

**PROGRAMMATIC AGREEMENT
BETWEEN
THE U.S.D.I. BUREAU OF LAND MANAGEMENT, UTAH,
THE UTAH STATE HISTORIC PRESERVATION OFFICER,
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION,
THE STATE OF UTAH
SCHOOL AND INSTITUTIONAL TRUST LANDS ADMINISTRATION,
CARBON AND DUCHESNE COUNTIES,
AND BILL BARRETT CORPORATION
REGARDING THE WEST TAVAPUTS PLATEAU NATURAL GAS FULL
FIELD DEVELOPMENT PLAN IN CARBON AND DUCHESNE
COUNTIES, UTAH**



Bureau of Land Management
Price Field Office
January 2010

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SCHOOL AND INSTITUTIONAL TRUST LANDS ADMINISTRATION,
CARBON AND DUCHESNE COUNTIES,
AND BILL BARRETT CORPORATION
REGARDING THE WEST TAVAPUTS PLATEAU NATURAL GAS FULL FIELD
DEVELOPMENT PLAN IN CARBON AND DUCHESNE COUNTIES, UTAH**

WHEREAS, the Bill Barrett Corporation and other operators (Operator(s)) propose to develop natural gas resources on leased and currently unleased lands in the West Tavaputs Plateau Project Area (Project), which includes Federal, State, and private lands in Carbon and Duchesne Counties in eastern Utah, as described in Attachment A-Project Description; and

WHEREAS, the Bureau of Land Management (BLM) is a multiple use agency responsible for the leasing and development of fluid mineral resources as well as the protection of cultural resources as authorized by the Federal Lands Policy and Management Act (FLPMA) of 1976 (43 USC 1701) and;

WHEREAS the BLM Utah State Director is -the agency official pursuant to 36 CFR Part 800.2 (a), and has determined that this project is an undertaking as defined under 36 CFR 800.16(y), and is responsible for signing this Programmatic Agreement (Agreement); and

WHEREAS, the BLM in consultation with the Utah State Historic Preservation Officer (SHPO), Advisory Council on Historic Preservation (ACHP), and the Consulting Parties have developed an Area of Potential Effect (APE) which includes 149,579 acres (see Attachment B-APE letter and map); and

WHEREAS, the BLM has determined that development of natural gas resources within the APE may have an adverse effect on properties included in or eligible for inclusion in the National Register of Historic Places (NRHP) (see Attachment C-Adverse Effect Determination Letter) and has consulted with the SHPO, the ACHP, and Consulting Parties to create this Agreement pursuant to 36 CFR Part 800.6 and 800.14(b) of the ACHP's regulations implementing Section 106 of the NHPA, as amended, [16 U.S.C. Section 470 (f)] as incorporated by reference herein; and

WHEREAS, the Federal agencies consult with the SHPO to ensure that historic properties are taken into consideration at all levels of Project planning and development for undertakings that may affect historic properties pursuant to 36 CFR Part 800.2 (c)(1); and

WHEREAS, the ACHP has elected to participate in the consultation process for this Agreement under 36 CFR Part 800.6 (a)(1); and

WHEREAS, the BLM is responsible for government-to-government consultation with Federally recognized Indian Tribes for this undertaking and is the lead agency for all Native American consultation and coordination, and has formally invited the Indian tribes and Native American organizations listed as interested parties to participate in consultation, and continue to be

consulted regarding the potential effects of the Project on historic properties to which they ascribe traditional religious and cultural significance (see Attachment D-Tribal Consultation Summary); and

WHEREAS, the Ute Indian Tribe has participated in consultation and have been invited to be Concurring Parties to this Agreement; and

WHEREAS, the Hopi Tribe, the Navajo Nation, and Southern Paiute Tribe of Utah have been invited to participate in consultation and have been invited to be Concurring Parties to this Agreement; and

WHEREAS, the Project includes lands administered by the School and Institutional Trust Lands Administration (SITLA), an agency in the State of Utah that has a responsibility to comply with Utah Code Ann. § 9-8-404 on lands owned or controlled by the SITLA within the APE. The SITLA intends to employ this Agreement to address the applicable requirements for actions resulting from this Agreement involving SITLA and BLM land. The SITLA, however, does not waive its independent state statutory jurisdiction to make final decisions concerning its lands, and is not bound in its leasing or other approval authority by actions taken, or determinations made, concerning Federal lands, and has therefore been consulted and invited to be a Signatory to this Agreement; and

WHEREAS, the State of Utah Governor's Office has participated in the consultation process through involvement of the Public Lands Policy Coordination Office (PLPCO) and has been invited to be a Concurring Party to this Agreement; and

WHEREAS, Carbon and Duchesne Counties have participated in consultation and have been invited to be Signatories to this Agreement; and

WHEREAS, the applicants (Operators) have participated in consultation and have been invited to be a Signatory to this Agreement; and

WHEREAS, the National Trust for Historic Preservation (NTHP), Nine Mile Canyon Coalition (NMCC), Utah Rock Art Research Association (URARA), Utah Professional Archaeological Council (UPAC), Colorado Plateau Archaeological Alliance (CPAA), Utah Statewide Archaeological Society (USAS), Barrier Canyon Style (BCS) Project, and Southern Utah Wilderness Alliance (SUWA) have participated in consultation and have been invited to be Concurring Parties to this Agreement; and

WHEREAS, unless defined differently in this Agreement all terms are used in accordance with 36 CFR Part 800.16; and

NOW, THEREFORE, the Consulting Parties agree that the Project shall be administered in accordance with the following stipulations:

STIPULATIONS

The BLM will ensure that the following measures will be carried out:

1. The BLM shall coordinate overall actions required under this Agreement as specified herein. The Operator(s) will fund all cultural resources fieldwork, analysis, monitoring, data recovery, reporting, curation, rock art conservation, and other mitigation required under this Agreement with the exception of the National Register of Historic Places nomination and development of the site stewardship program.
2. The BLM has identified Consulting Parties pursuant to 36 CFR 800.2 and will consult with them on fulfillment of stipulations associated with this Agreement including possible expansion of the APE if determined by the Authorized Officer that the Project is having adverse effects on Historic Properties beyond the current boundaries.
3. The BLM will continue to consult with the appropriate Indian Tribes regarding historic properties of religious and cultural significance, in accordance with the NHPA, the Native American Graves Protection and Repatriation Act (NAGPRA), Archaeological Resources Protection Act of 1979 (ARPA), American Indian Religious Freedom Act of 1978 (AIRFA), Executive Order 13007 Sacred Sites, and their implementing regulations. The BLM will provide copies of any reports/studies developed pursuant to this Agreement to those tribes that have expressed a desire for information as it is gathered for the Project.
4. The BLM will ensure that all work undertaken to satisfy the terms of this Agreement meets the Secretary of the Interior's Standards and Guidelines for Archeological and Historic Preservation (48 FR 44716-44742, September 23, 1983) (the Secretary's Standards) and takes into consideration the ACHP's Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites, May 1999, Section 106 Archaeology Guidance (at: <http://www.achp.gov/archguide/>), and Guidelines for Evaluating and Documenting Traditional Cultural Properties, *National Register Bulletin 38*, 1989, as incorporated by reference herein. The BLM will also ensure that the work is carried out by or under the direct supervision of a person or persons meeting, at a minimum, the applicable professional qualifications standards set forth in the Secretary's Standards. The terms of this Agreement will also be carried out in accordance with any existing BLM guidelines for cultural resources (prehistoric and historic).
5. Inventory Procedures and Protocols
 - A. Class I Cultural Resource Inventory

The BLM will ensure that the Operator(s) revise the Class I Inventory to include the entire APE. A Class I inventory is a professionally prepared study that includes a compilation and analysis of all reasonably available cultural resource data and literature; and a management-focused, interpretive, narrative overview, and synthesis of the data.

B. Class II Cultural Resource Inventory

The Operator(s) will fund a Class II cultural resource inventory that will develop and test an archaeological site location model for the project APE. A Class II cultural resource inventory is a statistically based sample survey, designed to aid in characterizing the probable density, diversity, and distribution of cultural properties in an area. A Class II inventory is most useful for improving cultural resource information in large areas where previously conducted cultural resource surveys are insufficient and information is lacking and is well suited to address a number of issues relating to mobility and land use aspects of the Tavaputs Plateau region. A committee, recommended by the Concurring Parties and approved by the BLM will determine what areas will be surveyed not to exceed 3,700 acres (approximately 2.5 percent of the project APE). The Class II survey will be completed by a BLM-permitted archaeologist who will work with the BLM to develop the sample design appropriate to the selected survey area. Development of the site location model will begin within 3 months of Project initiation with a goal of completing the model within 18 months. Inventory and analysis is expected to be completed in approximately 5 years with updates at the annual meeting. Summary reports will be distributed to all Concurring Parties and Signatories.

C. Class III Cultural Resource Inventory

The Operator(s) will complete a Class III Cultural Resource Inventory in areas within the APE that are subject to potential surface disturbance and have not been previously inventoried, or areas on Federal lands where the BLM, in consultation with the SHPO determine that the results of previous inventories are inconclusive or inadequate. When possible, the same cultural resource inventory methods shall apply to private and State lands. The BLM will ensure implementation of the Preconstruction Cultural Resource Identification Plan, which outlines the procedures for inventory, identification, evaluation, management, monitoring, and mitigation (if necessary) of cultural resources within the WTP Project Area and is included in Attachment E.

D. National Register of Historic Places Nomination

The BLM has prepared cover documentation in support of a Multiple Property Submission (MPS) for Nine Mile Canyon, including historic, rock art, and West Tavaputs Adaptation contexts. Using these MPS contexts, the BLM shall prepare and annually submit 100 recorded individual sites on BLM lands to be nominated as districts or sites over the next 5 years or until all previously recorded eligible sites are listed.

6. Measures to Avoid, Minimize, and Mitigate Adverse Effects on Historic Properties

A. Cultural Resources Monitoring Plan

Beginning immediately after signing this Agreement, the Operator(s) will fund and the BLM will ensure implementation of the Cultural Resources Monitoring Plan, in Attachment F. The objectives of the Cultural Resource Monitoring Plan are to determine baseline information about a sample of sites, monitor those sites over time, and collect samples of dust from sites to determine if dust is being deposited on them. Reports detailing the outcomes of these activities will be produced per the schedules outlined in Attachment F. If the BLM determines that dust is continuing to accumulate, the BLM will mitigate impacts

as specified below in stipulation 7 and 8.

B. Conservation Treatments and Continuing Research

In 2005, the BLM took action to initiate a scientific study to assess the effects of dust from industrial traffic on rock art in Nine Mile Canyon (Silver 2008). Within the Dust Study, a program is outlined for continuing research on dust and its effects on rock art in Nine Mile Canyon and for remedial conservation treatments. In accordance with the recommendations of this study, the BLM will implement the following measures:

- i. Conservation Treatments: The presence of dust on rock art panels has been determined to be an adverse effect (Attachment C). Therefore, systems for removing dust from panels that have been affected by past oil and gas development will be developed and tested by a rock art conservator selected by the BLM. The BLM will develop a scope of work and ensure its implementation. The BLM will begin the contracting process with the goal of selecting a rock art conservator within 9 months of Project authorization. A committee consisting of the Operator(s) and three representative Concurring Parties or Signatories will recommend sites for conservation treatment to the BLM.
- ii. Continuing Research: Within 6 months of Project authorization the Operator(s) will fund and the BLM will select a consultant to initiate a study researching the potential impacts of dust on rock art in Nine Mile Canyon. While a more detailed research design will be developed by the consultant, at a minimum, the study will investigate what constituents are present in various dust samples taken from rock art panels, and whether the dust is causing physical degradation of the rock art.

7. If monitoring data or research reports discussed in Stipulation 6 shows that project related human activity and/or dust generated by project-related traffic has documented adverse impacts to historic properties, the BLM, as the party responsible for protecting cultural resources on Federal lands within the APE, shall:

- A. Make recommendations to the County and Operator(s) that they immediately increase dust suppression efforts.

If no improvement is shown within 15 days the BLM shall:

- B. Require additional conservation treatments;
- C. Require additional project-related traffic reduction measures; and/or
- D. Stop or limit approvals of new APDs and deny or limit new ROW applications.

8. Nine Mile Canyon Road Committee and Dust Suppression Plan

A. Dust Suppression Plan

The BLM will ensure that on-going dust suppression efforts will continue on those segments of road discussed within the Dust Suppression Plan (see Attachment G) in, using 1) dust suppressant materials that were evaluated during previous tests within Nine Mile Canyon; or 2) materials that are tested and found to be effective and environmentally safe in the future. After project initiation, the BLM will ensure that dust suppression efforts are expanded to include portions of Nine Mile and Gate Canyon

Roads within the APE. Dust will be considered controlled when 1) no dust is generated above the cab of the vehicle; 2) there are no hanging dust plumes; or 3) until a less subjective but equally effective method of evaluating the effectiveness of suppressant materials is approved by the Nine Mile Canyon Road Committee. Within portions of the APE west of Sheep Canyon, if the Operator(s) can demonstrate that there are no eligible rock art sites, through Class III inventory, located within 500 horizontal or vertical feet of the road, a less stringent standard could be applied. The BLM Authorized Officer will approve this standard. The BLM will ensure compliance with dust standards as discussed in Stipulation 7.

