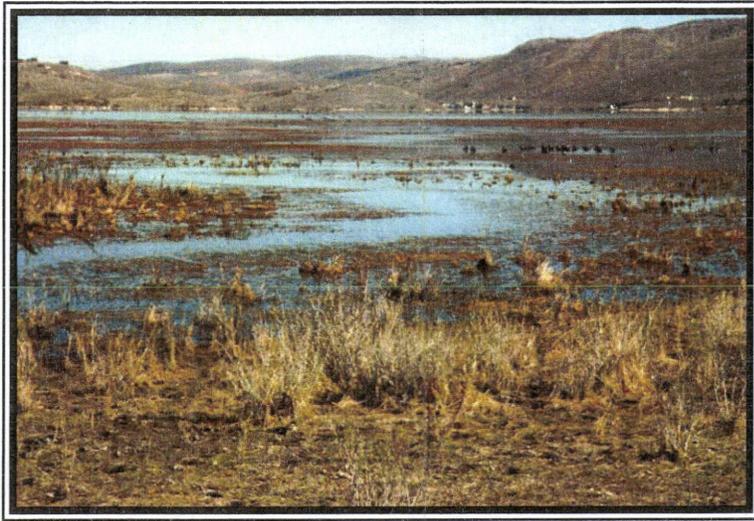


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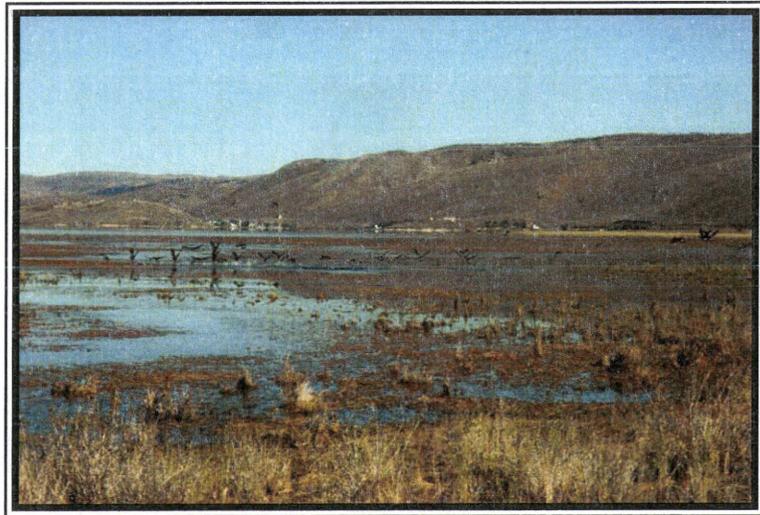