B. Use of Magnesium Chloride

The Operator(s), as well Carbon and Duchesne Counties, have agreed to discontinue the use of magnesium chloride as a form of dust suppression within canyon bottoms in the APE unless scientific research demonstrates there are no negative effects on rock art.

C. Role of the Nine Mile Canyon Road Committee

The Nine Mile Canyon Road Committee, which was created and is chaired by Carbon County, will continue to make recommendations to the Duchesne and Carbon County commissions regarding steps that should be taken to maintain and improve the Nine Mile Canyon Road. Meetings will be held every 3 months in accordance with the Committee's charter. Other participating entities include Duchesne County, representatives of the State of Utah, the BLM, Operator(s), and historic preservation organizations (i.e., Nine Mile Canyon Coalition).

Within 3 months of signing this Agreement, the Nine Mile Canyon Road Committee will commission a study to evaluate various dust collection devices and procedures with the objective of identifying a dust monitoring method that will be quantitative, cost effective, and easy to operate. Implementation of the new dust monitoring program will occur prior to project initiation.

Once this evaluation is completed the results will be distributed - by the contractor to all members of the Nine Mile Canyon Road Committee. If the committee agrees that - one or more of the dust monitoring methods should be adopted for future use, a recommendation will be submitted to the respective County Commissions. If the County Commissions are agreeable to the changes in dust monitoring, the Nine Mile Canyon Dust Suppression plan will be modified by the Road Committee. All Signatories and Concurring Parties to this agreement will be notified of any such changes by the BLM within 30 days.

9. In an effort to reduce the volume of industrial traffic, as well as mitigate visual and auditory impacts, the BLM will require the Operator(s) to implement all applicant committed environmental protection measures, Best Management Practices (BMP), and mitigating measures, which will be incorporated into the Record of Decision (ROD) for the West Tavaputs Plateau Natural Gas Full-Field Development Plan Environmental Impact Statement (WTP EIS).

10. Hopi Ethnographic Study

The Hopi tribe has expressed concerns regarding traditional use of the West Tavaputs Plateau. To address these concerns, the BLM is completing an ethnographic study addressing Hopi use of the West Tavaputs region. The BLM will provide this confidential information only to the Hopi Tribe.

11. Site Interpretation and Stewardship

A. Site Interpretation

The Operator(s) will fund and the BLM will ensure development of visitor interpretation/enhancement sites (e.g., parking, walking paths, signage, and/or informational kiosks), some of which may be located on Operator owned land, to inform and educate visitors of the unique archaeological resources in the Nine Mile Canyon area. These improvements will be consistent with those identified in the BLM *Special Recreation and Cultural Management Plan: Nine Mile Canyon Special Recreation and Cultural Management Area* (BLM 1995). The priority sites include:

- First Site;
- Owl Panel;
- Cottonwood Complex (i.e., Cottonwood Village, Great Hunt Panel, Big Buffalo)
- Rasmussen Cave;
- Daddy Canyon;
- Freight and Military Road Remnant (Gate Canyon historic road).

The BLM will obtain easements from willing private land owners for development of an additional two to four interpretive sites including the Long Neck Sheep and Balanced Rock sites. BLM will begin the process of obtaining these easements within 1 year of signing this Agreement. The ability of the BLM to obtain these easements will depend on available funding as well as the reasonable valuation of land purchase or exchange.

Prior to development of sites, the BLM will revise the SRCMA plan (as required by the Approved RMP) and develop an interpretive plan for Nine Mile Canyon. The BLM will also be responsible for timely completion of all required surveys (wildlife and cultural), technical site planning, and environmental analysis for the interpretation projects. Administration of site development will be completed by the BLM with input from interested parties including but not limited to Concurring Parties with cultural resource expertise. Following completion of the interpretive plan (within 24 months of signing this Agreement), at a minimum, two sites will be developed annually until 9 to 11 sites have been interpreted.

B. Site Stewardship

Upon signing of this Agreement, the BLM Price Field Office will develop a site stewardship program and cooperate with groups (e.g., Utah Division of State History, College of Eastern Utah Prehistoric Museum, USAS, NMCC, UPAC, and URARA) to preserve and protect historic properties in the West Tavaputs region. The development and implementation of this program is dependent upon available funding and staffing. The BLM Price Field Office will set an initial meeting to discuss the

development of the site stewardship program within 60 days of the signing of this Agreement, and shall invite all Signatories, Concurring Parties, and other interested groups to attend the meeting.

12. Collections

The BLM shall ensure that all collections and associated records resulting from identification and data recovery efforts are curated in accordance with 36 CFR 79, with the exception of those collections to be returned to their owners (at Private land owner's request). Collections that may be repatriated in accordance with the provisions of the NAGPRA and applicable state laws (i.e., Utah 9-9-401 to 406) (i.e., human remains, associated and unassociated funerary objects, sacred objects, and objects of cultural patrimony) will be curated in accordance with 36 CFR 79 until they have been repatriated. All costs of curation, which typically includes proper documentation, transfer of materials, and long-term storage of artifacts, photographs, site forms, and reports at a local repository, will be borne by the Operator(s). All collections resulting from investigations on any involved state lands in Utah shall be curated in accordance with Utah Code Annotated 53B-17-601 to 603.

13. Personnel Training

All personnel (including contractors; new, added, or replaced personnel; etc.) involved in construction, operation, and maintenance of this Project will be instructed (to a degree appropriate to their involvement in the Project) by the Operator(s) CRC, with BLM oversight, on site avoidance and protection measures, including information on the statutes protecting cultural resources as part of its Environmental Training Program prior to being authorized to work in the Project Area. At a minimum, all employees shall receive written information sheet(s) that discuss the importance of cultural resources and archaeological laws including penalties for violation. Personnel who routinely work in the canyon will be required to receive additional cultural resource awareness training. Operator shall maintain records demonstrating that the above described personnel training has been carried out. Signatories and Concurring Parties of this Agreement may participate in development of this training program.

14. Annual Programmatic Agreement Meeting

During the development phase, the Signatories and Concurring Parties will meet annually in October to discuss the fulfillment of the stipulations contained within this Agreement. If determined necessary by the majority of the Signatories, these meetings will continue during the production and abandonment phases.

15. Post-Review Discoveries

If potential historic properties are discovered or unanticipated effects on historic properties found, the BLM shall implement the discovery plan included as Attachment E of this Agreement.

16. Dispute Resolution

Should any Concurring Party or Signatory object, in writing, at any time to any actions proposed or the manner in which the terms of this Agreement are implemented, the

BLM shall consult with the objecting party to resolve the concern within 45 days. If the BLM determines that the concern cannot be resolved, the BLM shall:

- A. Forward all documentation relevant to the dispute, including the BLM's proposed resolution, to the ACHP. The ACHP shall provide the BLM with its advice on the resolution of the concern within 30 days of receiving adequate documentation. Prior to reaching a final decision on the dispute, the BLM shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, Signatories, and Concurring Parties; and provide them with a copy of this written response. The BLM will then proceed according to its final decision.
 - B. If the ACHP does not provide its advice regarding the dispute within the 30 days time period, the BLM may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, the BLM shall prepare a written response that takes into account any timely comments regarding the dispute from the Signatories and Concurring Parties to this Agreement, and provide them and the ACHP with a copy of such written response.
 - C. The BLM's responsibility to carry out all other actions subject to the terms of this Agreement that are not the subject of the dispute will remain unchanged.
17. Protection of Confidential Information

The BLM shall ensure that all confidential information, as defined in Section 9 of the ARPA, Section 304 of the NHPA, and Section 63-2-304(26) of the Government Records Access Management Act (GRAMA) is managed in such a way that historic properties, archaeological resources, traditional cultural values, and sacred objects are not compromised, to the fullest extent available under law.

Each Signatory and Concurring Party to this Agreement shall safeguard information about the nature and location of archaeological, historic, and traditional cultural properties, pursuant to Section 304 of the NHPA, Section 9 of the ARPA, and Section 63-2-304(26) of the GRAMA.

18. Amendments

Any Signatory or Concurring Party to this Agreement may request that it be amended, whereupon the Signatories will consult to consider such amendment. An amendment will go into effect upon written agreement by all Signatories.

19. Termination

Any Signatory to this Agreement may terminate it by providing 30 calendar days notice, in writing, to the other Signatories, provided that the Signatories will consult during the period prior to termination to seek agreement on amendments or other actions that will avoid termination. In the event of a termination, the BLM, Operator(s) and other Signatories will comply with 36 CFR Part 800.3 through 800.7 with regard to individual actions covered by this Agreement. Any Concurring Party to this agreement may withdraw their concurrence and participation at any time by written notice, but such withdrawal will not terminate this Agreement or affect it in any way.

20. Term

This Agreement shall be effective when all Signatories have signed it and will automatically terminate on the tenth anniversary thereof, unless each of the Signatories agrees to extend the term hereof through an amendment per Stipulation 18. All Signatories and Concurring Parties will meet prior to the termination date to discuss extending the term.

Execution of this Agreement by the Signatories and implementation of its terms evidence that the BLM has taken into account the effects of this Project on Historic Properties and afforded the ACHP an opportunity to comment.

SIGNATORIES

Advisory Council on Historic Preservation



John M. Fowler
Executive Director

1/5/10
Date

Bill Barrett Corporation



Duane Zavidil
Senior Vice-President, Government and Regulatory Affairs

Date

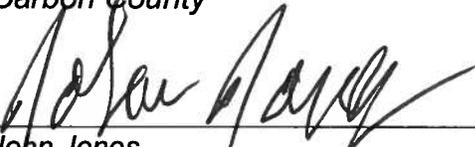
Bureau of Land Management, Utah



Selma Sierra
State Director

1-5-10
Date

Carbon County



John Jones
Carbon County Commission Chairman

1-5-10
Date

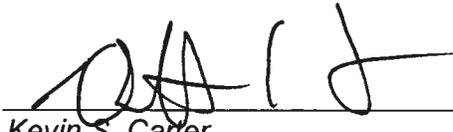
Duchesne County



Kent R. Peatross
County Commission Chairman

Date

School and Institutional Trust Lands Administration



Kevin S. Carter
Director

5 Jan 09

Date

State of Utah

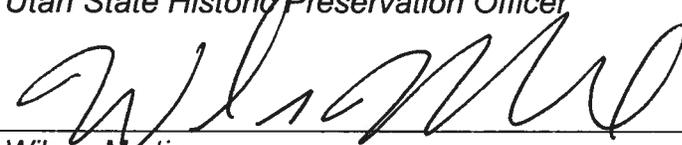


Gary Herbert
Governor

Jan 5, 2010

Date

Utah State Historic Preservation Officer



Wilson Martin
State Historic Preservation Officer

Jan 5 2010

Date

CONCURRING PARTIES

Barrier Canyon Style Project



David Sucec
Director

1-5-10

Date

Colorado Plateau Archaeological Alliance



Jerry Spangler
Executive Director

1-5-10

Date

National Trust for Historic Preservation

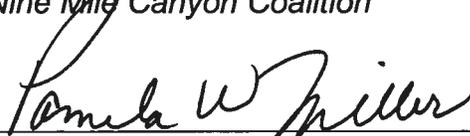


Barbara H. Pahl
Mountains/Plains Office Director

1-5-10

Date

Nine Mile Canyon Coalition



Pamela W. Miller
President, Nine Mile Canyon Coalition

1-5-10

Date

Public Lands Policy Coordination Office



John Harja
Director

1/5/10

Date

Southern Utah Wilderness Alliance



Stephen Bloch
Conservation Director

1-5-10

Date

Utah Professional Archaeological Council



Andy Yentch
Vice-President of Membership and Ethics

1-5-10

Date

Utah Rock Art Research Association

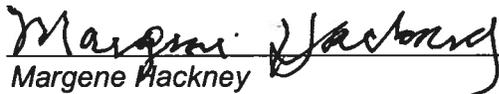


Stephen Robinson
President

1-5-10

Date

Utah Statewide Archaeological Society



Margene Hackney
Utah Statewide Archaeological Society President

1-5-10

Date

Definitions

Abandonment Phase- The phase that includes the plugging of a well after it has reached the end of its productive life. During the abandonment phase, the drill pad and roads will be recontoured to the approximate original contour and seeded with an appropriate seed mixture. The abandonment phase will be considered complete after the location and road have been successfully revegetated.

Area of Potential Effect (APE)- The geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36 CFR 800.16 (d)).

Authorized Officer- The Authorized Officer for this project is the Price Field Office Manager and his or her delegated representative.

Class I Inventory/Existing Information Inventory- A class I inventory is most useful for gaining a comprehensive view of all the known archaeological, historic, cultural and traditional places within a large area, such as the area to be covered by a land-use plan or an EIS. A class I inventory is a professionally prepared study that includes a compilation and analysis of all reasonably available cultural resource data and literature, and a management-focused, interpretive, narrative overview, and synthesis of the data. The overview also defines regional research questions and treatment options. Existing cultural resource data are obtained from published and unpublished documents, BLM cultural resource inventory records, institutional site files, State and national registers, interviews, and other information sources. Class I inventories, which should have prehistoric, historic, and ethnological elements, are in large part chronicles of past land uses, and as such they should be relevant to current land use decisions. General information about sacred sites and other places of traditional cultural or religious importance to Native Americans or other cultural groups (including "traditional cultural properties" as discussed in National Register Bulletin No. 38) should as much as possible be included in the inventory. Class I inventories are periodically updated, in both the compilation and the synthesis, to incorporate new data from class II and class III inventories, histories, oral testimony, and other sources. They can be used to develop regional research designs for resource evaluation. Maintaining current class I inventories in Geographic Information System (GIS) compatible format is of critical importance for making cultural resources information readily available for research,

planning, management and compliance activities (BLM Manual 8110).

Class II Inventory/Probabilistic Field Survey- A class II survey is most useful for improving cultural resource information in a large area, such as for planning or EIS purposes, where insufficient systematic identification work has been done in the past. A class II probabilistic field survey is a statistically based sample survey, designed to aid in characterizing the probable density, diversity, and distribution of cultural properties in an area, to develop and test predictive models, and to answer certain kinds of research questions. Within individual sample units, survey aims, methods, and intensity are the same as those applied in class III survey. Class II survey may be conducted in several phases, using different sample designs, to improve statistical reliability (BLM Manual 8110).

Class III Inventory/Intensive Field Survey- Intensive survey is most useful when it is necessary to know precisely what historic properties exist in a given area or when information sufficient for later evaluation and treatment decisions is needed on individual historic properties. Intensive survey describes the distribution of properties in an area; determines the number, location and condition of properties; determines the types of properties actually present within the area; permits classification of individual properties; and records the physical extent of specific properties (BLM Manual 8110).

Concurring Party- A party who signs this Agreement, but is not legally or financially responsible for completion of stipulations. Concurring Parties may volunteer to assist with implementation of stipulations; however, cannot terminate the Agreement.

Consulting Party- Any party that has participated in the development of this agreement.

Cultural Resource Consultant (CRC)- Cultural resource inventory, evaluation and treatment may be planned, supervised and implemented only by a qualified and BLM permitted professional cultural resource consultant (archaeologists, historians, ethnographers, architects, or anthropologists) as appropriate for the type of work being performed. They are responsible for preparing or technically reviewing reports, records, and professional literature.

Cultural Resource Monitoring Plan (CRMP)- A plan that monitors human-caused changes to cultural resource site conditions over the life of the Project. This plan allows the BLM to identify, evaluate, document, and monitor direct, indirect, and cumulative impacts to cultural resources.

Development Phase- The development phase consists of the construction of infrastructure, such as roads, drill pads, pipelines, and the drilling and completion of wells preparing them for the production of oil and gas.

Dust- A fine powdery material that contains minute solid particles with diameters less than 500 micrometers that can be blown about in the air. Dust can arise from various

sources including dry earth and pollution.

Production Phase- During the production phase, well fluids and gases are brought to the surface and separated, stored, gauged, and otherwise prepared delivery to market via pipeline or truck. The production phase also includes the use of workover rigs to repair the well mechanical components and do other maintenance activities to the well to keep oil and gas production flowing.

Project Authorization- For this Agreement, project authorization is after the BLM completes the Final Environmental Impact Statement (EIS) for the West Tavaputs Plateau Natural Gas Full Field Development Plan and issues a Record of Decision (ROD).

Project Initiation- For this Agreement, project initiation is when the BLM approves an Application for Permit to Drill (APD).

Signatory- For this Agreement, the BLM, SHPO, ACHP, Bill Barrett Corporation, School and Institutional Trust Lands Administration, Carbon County, and Duchesne County.

Attachment A

Project Description

West Tavaputs Plateau Natural Gas Full Field Development Plan Project Description

Bill Barrett Corporation (BBC) and other oil and gas operators have proposed to develop the oil and gas resources of the West Tavaputs Plateau (WTP) Project Area in Duchesne and Carbon Counties, Utah, approximately 30 miles east-northeast of Price, Utah. The WTP Project Area is bounded on three sides by natural features – on the west by Sheep Canyon, on the north by Nine Mile Canyon, and on the east by the Green River. The southern boundary of the WTP Project Area is a straight line reflecting an anticline in the sub-surface that limits the southern extent of the natural gas resources targeted by the project. Surface ownership in the 137,930-acre WTP Project Area is approximately 87 percent Federal (managed by the Bureau of Land Management [BLM]), approximately 8 percent State of Utah (managed by the State Institutional Trust Lands Administration [SITLA]), and approximately 5 percent private. Mineral ownership closely parallels surface ownership

Under the Proposed Action (maximum development scenario), BBC and other operators would develop up to 807 natural gas wells from up to 538 well pads in the WTP Project Area. Of the 538 well pads proposed, approximately half of those pads would have more than one well (hence, the 807 wells). For the purpose of analysis, it is assumed that during the first year of development (the assumed peak year of development) BBC would operate six drill rigs year-round and other WTP operators would operate three rigs year-round. Following the first or peak year of development, drilling activity would likely begin to decline as other operators begin to exhaust their well locations. Drilling activities would occur for approximately 8 years. The anticipated life of an individual well is 20 years. The anticipated time it would take for field abandonment and final reclamation is 5 years. Therefore, the anticipated life of project (LOP) under the Proposed Action would be approximately 33 years.

Attachment B

APE Letter and Map



United States Department of the Interior
BUREAU OF LAND MANAGEMENT

Price Field Office
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Price, UT 84501
(435) 636-3600 Fax: (435) 636-3657



JUN - 3 2009

In Reply Refer To:

3100 (UTG020)

Lori Hunsaker
Deputy State Historic Preservation Officer-Archaeology
Division of State History
300 Rio Grande
Salt Lake City Utah, 84101

Dear Ms. Hunsaker:

The BLM requests your formal concurrence on our determination of the area of potential effects (APE), as defined in 36CFR 800.16(d) for the West Tavaputs Plateau Natural Gas Full Field Development Plan.

In consultation with your office, we had originally identified multiple APEs for this project including 1) all BLM and SITLA lands within the Project Area; 2) the Nine Mile Canyon and Gate Canyon Roads (i.e., 150 feet on either side of the roads); and 3) the canyon bottoms, for effects to the setting. However, through the course of ongoing consultation the State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation (ACHP), Indian Tribes, and other consulting parties, the BLM has determined the APE should be expanded to include areas outside of the Project Area. A description of the revised APE is presented below. Also included (enclosure) is a figure showing the revised APE.

- The modified APE boundary follows the north canyon rim and then connects with the Project Area boundary approximately 1 mile east of Cottonwood Canyon, near the mouth of Devil's Canyon. The northern rim boundary was brought to an end at this location because no project-related traffic is anticipated within Nine Mile Canyon east of Cottonwood Canyon.
- To the west of the Project Area, the APE has been expanded to include Nine Mile Canyon to its junction with Minnie Maud creek. Outside the Project Area, as Nine Mile Canyon widens out, the northwest and southwest boundaries of the APE break away from the canyon rim. Within this portion of the APE, the boundary has been formed by contour lines, which generally ranges from 200 to 1000 vertical feet above the road and approximately ½ mile horizontal distance from the road. The APE was brought to an end slightly west of the confluence of the Minnie Maud and Nine Mile Creek drainages.

At this point the topography levels out and the road is well outside of Nine Mile Canyon, where the concentrations of prehistoric rock art occur.

- The APE has been adjusted to include Gate Canyon from the east to the west rim. It was determined that the APE should end at the top of Gate Canyon because the resource of concern in Gate Canyon is historic inscriptions which do not occur outside of Gate Canyon on this route.

There was a proposal by Bill Barrett Corporation (BBC) to adjust the eastern APE boundary to exclude the Green River Corridor due to lack of development in that portion of the project area. This option was not adopted since there are well pads which could potentially be within sight and sound of the Green River Corridor in Desolation Canyon. BBC also proposed to contract the southern APE border to just outside of the surface development. This option was also not adopted due to the potential for future impacts to cultural resources outside of the immediate vicinity of the development's current proposed surface disturbance area.

In addition to the aforementioned changes, the BLM is currently in the process of pursuing an agreement with a private property owner that would allow an alternative access route to be constructed through Trail Canyon. If an agreement is reached wherein the BLM is able to obtain reasonable access, the APE will be expanded to include Trail Canyon (west rim to east rim) as well as the existing Rye Patch Road, between Gate Canyon and the head of Trail Canyon (150 feet on either side).

In an effort to identify historic properties, the BLM will conduct a Class I inventory for all lands within the expanded APE. A copy of the revised Class I inventory will be distributed upon completion.

Sincerely,

/s/ Roger L. Bankert

FOR Michael Stiewig
Associate Field Manager

Enclosure(s): APE boundary

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Leigh Kuwanwisiwma, Director
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bcc: Central Files
Reading File

UT:UTG021:MStiewig:ah:6/2/09-435-636-3633

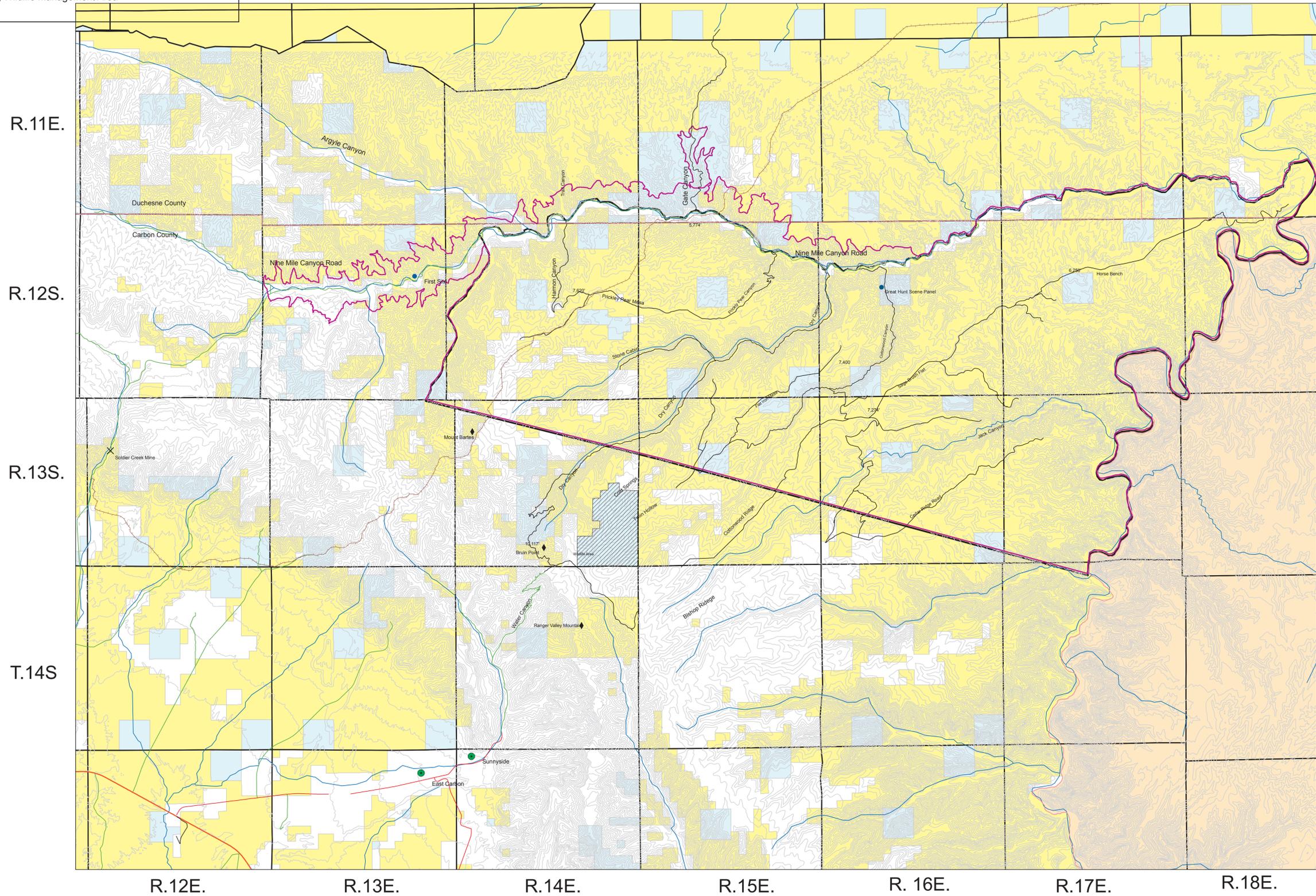
West Tavaputs Plateau EIS Project

APE Rim to Rim Boundary



Legend

Questar Pipeline	Surface Ownership OWNER	Federal
APE Boundary		Private
Carbon, Duchesne & Grand Counties		State
BLM_SYSTEM		Tribal
COUNTY_SYSTEM		
FEDERAL_SYSTEM		
STATE_SYSTEM		
Cold Spring Wildlife Management Area		
Streams		



Attachment C

Adverse Effect Determination Letter



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Green River District Office

Price Field Office

125 South 600 West

Price, UT 84078

(435) 636-3600 Fax: (435) 636-3657

<http://www.blm.gov/ut/st/en/fo/price.html>

JUL - 7 2009

In Reply Refer to:
1310 (UTG020)

Surname	Date

Lori Hunsaker
Deputy State Historic Preservation Officer- Archaeology
Division of State History
300 Rio Grande
Salt Lake City, Utah 84101

Dear Ms. Hunsaker:

After additional consultation with our consulting parties on the West Tavaputs Plateau Natural Gas Full Field Development Plan, the Bureau of Land Management (BLM) has elected to revise the project's effects determination. The initial determination of "Adverse Effect" in December 2008 was limited to the potential for dust generated by industrial traffic to settle on and affect the visual appearance of rock art panels pursuant to 36 CFR 800.5 (a) (2) (v). Based on continuing consultation, the BLM has determined there are also potential "Adverse Effects" to the cultural setting within Nine Mile Canyon and indirect impacts to sites over the entire project area, also pursuant to 36 CFR 800.5 (a) (2) (v).