Figure 32



Figure 33

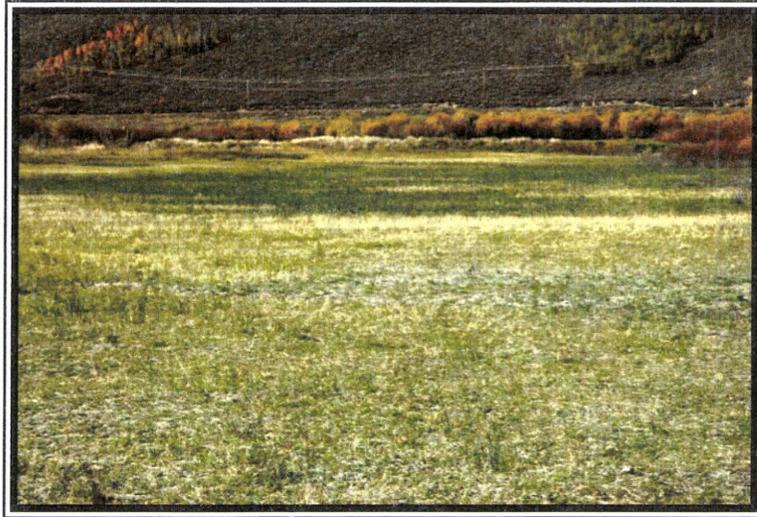


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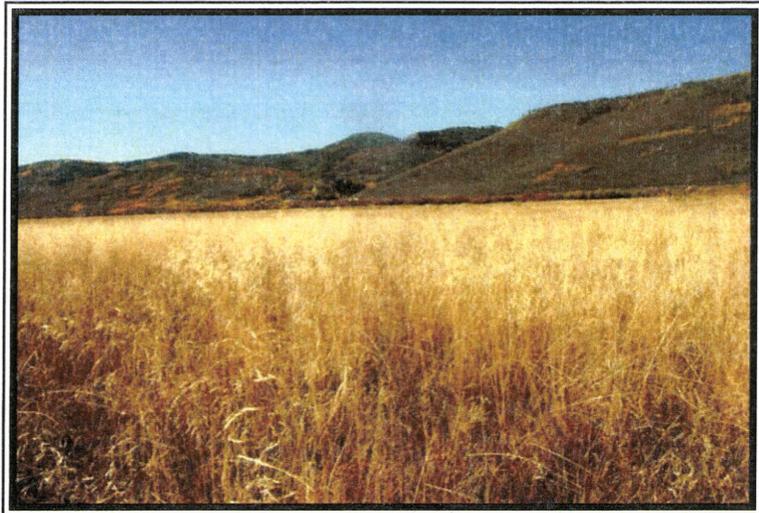


Figure 35



Figure 36

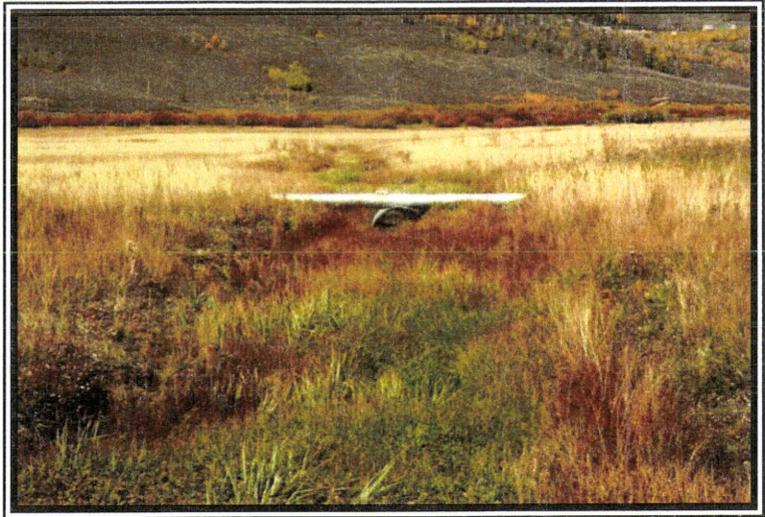


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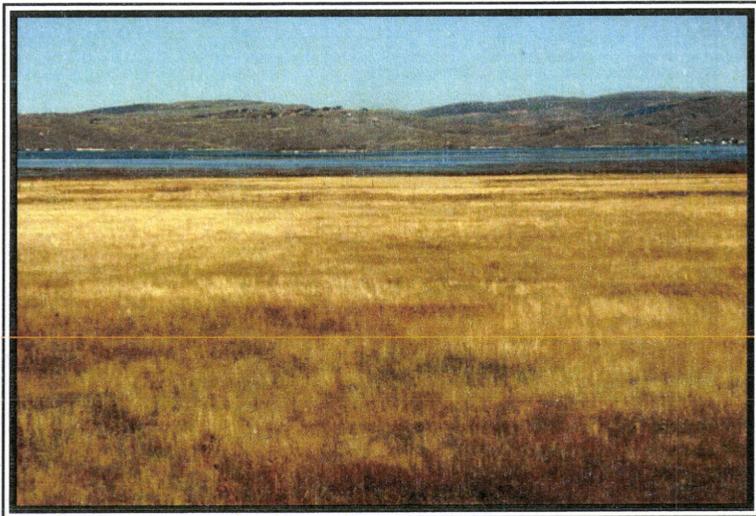


Figure 38

MAP

PLANT COMMUNITIES
IN THE
POTENTIAL AVF AREA