Implementation of some proposed project mitigation measures would reduce visual and auditory impacts within the canyon; however, the cultural setting, feeling, and association would still be altered due to substantial increases in traffic on canyon roads, increased human activity, and the presence of additional surface facilities. Indirect and cumulative impacts could potentially result from the increase in human activity and the opening or improvement of various travel routes, to include vandalism. The presence of additional personnel in the area may deter some individuals from illegal behavior, but the overall increase in person hours and access points in the region will provide additional opportunities for potential damage to cultural sites.

In sum, in addition to potential dust impacts to rock art, there is also potential for adverse effects to the cultural setting within Nine Mile Canyon and indirect and cumulative impacts to sites. Though significant project-related mitigation measures are proposed that will significantly reduce these effects, there is no guarantee they will be completely eliminated. The BLM requests your concurrence on this revised effects determination for the West Tavaputs Plateau Natural Gas Full Field Development. When a cultural resource monitoring plan is implemented for this

project, additional effects may be identified and a subsequent effects determination may be necessary. This will only be initiated with adequate new data and in consultation with our consulting parties.

Sincerely,


/s/ Michael Stiewig

Michael Stiewig
Associate Field Manager

cc:

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bcc: Working File
Reading File

UT:UTG021:MStiewig:ah:7/6/09:435-636-3633

Attachment D

Tribal Consultation Summary

Tribal Consultation Summary

On October 4, 2005, the Price Field Office mailed a certified notification letter, a project summary, and a project location map to 27 Native American Tribal organizations for the WTP EIS:

- Hopi Tribal Council
 - Hopi Cultural Preservation Office (CPO)
- Jicarilla Apache Tribe
- Navajo Nation
 - Aneth Chapter
 - Dennehotso Chapter
 - Mexican Water Chapter
 - Navajo Mountain Chapter
 - Navajo Nation Historic Preservation Office (HPO)
 - Navajo Utah Commission
 - Oljato Chapter
 - Red Mesa Chapter
 - Teec Nos Pos Chapter
- Northwestern Band of Shoshoni Nation
- Paiute Indian Tribe of Utah
- Pueblo of Acoma
- Pueblo of Laguna
- Pueblo of Nambe
- Pueblo of Santa Clara
- Pueblo of Zia
- Pueblo of Zuni
- Shoshone Business Council
- Shoshone-Bannock Tribes
- Southern Ute Tribal Council
- Uintah and Ouray Ute Indian Tribe
- Ute Mountain Ute Tribe
 - White Mesa Ute Tribe

From October 2005 to December 2008, the BLM contacted and received written and verbal responses from Tribal organizations. The goals of contacting Tribal organizations for the proposed WTP EIS were: 1) to notify Tribal authorities of Price Field Office issuance of the NOI to conduct public scoping and prepare an EIS for the proposed project; 2) to identify Tribal organizations that may attach religious and cultural significance to historic properties within the WTP Project Area; 3) to document traditional values associated with these types of properties in accordance with various Federal environmental laws; and 4) to invite the Tribes to be consulting parties in the Section 106 process.

Results of the contact effort were as follows: eighteen Tribes responded to the initial request to consult:

- Twelve Tribal organizations (i.e., Hopi, Navajo Nation HPO, Navajo Utah Commission, Oljato Chapter, Red Mesa Chapter, Ute Mountain Ute Tribe, Paiute Indian Tribe of Utah, Pueblo of Acoma, Pueblo of Santa Clara, Pueblo of Zia, Pueblo of Zuni, and Uintah and Ouray Ute Indian Tribe) requested the WTP EIS Class I Cultural Resource Overview.

- Six Tribal organizations (i.e., Navajo Mountain Chapter, Dennohotso Chapter, Mexican Water Chapter, Southern Ute Tribe, Pueblo of Laguna, and Jicarilla Apache) did not require additional consultation for the WTP EIS.

In February, 2006, a copy of the report, *West Tavaputs Plateau EIS Class I Cultural Resources Literature Review*, was mailed to 12 Tribal organizations with the results as follows:

- Four Tribal organizations (i.e., Hopi Tribe, Navajo Nation HPO, Paiute Indian Tribe of Utah, and Uintah and Ouray Ute Indian Tribe) requested additional consultation in the form of a field visit to view the WTP Project Area. The Hopi Tribe also requested a meeting with BLM personnel.
- Two Tribal organizations (i.e., Pueblos of Acoma and Zia) requested to be informed in the event of inadvertent discoveries.
- Two Tribal organizations (i.e., Red Mesa Chapter and Navajo Utah Commission) did not require additional consultation, but requested to receive project information (i.e., a copy of the DEIS) when it becomes available.
- Representatives from three Tribal organizations (i.e., Pueblo of Santa Clara, Pueblo of Zuni, Ute Mountain Ute Tribe) reviewed the cultural resources literature review and did not have additional comments or require additional consultation.
- One Tribal organization (i.e., Oljato Chapter) did not provide a final response to the literature review.

The Price Field Office responded to the requests for additional consultation by hosting two field visits to the WTP Project Area, participating in a meeting at the Hopi CPO in Kykotsmovi, Arizona, and participating in a conference call with the representatives from the Navajo HPO. At each meeting, BLM personnel provided Tribal representatives with a project overview and map, and a summary of the project's Proposed Action and alternatives.

Initially, one TCP, a prehistoric temporary camp site with culturally modified tree scars, was identified by the Uintah and Ouray Ute Indian Tribe during consultation. Additionally, several previously-documented archaeological sites (rock art panels) were noted as sites of interest to the Hopi Tribe.

On January 29, 2008, the DEIS was mailed to five Tribal organizations (i.e., Navajo Nation HPO, Hopi CPO, Navajo Nation-Red Mesa Chapter, Uintah and Ouray Ute Indian Tribe, and Paiute Indian Tribe of Utah) that requested the document during the course of consultation. Of these Tribes, the Navajo Nation HPO, Hopi CPO, and Paiute Indian Tribe of Utah submitted verbal and written comments to the DEIS. The Navajo Nation HPO and the Paiute Indian Tribe of Utah did not require additional consultation following the release of the DEIS.

The Hopi CPO provided a substantive DEIS response letter with a new TCP claim for Nine Mile Canyon. It should be noted, the Hopi Tribe did not make this claim during the course of consultation. Nonetheless, as a result of this claim, the BLM held additional meetings with the Hopi CPO. The BLM and Hopi CPO consultation concerning this site and TCP analysis for eligibility to the NRHP is ongoing.

In January of 2009, development of a programmatic agreement (PA) with "consulting parties" was initiated to address adverse effects associated with the full field development program. All

four interested tribes were invited to be involved in the development of the PA and have been included in all correspondence. Betsy Chapoose, Director of Cultural Rights and Protection for the Ute tribe participated in some of the meetings. A copy of this final PA as well as a formal consultation letter will be distributed by the BLM to the interested Tribes who will be invited to sign.

A summary of the consultation results are provided below.

Hopi Tribe

At the request of the Hopi Tribe, the BLM met with the Hopi CPO Director and staff on July 19, 2006, in Kykotsmovi, Arizona. The Hopi Tribe asserted a claim of cultural affiliation to the inhabitants of Nine Mile Canyon, and voiced concerns about dust impacts to the petroglyphs in the WTP Project Area and increased use of the Nine Mile Canyon Road. Direction of the Hopi CPO, Mr. Leigh Kuwanwisimwa, requested an ethnographic overview of the Nine Mile Canyon complex that would allow BLM personnel and the BBC to better understand the Hopi cultural presence in the canyon (affiliation to petroglyphs and other structures). A suggested focus of the study would be a TCP investigation of the cultural significance of the petroglyphs in the canyon before resource development changes the nature of the canyon.

During the meeting, Hopi CPO staff also requested long-term impact studies (recreation, traffic studies) to cultural resources and golden eagle habitat in Nine Mile Canyon.

With consideration to the cultural resources in Nine Mile Canyon, the Hopi CPO staff members would not support any of the alternatives being developed for the EIS because none of the alternatives consider an alternative access route to the existing county road in Nine Mile Canyon.

The Price Field Office WTP project team hosted Hopi Cultural Resource Advisory Team (CRAT) representatives for a two-day field visit to the WTP Project Area on September 12-13, 2006. Four CRAT members and Mr. Terry Morgart, Hopi CPO Legal Researcher, attended the field visit. Representatives requested to spend the majority of the tour viewing petroglyph panels in Nine Mile, Cottonwood, and Dry Canyons, instead of viewing the plateau locations selected for proposed development. All panels viewed during the tour were either at existing interpretive sites or could be viewed from the canyon roads. Hopi clan symbols were identified at the following panels:

Nine Mile Canyon

- 1) 42DC162 (water snake-plumed serpent figures, corn symbols, spiritual figures-possibly 'war gods'; depiction of celestial phenomena including star constellations)
- 2) 42DC771 (migration symbol along with other symbols depicting Hopi movement across the landscape)
- 3) 42CB120 (plume serpent)

Dry Canyon

- 1) 42CB50 (whirls, spiral serpent)

2) "The Mummy" formation (guardian figure similar to those in southern Utah)

In addition to the petroglyph panels, CRAT members identified several culturally-significant plant species. Each of these plant species and their Tribal use are discussed in the Table below:

Plant and Mineral Resources Identified During Hopi Field Visit		
Plant/Mineral Name	Hopi Name	Tribal Uses
Sage	<i>Kungya Wikwavi</i>	Ceremonial
Greasewood	<i>Teeve</i>	Planting, Hunting, Harvesting, Ceremonial
Willow	<i>Qahavi</i>	
Rabbitbrush	<i>Siivapi</i>	Basketmaking
Snakeweed	<i>Maaövi</i>	Ritual
Saltweed		Preparation of corn/corn batter
Cliffrose	<i>Hunvi</i>	Medicinal
Yucca	<i>Samowa</i>	
Water tobacco	<i>Piiva Tapalviva Paaviva</i>	Ritual
Juniper	<i>Ngömapi</i>	Medicinal/Ceremonial
Cottonwood	<i>Söhövi</i>	
Cottonwood Root	<i>Paako</i>	Ritual-used to make family katchinas
Water Reeds	<i>Baqavi</i>	Ritual, Weaving
Douglas Fir	<i>Salaavi</i>	Ceremonial
Clayshale		Pottery
Sourberry	<i>Suvisifsi</i>	
Reed	<i>Paaqau</i>	Pipe stems, Snorkels, Weaving loom, and Ritual
Cattails		Ritual
Yellow Pigment	<i>Paavisa</i>	Ritual

Following the field visit, a meeting was held at the county picnic grounds in Nine Mile Canyon. The Hopi had the following comments:

- Requested provision in the DEIS for an ethnographic study, as discussed during the meeting held on July 19, 2006.
- The Hopi do not have issues with full field development on the plateau. The use of Nine Mile Canyon as the primary access to the plateau is the main concern due to dust impacts to the petroglyphs. Another alternative should be developed in the DEIS that would provide a different route to the plateau. The percent increase in industrial traffic and fugitive dust that are proposed in the alternatives is unacceptable.
- BLM must consider the Backcountry Byway status of the road in Nine Mile Canyon.
- A follow-up meeting should be held for the purpose of discussing the ethnographic study.

Follow-up contact with the Hopi CPO included several telephone calls with Mr. Morgart. During

a telephone conversation on September 27, 2006, Terry Morgart said that the Hopi did not want to identify individual panels in Nine Mile Canyon as TCPs, but would rather work with the Nine Mile Coalition and BLM to secure the NMCAD nomination to the NRHP. Mr. Mogart also indicated that he was against the idea of "segmenting" the cultural significance of Nine Mile Canyon by listing each panel as a separate historic property.

An ethnographic overview that considers the Hopi cultural presence in Nine Mile Canyon is currently being developed by ethnographer Dr. John N. Fritz (Montgomery Archaeologists).

To assist in preparation of the overview, a meeting was planned for October 26, 2006, between the Hopi CRAT and project ethnographers, but the Hopi CPO staff scheduler cancelled the meeting due to CRAT members conflicting travel schedules for other projects.

On February 22, 2007, Dr. Fritz attended a meeting with members of the Hopi CPO and the CRAT to review the proposed Hopi Ethnographic Overview of WTP Project Area and Nine Mile Canyon. The scope of work and table of contents were examined, discussed, and accepted by Hopi representatives. During discussions concerning the organization of the fieldwork, the group agreed that pre-field organization and tightly-structured itineraries would be essential to maximize the time in the field. The need to safeguard and protect Hopi sacred knowledge was also discussed. A member of the Hopi CPO was assigned to assist Dr. Fritz with field trips and research. It was agreed that the ethnographers' work products including notes, transcripts of interviews, and working drafts would be returned to the Hopi CPO upon completion of the project.

On May 2, 2007, representatives from the BLM Utah State Office and Price Field Office participated in a conference call with the Hopi CPO to discuss several ongoing projects within Nine Mile Canyon. Ongoing gas exploration projects, the repatriation consultation for a prehistoric flute discovered in the Range Creek area (not within the WTP Project Area), and the ethnographic overview were agenda items. The BLM and Hopi CPO also discussed a possible Hopi TCP claim for Nine Mile Canyon, first identified in a letter to the BLM dated March 12, 2007, regarding an unrelated project.

On January 9, 2008, the BLM mailed a copy of the WTP DEIS to Mr. Kuwanwisimwa. Mr. Kuwanwisimwa submitted a written response on April 30, 2008, in support of Alternative B, the No Action Alternative, stating that the DEIS does not identify or avoid cultural resources significant to the Hopi Tribe, nor does it provide a comprehensive TCP analysis of the WTP Project Area. The Tribe also made a TCP claim for Nine Mile Canyon based on oral history related to creation and migration stories, and based on the interpretations of clan symbol markings identified on Nine Mile Canyon rock art panels. The Tribe pointed out the Backcountry Byway road designation within Nine Mile Canyon and gas exploration and drilling activities would have adverse effects on cultural resources significant to the Hopi Tribe. The effects of industrial traffic and lack of adequate control measures for dust plumes and dust accumulation on rock art in the Nine Mile Canyon complex were specifically discussed in the response letter. The Tribe also noted their continued support of national and local efforts to nominate Nine Mile Canyon as a historic district for inclusion on the NRHP. The Tribe requested Advisory Council participation in the DEIS process and Section 106 of the NHPA, citing 36 C.F.R. Part 800, Appendix A, Criteria for Council Involvement in Reviewing Individual Section 106 Cases, (c)(4), *Presents Issues of Concern to Indian Tribes or Native Hawaiian Organizations*.

In response to the Hopi's concerns, the BLM has 1) consulted further with the Hopi Tribe concerning their TCP claim; 2) rigorously explored alternative access routes through the

consultation process; 3) approved a dust suppression plan submitted by the Nine Mile Canyon Road Committee to prevent dust accumulation on rock art; and 4) submitted a multiple properties listing for Nine Mile Canyon to the National Register. In addition, the ACHP has actively participated in the development of a programmatic agreement a consulting party.

In their response letter to the DEIS, the Hopi also voiced a concern for excavated human remains and requested that BLM IM 2007-002, which allows for reburial of human remains and associated funerary objects excavated on BLM-administered land, to be added to the FEIS. The Hopi have also requested inclusion of a Native American Graves Protection and Repatriation Act Plan of Action (NAGPRA POA) in the FEIS that identifies a pre-designated location where remains can be reburied and protected. This information has been added to the Programmatic Agreement in Attachment E-Preconstruction Cultural Resource Identification Plan.

On April 24, 2008, the BLM attended a meeting with the Hopi CPO at their office in Kykotsmovi, Arizona to discuss 1) fieldwork associated with the Nine Mile Canyon ethnographic study; 2) various ongoing gas development projects in the Price Field Office; and 3) the dust study report commissioned by the BLM to determine the effect of dust and chemical dust suppressants on rock art. The Hopi CPO emphasized their concern for protection of the entire cultural landscape, and also stated that the road in Nine Mile Canyon should be considered as part of the APE for future projects so that impacts associated with traffic can be sufficiently analyzed in future NEPA documents. The BLM also discussed possible dates for field visits to the canyon.

As part of the ethnographic overview, Dr. Fritz and Ms. Molly Molenaar conducted a field visit with Hopi CPO and CRAT members to Nine Mile Canyon on June 18-19, 2008. Rock art sites in Nine Mile Canyon and tributary canyons that had been viewed by Hopi representatives during previous field visits were revisited, and additional comments about these sites were documented.

Following this field visit, personnel from the BLM Utah State Office and Price Field Office, and BBC met with the Hopi representatives. At the post field visit meeting in Price, Utah, on June 19, 2008, the Hopi CPO explained the Hopi connection to Nine Mile Canyon. In terms of significance, Hopi representatives said that the Tribe carries its cultural history through clanships, and that the Hopi CPO and CRAT had successfully identified Hopi clan symbols in rock art panels in Nine Mile Canyon. The Nine Mile Creek was also identified as a culturally-significant feature to the Hopi. Concerns for burial discoveries were again voiced. The BLM requested that the Hopi Tribe submit a written letter to the BLM concerning the TCP claim as soon as possible so that it could be entered into the consultation record. .

The Hopi CPO and CRAT representatives participated in another field visit to Nine Mile Canyon on August 4, 2008. The field visit was intended to be part of the fieldwork for the ethnographic overview, but also included some preliminary steps to document the Hopi TCP claim for Nine Mile Canyon. The participants viewed additional rock art panels and located a possible Hopi shrine within the WTP Project Area. As a result of this site, the Hopi have requested one additional field visit and additional survey of the area surrounding the shrine. The Hopi CPO requested that Ms. Molenaar start the documentation effort of the TCP claim by using the NMCAD boundary. A meeting between the Hopi and BLM was held on September 25, 2008, at the Hopi CPO office in Kykotsmovi, Arizona. During this meeting, the BLM provided the Hopi with an update on the progress of the EIS, discussed the ethnographic overview, and the Nine Mile Canyon National Register form.

Finally, a meeting was held on November 20, 2008 with the BLM at the Hopi CPO office in

Kykotsmovi, Arizona. The primary purpose of the meeting was to discuss how to proceed with the Hopi TCP claim. During this meeting the Tribe decided to hold their TCP claim in abeyance. This decision was made mainly because of protections afforded to Nine Mile Canyon through designation of the Nine Mile Canyon ACEC in the Price Field Office Approved RMP (BLM 2008b). During this meeting the Hopi also expressed their support for the "Multiple Properties Listing" for the nomination of the NRHP that the BLM is pursuing instead of the National District nomination. The Multiple Properties Listing has since been submitted. The Tribe also reserved the right to renew their TCP claim in the future.

Uintah and Ouray Ute Indian Tribe

Representatives from the Uintah and Ouray Ute Cultural Rights and Protection Program participated in a joint field visit with Paiute Indian Tribe of Utah representatives on May 16-17, 2006. Prehistoric and historic sites, and an operational well pad, were viewed by Tribal representatives on Sagebrush Flat (Peters Point Unit), Daddy Canyon, Cottonwood Canyon, and in the vicinity of the Stone Cabin Gas Field.

The Ute representatives identified three of five scarred Ponderosa trees at site 42Cb1909 (prehistoric temporary camp site) as being culturally modified by Ute ancestors. This site is eligible to the NRHP, but has a road cutting through a portion of the site. As part of mitigation for the archaeological site, BBC avoided the site by re-routing the existing road around the site (for oil and gas traffic only). The Ute Tribe did not request additional mitigation at the site, but questioned why the original road that bisects the site remained open. The project archaeologist and ethnographers will update the archaeological site forms to include the cultural significance of the tree scars and the site will be discussed in a final consultation report as a TCP. The BLM is considering the possibility of closing the original road through the site.

Finally, Ute representatives requested that some type of consultation process be in place to address cultural resource issues as the project moves forward. BLM personnel offered to add the Ute Tribe to an agency resource data distribution list and arrange annual meetings with the Tribe, as needed. The BLM also offered to send Betsy Chapoose (Director, Cultural Rights and Protection) and the Business Committee all archaeological reports as they are completed, which would allow the Tribe an opportunity to comment on and participate in pre-drill onsite inspections as needed.

A copy of the DEIS was mailed to Curtis Cesspooch (Chairman), Betsy Chapoose, and Bruce Pargeets (Energy and Minerals Department) on January 29, 2008. All of the parties received the document, but did not provide comments.

Betsy Chapoose has participated in the development of the West Tavaputs Plateau Natural Gas Full Field Development Programmatic Agreement meetings.

Paiute Indian Tribe of Utah

Two Paiute Indian Tribe of Utah representatives attended the joint field visit with the Uintah and Ouray Ute Indian Tribe on May 16-17, 2006. Traditional cultural locations were not identified by Paiute representatives during the field visit, but the Paiute Tribe voiced concern for wildlife habitats within the WTP Project Area, especially in the vicinity of the proposed and existing drilling operations.

In a letter dated December 13, 2006, Ms. Dorena Martineau (Cultural Resources Director)

voiced concerns for the protection of wildlife habitat in areas near existing drilling operations. She said that the fences used to enclose the water holding ponds will not prevent animals and birds from drinking the water and possibly falling into the pools. She also voiced concern for the fugitive dust in the canyon bottoms and preventative measures (potentially harmful salt mixture) used to control the dust plumes in the canyon.

A copy of the DEIS was mailed to Lora Tom (Chairwoman) and Dorena Martineau on January 29, 2008. Ms. Martineau reviewed the document, did not provide additional comments.

Navajo Nation Historic Preservation Office

A field visit was planned with Mr. Marklyn Chee (Cultural Resources Director, Navajo Nation HPO), but the visit was cancelled by Mr. Chee and his supervisor, Tony Joe (Program Manager, Navajo Nation HPO Traditional Cultural Programs). Their travel request was denied. A conference call was held in lieu of the field visit on October 16, 2006.

The following comments and concerns were recorded:

- Appropriate protection of the petroglyphs in Nine Mile Canyon- What is the BLM doing about the dust, traffic issues, and road improvements that were considered during consultation for past projects in the canyon?
- The more education visitors have about cultural resources in the canyon, which includes the Native American perspective, the better chance the resources will be protected.
- Signage and interpretive sites are useful tools in educating the public.

A copy of the DEIS was mailed to Joe Shirley, Jr. (President, Navajo Nation) and Marklyn Chee on January 29, 2008. On March 28, 2008, Tony Joe submitted a written response stating that the proposed project would not impact any known Navajo TCPs or historic sites. Mr. Joe requested to be notified within 24 hours in the event of inadvertent discoveries during the course of project construction.

Navajo Nation-Red Mesa Chapter

A copy of the DEIS was mailed to the chapter offices January 29, 2008, but the chapter did not provide comments to the document.

Attachment E

Preconstruction Cultural Resource Identification Plan

IDENTIFICATION AND MITIGATION OF KNOWN AND ANTICIPATED IMPACTS-PRECONSTRUCTION CULTURAL RESOURCE IDENTIFICATION PLAN

As noted above, the conceptual designs for the various alternatives conflict directly and indirectly with numerous known and potential cultural resources. However, as previously stated, while the locations of proposed well pads, access roads, pipelines, and other surface facilities (**Figures 2.2-1 – 2.6-1**) have not been individually inspected, they have been conceptually identified considering topography, land features, vegetation, and operational constraints. Onsite inspections of individual well pads, access roads, pipelines, and other surface facility locations by the BLM and operator personnel would occur during the permitting process for individual wells or ROWs, and site-specific adjustments to location and orientation would be made at that time. The individual APD and ROW permitting processes incorporate measures for protecting, documenting, evaluating, and mitigating cultural resources through the Section 106 process, applicable State law, and numerous Federal and State regulations.

This Preconstruction Cultural Resource Identification Plan outlines the procedures for the identification, evaluation, management, monitoring, and mitigation (if necessary) of cultural resources within the WTP Project Area for each disturbance. It also provides guidelines for adherence to findings from studies currently being conducted on dust, TCPs, continuing archaeological research, as well as previous cultural resource recommendations.

Because the nature of the proposed alternatives is conceptual, this plan refers to the entire WTP Project Area. The area of potential effect (APE), however, refers to each specific project component such as well pads, access roads, pipelines, and other surface facilities. Therefore, only those resources within an individual APE would need consideration for identification, monitoring, evaluation, or mitigation of cultural resources. Indirect and cumulative impacts, such as the effect of dust and vibration on rock art, are considered at the level of the entire WTP Project Area.

INVENTORY

Prior to any surface disturbance, all areas within an individual APE would be inventoried for cultural resources. Prior to conducting the field inventory, the archaeological contractor would obtain a project number from the SHPO, conduct a file search for previous cultural resource inventories and previously-documented sites at either the Price Field Office, SHPO, or both, and submit the necessary fieldwork authorization forms. If an area within an individual APE has been previously inventoried and the BLM or SITLA find the existing inventories adequate, no new survey would be required in the area. If unevaluated cultural resources occur in a previously inventoried area, they would be evaluated by the archaeological contractor and eligibility and management recommendations would be provided to the land managing agency.

Numerous procedures and protocols are already established for cultural resource inventories on the BLM and State lands in general (BLM 2002c), and in the Price Field Office specifically (e.g., Spath 1999). The inventory procedures identified in the Cultural Resource Plan for the Ferron Natural Gas Development project (Spath 1999) have been adopted throughout the Price Field Office area. These procedures, with some modification due to the increased size of well pads used for directional drilling, are reiterated below. In most regards, these inventory standards are more stringent than in many other parts of Utah. These standards would be implemented for all cultural resource inventories related to the Proposed Action and its alternatives because most

companies, including BBC, already adhere to these standards, which have resulted in a very effective protection record of cultural resources in the WTP Project Area.

Survey Standards and Protocols

- A. Well Pads: At minimum, survey of a 10-acre block, centered on the staked drill location (center stake) would be required for pads containing a single drill hole. Depending on the amount of surface disturbance proposed at drill locations that contain multiple drill holes, a larger area (up to 40 acres) would be surveyed for each down hole. In most instances, surveying this size of an area would allow for identifying cultural resources in the vicinity of a particular location. In many instances, it would also be large enough to allow for avoidance of most sites while keeping the well in the same general location, which may be geologically important.
- B. Other Facilities: A minimum 5-acre area would be surveyed for all other surface facilities. If the surface disturbance exceeds 3 acres, a minimum 10-acre block surrounding the center of the facility would be inventoried for cultural resources. If the surface disturbance of a facility exceeds 5 acres, the inventory area would include the facility disturbance footprint plus a reasonable buffer..
- C. New Roads and Pipelines: A corridor width of 300 feet; 150 feet on either side of the ROW centerline would be inventoried for cultural resources. This corridor width allows for adjustment of the project ROW to easily avoid most cultural resources.
- D. Existing Roads Requiring Extensive Upgrades: Existing roads that would require extensive modifications would be inventoried in a similar fashion to new roads and pipelines.
- E. Regular Maintenance, Reroutes, and Minor Upgrades: New surface disturbances related to maintenance, reroutes, and minor upgrades would be inventoried for cultural resources. Fifty feet on either side of the road center would be surveyed for road maintenance requiring more than blading and small reroutes. Larger reroutes longer than 200 feet would be surveyed to a width of 150 feet on either side of the reroute center. Minor upgrades, such as culverts and drainage control channels would be inventoried based on the extent of the disturbance. At a minimum, a buffer of 100 feet around the maximum area of disturbance would be inventoried for cultural resources.
- F. Inventory Procedures: Cultural resource inventories would follow the guidelines established in the Guidelines for Identifying Cultural Resources (BLM 2002c).
- G. All necessary efforts to avoid eligible cultural resources would be made during the planning phases of a particular undertaking. These efforts include, but are not limited to, rerouting pipelines or road corridors and moving well locations or other facilities to ensure the avoidance of important resources during the design phase.

EVALUATION

All sites identified in an individual APE would be evaluated for eligibility for inclusion on the NRHP. The NRHP criteria for evaluation and procedures for nominating cultural resources to the NRHP are outlined in 36 CFR 60.1 as follows:

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, material, workmanship, feeling and association, and that they:

- a) ...are associated with events that have made a significant contribution to the broad patterns of our history; or
- b) ...are associated with the lives of persons significant to our past; or
- c) ...embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- d) ...have yielded or may be likely to yield information important in prehistory or history.

In addition, 36 CFR 60.4 states those cultural resources that meet the above criteria but have achieved significance within the last 50 years shall not be considered eligible for nomination to the NRHP unless they are integral parts of districts that do meet the criteria, or if they meet additional exceptional criteria outlined therein.

REPORTING, RECOMMENDATIONS, AND AGENCY AND TRIBAL CONSULTATION

Cultural resources reports, specific to APD or ROW applications, would be submitted prior to or at the time these documents are submitted to the land management agencies. Through their archaeological contractor, BBC would initiate and prepare these documents for the land management agency. The cultural resource reports would adhere to the requirements and recommendation specified in the *BLM Cultural Resources Management 8110 and 8120 Manuals* and the *Secretary of the Interior's Standards and Guidelines for Archaeological and Historic Preservation*. As such, the reports would include a description of previous work in the vicinity of the undertaking, a cultural history overview, a summary of the findings of the inventory, eligibility recommendations, and management recommendations. Upon receiving and reviewing the cultural resource reports, the BLM or SITLA would initiate the Section 106 consultation with the SHPO. In addition, as requested by the Ute Tribe, the BLM would send all archaeological reports as they are completed to the Uintah and Ouray Ute Indian Tribe Cultural Rights and Protection Office and a notification to the Ute Business Committee, which would allow the Tribe an opportunity to comment on the cultural report. If the Tribe determines the need for additional consultation, they will request participation in the pre-drill onsite inspections.

CONSTRUCTION MONITORING

Monitoring of construction activities involving surface disturbance serves to verify that recommendations concerning resource avoidance are met, to ensure that cultural resources are properly avoided, and to identify discoveries in areas deemed to have a high potential for containing buried cultural resources. Cultural resource monitoring would be required in areas with high cultural resource densities, areas with high geomorphological potential for containing cultural resources, or as recommended in the approved APD or ROW permit. If a discovery is made during construction monitoring, the Discovery Plan, presented in the following sections would be followed.

DISCOVERY PLAN

In the case that an unanticipated buried cultural resource (referred to hereafter as a discovery) is identified during surface-disturbing activities, the following protocol would be followed to ensure the proper identification, evaluation, and mitigation of adverse impacts to the resource.

Discovery Protocol Overview

In general, all activity within 100 feet of the discovery would cease immediately. Work may not resume until the resource can be identified and evaluated by the archaeological contractor and the appropriate government archaeologist. In direct consultation with the BLM, SITLA or other appropriate surface management agency, SHPO, BBC, and the archaeological contractor would develop an emergency treatment strategy. Efforts would be made to expedite resumption of construction without further adverse impacts to the cultural resource. Briefly, the following six steps must be completed before work can resume in the vicinity of the discovery.

1. Cease all activity within 100 feet of the discovery. Work can continue outside the 100-foot buffer if an archaeological monitor is present and has determined that no additional impacts to the discovery would occur.
2. Notification
 - a. If the discovery is on the BLM lands, notify the appropriate BLM Field Office, and SHPO of the discovery within 24 hours.
 - b. If the discovery is on State or private land, notify SITLA and SHPO of the discovery within 24 hours.
3. Site documentation and evaluation by an archaeological consultant, and government representatives, if warranted.
4. Determination of eligibility.
5. Action Plan/Mitigation.
6. Resumption of work upon receipt of written permission from the appropriate land management agency or SHPO.

Mitigation Efforts for Unanticipated Discoveries of Cultural Resources

If unanticipated cultural resources are encountered during the course of surface disturbance, the following procedures shall be followed before work can resume.

1. Determine Extent of Discovery/Site Recordation

In order to understand the nature and extent of the discovery, an archaeologist would document the discovery following the BLM guidelines for site documentation as stated in the 8100 manuals. This can include, but is not limited to, documenting exposed artifacts and features; mapping the extent of artifacts, features, and cultural horizons; and documenting natural and cultural stratigraphy in open trenches or pits.

2. Evaluation of Eligibility

The discovery would be evaluated, based on the eligibility criteria outlined above, to determine if it is a property that is eligible for inclusion on the NRHP. The contract archaeologist would make eligibility recommendations to the appropriate government entity. The government archaeologist would either concur or not concur with the eligibility recommendation. If needed or required, the government archaeologist would consult with the SHPO or seek concurrence on the preliminary eligibility determination. Findings of eligibility can include *ineligible*, *eligible*, and in rare cases, *insignificant data* to make a determination (e.g., *unevaluated*).

- a. If the site is determined to be ineligible for inclusion to the NRHP, and there is SHPO concurrence on this eligibility recommendation, work may resume and no further action need be taken.
- b. If the site is determined to be eligible for inclusion on the NRHP, the appropriate government officials, BBC, and their contractors, would determine an appropriate action plan to mitigate any adverse effects to the resource so work can continue.
- c. If a determination cannot be made based on the data collected during recordation, additional testing may be required to further delineate the nature, extent, and significance of the discovery.

If the site is determined to be eligible for inclusion on the NRHP, then an assessment of the disturbance to the resource would be made. If there is a finding of “no adverse effect,” work may resume after adequate documentation is completed, and BBC or its contractors receive permission to proceed from the appropriate government representative.

If the site is determined to be eligible and there is a finding of “adverse effect” to the resource, then procedures to mitigate the adverse effects must be completed before work can continue. Mitigation efforts would be contingent upon several factors. These include the type and extent of the disturbed resource, the extent of the adverse effect, and whether or not it is possible to avoid any further impact to the resource.

Mitigation efforts can be considered either non-destructive or destructive, and can include:

- a. Collection of additional information from the disturbed portion of the resource using non-destructive methods.
- b. Collection of additional information from undisturbed portions of the resource using non-destructive methods.
- c. Collection of additional information from disturbed portions of the resource using destructive methods.

Non-destructive methods include narrative descriptions, scaled drawings and profiles, mapping, and noninvasive procedures such as photography and the use of remote sensing technologies. Destructive methods include artifact collection, testing, excavation, and the recovery of samples for environmental analysis and dating (e.g., charcoal or soil samples for radiocarbon or

macrobotanical analysis). It is recommended that any destructive methods used in mitigation be restricted to areas where adverse effects have occurred.

Unanticipated Discovery of Human Remains and Associated Materials

Human Remains on the BLM Land

A. Discovery Notification

If human remains, remains thought to be human, associated or unassociated funerary objects, or objects of cultural patrimony are discovered, work within 100 feet of the discovery would stop immediately. Verbal notification of the discovery would be made to the BLM and the SHPO by BBC or its contractors immediately. Upon notification, the BLM would notify the appropriate law enforcement authorities, the county coroner, and appropriate Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) coordinator. If the remains are determined to not be of forensic importance, an assessment of the remains would be made.

B. Assessment of the Remains

An in-situ assessment of the remains would be made to determine the cultural affiliation of the remains to aid in determining required actions as defined in a written NAGPRA Plan of Action (POA) prepared by the BLM. The BLM would meet all requirements of NAGPRA for all discoveries of human remains and associated objects in accordance with 43 CFR 10 and BLM IM 2007-002, which allows for reburial of human remains and associated funerary objects excavated on BLM land. All reasonable measures would be taken by the involved parties to resolve issues regarding affiliation and disposition of human remains within 30 days as required by law.

C. Protection of Human Remains

BBC is responsible for the security and protection of human remains during NAGRPA consultations, at least until disposition of the remains is determined.

D. Resumption of Work

Work in the immediate vicinity of the human remains may not resume until after the disposition of the human remains is determined. Permission to proceed would come from the BLM, after consultation with SHPO and appropriate Tribal representatives. This permission can only be given after a written binding agreement is executed between the necessary parties. This agreement adopts a recovery plan for removal, treatment, and disposition of the human remains or associated objects in accordance with 43 CFR Part 10.4(e).

Human Remains on State and Private Land

Treatment of human remains discovered on State or private land would be treated as defined by State law, State of Utah Code Annotated 9-9-401 et. seq., 7-9-704, 9-9-305, 9-8-176. Human remains discovered on lands managed by SITLA would be treated as defined in its Trustees' Board Policy 97-04.

A. Discovery Notification

If human remains, remains thought to be human, associated or unassociated funerary objects, or objects of cultural patrimony are discovered, work within 100 feet of the discovery would stop immediately. BBC, or their contractors, would make notification, either verbal or written, of the discovery to the SITLA, SHPO, and the appropriate law enforcement agency. If the remains are determined to not be of forensic importance, an assessment of the remains would be made.

B. Assessment of the Remains

An in-situ assessment of the remains would be made to determine the cultural affiliation of the remains to aid in determining required actions as defined in a written Action Plan prepared by the SHPO. SHPO would meet all requirements of applicable State and Federal laws for all discoveries of human remains and associated objects on State lands and private property. All reasonable measures would be taken by the involved parties to resolve issues regarding affiliation and disposition of human remains within 30 days as required by law.

C. Protection of Human Remains

BBC is responsible for the security and protection of human remains during consultations if the remains are located on State or private lands.

D. Resumption of Work

Work in the immediate vicinity of the human remains may not resume until after the disposition of the human remains. Permission to proceed would come from the SITLA or SHPO in consultation the appropriate Tribal representatives, depending on property ownership. This permission can only be given after a written binding agreement is executed between the necessary parties. This agreement adopts a recovery plan for removal, treatment, and disposition of the human remains or associated objects. Removal of human remains from State and private lands can only be executed by special permit issued by the SHPO and after consultation with the Native American Remains Committee and affiliated Tribes.

Attachment F

Cultural Resources Monitoring Plan

WTP EIS CULTURAL RESOURCE MONITORING PLAN

INTRODUCTION

The overall objective of the West Tavaputs Plateau Cultural Resource Monitoring Plan (WTP-CRMP) is to monitor human-caused changes to cultural resource site conditions associated with development of natural gas resources over the life of the West Tavaputs Plateau Natural Gas Full Field Development Project (WTP Project) proposed by Bill Barrett Corporation (BBC) and other Operators (collectively hereafter referred to as Operator(s)). Implementation of this plan, in conjunction with the Preconstruction Cultural Resource Identification Plan (Attachment E), will allow the BLM to identify, evaluate, document, and monitor, direct, indirect, and cumulative impacts to cultural resources. This plan will also provide the BLM with the tools necessary to determine appropriate mitigation measures.

MONITORING SITE SELECTION

Introduction

The potential pool of cultural resources where monitoring may occur consists of all properly documented sites in the Area of Potential Effect (APE) that are eligible to the National Register of Historic Places (NRHP). In addition, the pool includes any sites found in the APE that are documented and recommended as eligible that are identified during subsequent cultural resource inventories. These latter sites may be identified during cultural resource inventories related to the WTP Project, by unrelated survey projects related to other development, scholarly research, or inadvertent or incidental discoveries.

As detailed in a Class I cultural resource inventory for the West Tavaputs Plateau (Whitfield et al. 2006), nearly 1,000 cultural resources are known within the APE and many more have been identified and recorded since the completion of the report. The Class I report identifies 727 sites that are eligible for inclusion on the National Register of Historic Places (NRHP)¹. Given the number and diversity of site types and the large area covered by the APE monitoring each site is not practical or even necessarily warranted. Instead, a two-pronged monitoring system, consisting of continued monitoring of a set of predetermined sites and monitoring of a rotating discretionary sample of additional sites, is warranted. The number of sites to be monitored will not be less than 5 percent of the total number of eligible sites; the 5 percent will be evenly split between the predetermined and discretionary samples. Because of the large area and the different types of impacts that may occur at different site types, both monitoring samples are stratified according to two major topographic areas within the APE including the major canyons and the plateaus. A representative sample of sites will be identified taking into consideration factors such as topography, vegetation, and site distribution. However, priority consideration will be given to rock art sites that are visible from major access roads (e.g., Nine Mile, Gate, Harmon, Cottonwood, and Dry Canyon roads) and are within the range of potential dust accumulation.

Monitoring Areas

To monitor, document, and mitigate any impacts directly or indirectly related to the Operator(s) development in the APE, the monitoring program requires that each area where development occurs be monitored. In addition to development areas, major transportation

¹ The Class I Inventory is currently being revised to include cultural resources within the APE. Modifications to the Class I report will change the numbers presented within this Plan.

routes and sites in certain “control” areas are also included in the monitoring program. Control areas will consist of portions of the APE or other areas on the West Tavaputs Plateau (e.g., Range Creek) that are generally inaccessible, not well-known, or not commonly visited. Monitoring sites in these areas will allow a level of control in evaluating other sites. Tentatively, the major plateaus where drilling will occur, including the Prickly Pear area, the Flat Iron Mesa area, Sagebrush Flats, Peter’s Point, and Horse Bench, are specifically targeted for monitoring. In addition to the upland settings, Nine Mile Canyon, Gate Canyon, Dry Canyon, Cottonwood Canyon, and Jack Canyon are also included in the plan.

Predetermined Site Selection

Ultimately, the final determination of the predetermined monitoring sites will be made by the BLM. Prior to determining the final list of sites in this category, the BLM, will consult with the State Historic Preservation Officer (SHPO), the School and Institutional Trust Lands Administration (SITLA), and other Consulting Parties. In addition, the BLM will consider adding a set of culturally sensitive sites to the monitoring program. Location information pertaining to these sites will not be made available to the general public. The number of predetermined sites will be approximately 20, or roughly 2.5 percent of the approximately 727 documented eligible sites in the APE. Given the frequency and high density of sites in the canyon settings, approximately 15 of the 20 predetermined monitoring sites will be in a canyon setting and at least one of these sites will be in Jack Canyon. The remaining five predetermined monitoring sites will be on the major plateaus. At least one of these five sites will be within the Horse Bench area of the project area.

Discretionary Site Selection

In addition to the predetermined sites, the BLM will discretionally monitor an additional sample of 15-20 eligible sites in the APE. This will allow the BLM to increase monitoring in areas where development is concentrated during a given year or add newly discovered/recorded sites.

Monitoring

In addition to monitoring for vandalism and inadvertent impacts in general, there is considerable public and scientific concern for impacts to rock art and certain types of prehistoric standing structures pertaining to dust and vibration related issues. Much of this concern comes from empirical observations of dust accumulation on rock art and a lack of data regarding the actual impacts caused by dust and vibrations. In monitoring these site types, specific attention will be given to monitoring and addressing impacts related to these factors. At structural sites, including historic structures that receive considerably less regard than their prehistoric counterparts, structural decay needs to be monitored and the causes of the decay need to be assessed. At rock art sites, including historic inscriptions, dust accumulation, as well as dust constituents, need to be monitored and assessed. Panels also need to be monitored for evidence of vibration-induce cracking or spalling that may compromise it. In preparation for the WTP EIS the Operator(s) voluntarily agreed to fund a study that examined the impacts of dust and dust suppressants (i.e., magnesium chloride) on rock art. Laboratory analyses, in combination with visual observations confirmed that the combination of raw road surfaces and

heavy vehicle traffic produces large plumes of fine dust that settle on adjacent rock art. In response to the findings of the dust study the BLM determined that this project could have an adverse effect on Historic Properties. Beginning in the summer of 2008 a Dust Suppression Plan was put into place to minimize the amount of dust generated by Project-related traffic. Implementation of this monitoring plan will allow the BLM to evaluate the effectiveness of dust suppression efforts in the Canyon and the long-term impacts that increased traffic and human activity may have on cultural resources.

As discussed in Section 4.12.1.2 of the Draft EIS (October 2008), “the potential for traffic-induced vibration resulting in the collapse of a rock art panel or standing architectural structure are seemingly low.” Nonetheless, implementation of this monitoring plan will also allow the BLM to check for vibration induced-cracking.

TYPES OF MONITORING AND PROTOCOLS

Monitors

Monitoring must be conducted by professional archaeologists permitted to work on State and Federal lands.

Baseline Data Acquisition and Database Construction

The preliminary step in the monitoring plan concerns the collection of baseline data addressing the integrity of a site at the time it was originally recorded and the integrity of the site as it currently exists. For those sites in the predetermined and discretionary samples, baseline data acquisition for the monitoring plan will take two forms. First, existing documents, particularly Intermountain Antiquities Computer System (IMACS) forms and their associated assessments, maps, and photographs, will be gathered. Additional documentation that can be used to assess site integrity will be sought from academic institutions, cultural resource management companies, historic photograph collections, conservation organizations, and private citizens who reside in or near Nine Mile Canyon currently or in the recent past. Documentation sought from these sources will include field notes related to site assessments, photographs, historical narratives, and first-person accounts of how sites may have appeared in the past. These types of data will be useful for rock art and structural sites in the canyon, but will have limited applicability to many of the sites located on the plateaus. In these instances, it will be necessary to rely on IMACS documentation.

The initial baseline assessment will be made for each predetermined site as well as for each discretionarily selected site. All future cultural resource inventories conducted within the APE, whether related to the Operator(s) development or not, will be required to conduct an integrity assessment at any newly or previously recorded sites that are recorded or revisited during the course of a cultural resource inventory. Data concerning site visibility and site accessibility will be collected. This data can be compared over the life of the project (LOP) to measure the rate of change relative to increased development.

To facilitate the accumulation and analysis of the data collected relative to the cultural resource base and the integrity assessments, a monitoring database will be established and maintained at the BLM Price Field Office. Monitoring reports will be submitted annually.

Site Monitoring and Frequency

Monitoring will consist of collecting data related to determining any change in site integrity and the rate that change is occurring. To accomplish this, each site will be evaluated based on site condition criteria established under the existing IMACS Site Form User's Guide (Appendix 1). The IMACS system, under which most of the identified sites are recorded, consists of two components including a site condition assessment and the identification of impact agents. The site condition assessment is:

Excellent	Virtually Undisturbed
Good	75 Percent Undisturbed
Fair	50-75 Percent Undisturbed
Poor	More than 50 Percent Disturbed
Inundated	Covered with Water
Destroyed	No Longer Exists
Unknown	No Information Available

The most relevant impact agents listed in the IMACS User Guide include, clear cutting, deflation, demolition/dismantling, erosion, grazing, development, recreation use, road, recreational vehicle, structural decay, other, and no impact. The supplemental IMACS rock art form adds an additional impacts, or destructive agents as called on the form, that can be used to assess rock art panels. Natural destructive agents include bird/insect nests, exposure, lichen growth, mineral deposits, mud deposits, surface spall, vegetation abutment, water run-off, other, and none. Other, or human-induced, destructive agents include alteration/defacing, bullet holes, chalking, construction, graffiti, livestock, obliteration, paint, removal (both attempted and complete) smoke blackened, other, and none. In the supplemental form, the results or observations are recorded as the percentage of the rock art affected by these agents.

To assist in objectively assessing site integrity, the monitor(s) will be required to fill out a site monitoring form and include photographic documentation. Photographic Point monitoring, as detailed in the Photo Point Monitoring Handbook (Hall 2002) may be used. The number of photo points will be dependant on the type of site and the number of photographs needed to adequately monitor the site condition and the rate of change. For instance, a rock art site with multiple panels may require more photographic control points than a lithic scatter located in a sagebrush field. Photo Point monitoring will occur at all monitor sites regardless of whether in the predetermined sample or random sample. Since it likely that a site in the random sample will be visited more than once during the monitoring, establishing control points during the initial assessment will be beneficial for future documentation. As detailed below, this will also allow for consistency during the final documentation of all sites monitored over the LOP.

Monitoring reports will be submitted annually to the BLM, who will provide a copy to all Signatories and Concurring Parties to the Programmatic Agreement for the West Tavaputs Plateau Natural Gas Full Field Development Project (Project) within 30 days. In addition, during

the development phase, a cumulative assessment of impacts of the project on historic properties in the APE will be completed every three (3) years and distributed to all Signatories and Concurring Parties. During the production and abandonment phase a cumulative assessment of the impacts of the Project on historic properties in the APE will be filed every (5) years as described above. Summary reports without site location information will be made available to the public.

In addition to assessing site integrity through visual observation and photographic documentation, the Operator(s) will be required to conduct dust sampling at the five rock art sites tested during the Dust Study and an additional control site selected by the BLM. If dust samples collected at the five test sites indicate that dust is still accumulating on the cultural sites within the WTP Project Area, the BLM will have the option to require discretionary sampling at an additional three to five sites. The dust samples will not be taken directly from a rock art element, but from the surrounding rock matrix that shares the average slope, aspect, and height of the rock art on the panel. For the predetermined sites, sampling will occur semi-annually during the development phase in September and March. Dust samples will be submitted for analysis to identify the quantity and types of contaminants in the dust. As data becomes available, or techniques are improved, dust sampling procedures will be modified accordingly.

Reports will be submitted to the BLM following each laboratory analysis, which will be provided to all Signatories and Concurring Parties to the Programmatic Agreement within 30 days of receipt. In addition, during the development phase, a cumulative assessment of impacts of the project on historic properties in the APE will be completed every year and distributed to all Signatories and Concurring Parties. Summary reports without site location information will be made available to the public. The need for additional laboratory sampling during the production and abandonment phases will depend on the results of samples collected during development. If the cumulative impact analysis shows that dust is continuing to accumulate on the rock art, sampling will continue at the same intervals for the LOP. If the monitoring results show that there is no dust accumulation during the development phase, then no further sampling would be required during production.

Impact Control and Mitigation

Monitoring serves to identify the range, intensity, and effects of impacts directly or indirectly related to development, but in itself does nothing to alleviate or mitigate potential impacts. Where the monitoring results in the identification of impacts to a cultural resource one of two options will be followed. Where impacts are noted but overall integrity of a site is not compromised, impact control measures may be established. The impact control measures are site and impact specific and cannot be entirely identified in advance. Some examples may include placing appropriate signage or barricades in places where unauthorized trails are forming, constructing walkways at popular rock art sites, or facilitating public education and/or awareness. Where the impacts are compromising a site's integrity, mitigation may be necessary (see Stipulation 8 of the Programmatic Agreement). Again, mitigation is site and impact specific but can include eligibility testing, nature and extent testing, data recovery, temporary avoidance fencing, site closure, etc.

LOP Review

Upon completion of the project, all predetermined sites monitored over the LOP will be revisited and a final integrity assessment will be made.

REPORTING

Monitoring reports will be submitted no later than one month after each monitoring period. The monitoring reports will include, at a minimum, a description of the monitoring results that identifies, by site, all observed impacts, an assessment of each monitoring criteria, an assessment of change on those sites in the predetermined sample, and recommendations for alleviating any impacts observed. A final LOP report will be completed which summarizes the entire monitoring program and includes a final integrity assessment of all predetermined sites monitored throughout the LOP. Monitoring reports will be submitted to the BLM, SHPO, and Signatories and Concurring Parties to the Programmatic Agreement. Summary reports will also be made available to the public.

Appendix 1

Attachment G

Dust Suppression Plan

FINAL REPORT DUST SUPPRESSION PLAN

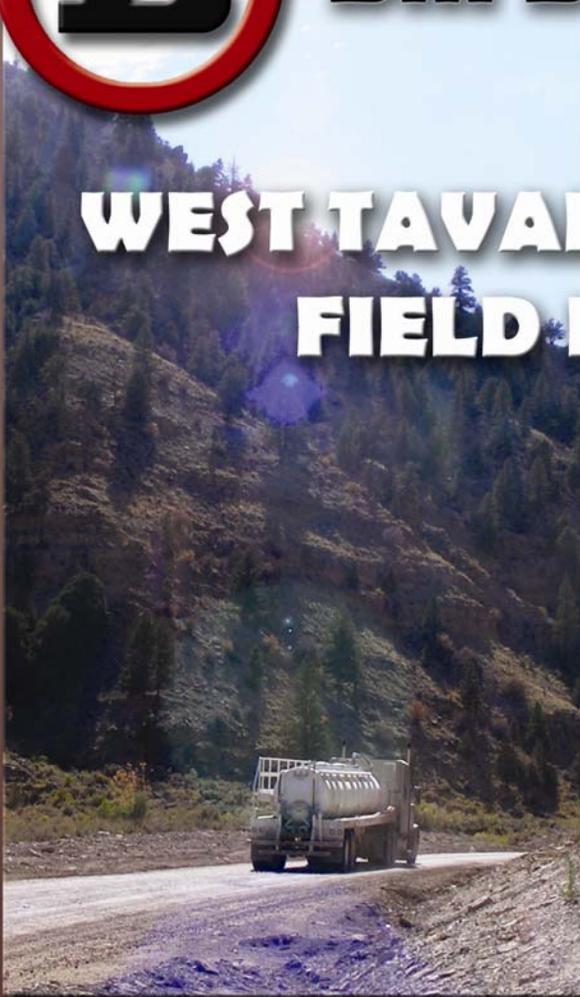


FOR



Bill Barrett Corporation

WEST TAVAPUTS PLATEAU FULL FIELD DEVELOPMENT



DECEMBER 2008



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1. INTRODUCTION

This report presents a plan to suppress fugitive dust generated by vehicles visiting the Nine Mile Canyon area as well as those accessing the West Tavaputs Plateau Natural Gas Full Field Development (WTP). This plan is based on extensive field testing and observations as well as engineering judgment.

1.1 Nine Mile Canyon Road Committee

This plan and the corresponding dust suppressant evaluations have been completed at the request and under the guidelines of the Nine Mile Canyon Road Committee (9MCRC). This committee met initially on March 18, 2008, and has had an ongoing interest in the progress and status of the project. Members of the 9MCRC are shown in Table 1 below.

Table 1. Nine Mile Canyon Road Committee members

ENTITY	REPRESENTATIVE(S)
Carbon County	Commissioners
	Planning
	Public Lands
	Engineering
	Transportation Safety
Duchesne County	Commissioner
Natural Gas Industry	Bill Barrett Corporation
State of Utah	Governor's Office
BLM	Field Office Management
	Environmental
	Real Estate
Congressional	Senator Orrin Hatch's Office
	Senator Bennett's Office
	Representative Matheson's Office
Special Interest Group	Nine Mile Canyon Coalition
Technical/Engineering	Jones & DeMille Engineering

2. PURPOSE & NEED

As stated in the BLM's guidance concerning the dust suppression plan, dated September 5, 2008, "In order to respond to public comments received on the DEIS and complete Section 106 consultation, the BLM has determined the FEIS must include a formal dust suppression plan specific to the WTP project." This document is intended to fulfill the requirement of the dust suppression plan.

Please refer to the associated Environmental Impact Statement (EIS) for the purpose and need information concerning the WTP full field development. The purpose of this Plan is to demonstrate there are feasible alternatives to suppress and control fugitive dust that is generated by transportation elements through the Nine Mile Canyon Road study area. The study area is shown on maps that can be found in Appendix A.

Due to the fugitive dust concerns, the WTP project proponents are implementing a fugitive dust plan within the established study area. This Plan is flexible in order to accommodate environmental, economic, hydrologic, and other indeterminable factors that may be introduced at any time within the study area. Other approaches may be considered in the future to more permanently improve the roadways.

2.1 Roadway Corridors of Primary Concern

There are four principal roadway sections that are of primary concern. Nine Mile Canyon Road, from Harmon Canyon to Cottonwood Canyon, is the primary and most heavily traveled corridor. The portion of Harmon Canyon from Nine Mile Canyon Road to a point approximately one mile south of Nine Mile Canyon Road is included. One mile of Gate Canyon Road (the principal route to Duchesne County) is included, as is approximately eight miles of Cottonwood Canyon Road. The project area maps are in contained in Appendix A. These roads segments are the focus of the enhanced dust suppression efforts because of traffic volume and proximity to waterways and cultural resources.

Nine Mile Canyon Road is the most traveled corridor in the study area. It carries recreational, agricultural, and industrial traffic that accesses Gate Canyon, Harmon Canyon, Cottonwood Canyon, and other canyons along the corridor. It carries traffic originating from and traveling to both Carbon and Duchesne Counties. Measured traffic counts along this corridor were measured at approximately 190 vehicles per day in the summer of 2008, with the majority of the traffic apparently related to oil and natural gas development.

Gate Canyon Road is the only link from Nine Mile Canyon to the Uintah Basin. Recreationists and industry related vehicles use Gate Canyon to view the cultural sites and transport goods and services. Harmon Canyon Road and Cottonwood Canyon Road serve as independent accesses to the WTP area. Industrial and construction traffic accessing the WTP must utilize one of these roadways (Harmon to access the west half and Cottonwood to access the east half).

3. PROJECT DESCRIPTION

The 9MCRC determined that testing should be conducted prior to preparation of a dust suppression plan. A test section consisting of four one-mile-long sections of roadway were treated using various

dust suppressant materials. Fugitive dust sampling, qualitative observations, and professional engineering judgment was required to evaluate dust suppressant performance.

Bill Barrett Corporation had ongoing dust suppressant efforts in the canyon concurrent with the suppressant study. These observations contributed to the conclusions.

3.1 Location

Each of the monitored test strips were located in Cottonwood Canyon, beginning approximately 1,000 feet south of the Cottonwood rock art panel (the Hunt Panel) and continuing south. The test strips were separated by approximately 1,500 feet to prevent tire-tracking from one test strip to another. A fourth test strip was added that treated 1.3 miles of Cottonwood Canyon Road that began at the bridge over Nine Mile Creek to the beginning of Test Strip #1 immediately south of the Hunt Panel. Please see the project plan sheets in Appendix B for additional location information.

Soil types in the region consist of sandy, silty, non-plastic materials that are easily transported during floods and other hydrologic events. Wind is also a major factor in soil transport throughout the study area. There are very few clayey, plastic materials within the corridor. The silty soils are very erodible and migrate easily.

3.2 Dust Suppressant Materials

Multiple dust suppressant materials were evaluated during the selection process. A list of the products considered for use are listed in Table 2 below.

Table 2. Dust suppressant materials considered for testing

Material Name	Product Type
*Pennz Suppress D	Emulsified Petroleum Resin
*TerraLOC	Polyvinyl Alcohol Polymer
PX300	Vinyl Acetate/Maleate Copolymer
EnviroTac II (Rhino Snot)	Acrylic Polymer
X-hesion	Complex Organic Polymer
*LignoSulfonate	Lignin Sulfonate
*PermaZyme 11X	Organic Enzyme

*Selected for Testing

Magnesium chloride has been proven to be an effective, economical dust suppressant. Speculation that this suppressant could potentially affect rock art has discouraged its use in the project area. The project proponent, BLM, and Carbon County have committed to discontinue use of magnesium chloride on the canyon roads within the project area. Therefore magnesium chloride was dismissed from consideration.

Several chemical and physical properties were evaluated during the selection process. These properties included toxicity (human and aquatic), corrosivity, flammability, carcinogenicity, ecological impact due to spillage, and other issues. The material safety data sheets for the four selected materials are included in Appendix D.

The four products selected for use during the testing process were Pennz Suppress, TerraLOC, LignoSulfonate, and Permazyme 11X. The decision was based on physical properties, chemical properties, economic considerations, availability, published use in sensitive areas, prior experience, and other factors. Each of the selected materials is environmentally friendly, non-toxic, non-corrosive and non-carcinogenic according to published data.

The other potential dust suppressant materials were eliminated for multiple reasons including cost, availability and track record in other applications.

3.3 Suppressants Applied to Test Strips

Suppressants were applied according to the work plan included in Appendix G. Subgrade materials within the test strips were pulverized and mixed prior to treatment utilizing a specialized pulverizing machine mounted to a large front end loader. Pulverization resulted in a somewhat varied gradation but allowed more proper grading and more manageable roadway conditions in the future. It also allowed for a base material stabilization evaluation along with a topical dust suppression evaluation.

The pulverized materials were shaped, watered, and prepared for dust suppressant treatment according to manufacturer's recommendations. A different dust suppressant was used for each test strip as follows:

- Test Strip #1: Pennz Suppress D (mixing and topical)
- Test Strip #2: PermaZyme 11X (mixing) and Pennz Suppress D (topical)
- Test Strip #3: LignoSulfonate (mixing and topical)
- Test Strip #4: PermaZyme 11X (mixing - gravel) and TerraLOC (topical)

Dust suppressant materials were applied according to the manufacturer's recommendations. Manufacturer representatives attended the applications in order to direct the contractors and make adjustments based on field conditions. Equipment used included water trucks, a road grader, compactor, and pulverizer mounted on a large front end loader. See Appendix E for selected photos of the operation.

Base stabilization refers to dust suppressant material being mixed into the subgrade materials. Subgrade materials for the test strips were developed using either mechanical pulverization (Test Strips 1-3) or imported granular materials (Test Strip #4). All tested suppressants are able to be used for base stabilization. Mixing of the suppressants into the pulverized or imported base is most effectively accomplished by traditional windrowing methods using a road grader. Suppressants are sprayed onto the windrows and mixed back and forth across the road to ensure even distribution.

Topical treatment refers to suppressants being sprayed onto the roadway surface only. Topical applications require only surface watering and grading prior to application of the suppressant material. The 1,500-foot gaps between the test strips were treated topically as was Nine Mile Canyon Road between Gate and Harmon Canyons.

Following application of the suppressants, no further watering or grading was allowed at any of the test strip locations in order to determine performance characteristics of the suppressants over time.

Key properties of the dust suppressants used for this study are briefly summarized in the following table.

Table 3. Key dust suppressant material properties

Material	Desirable Properties	Less-desirable Properties
Pennz Suppress	Solid, smooth surface, impervious	Cannot be regraded or reshaped without losing dust suppression, strength properties
TerraLOC	Re-emulsifies; Can be regraded and reshaped without losing strength	Soluble; maintenance applications are required to maintain dust suppression, strength properties
LignoSulfonate	Re-emulsifies; Can be regraded and reshaped without losing strength	Soluble; maintenance applications are required to maintain dust suppression, strength properties
PermaZyme 11X	Excellent base material stabilizer; economical	Cannot be regraded or reshaped without losing dust suppression, strength properties; not an effective dust suppressant

NOTE: Desirability is measured relative to observed conditions within the study area.

Each dust suppressant requires maintenance applications in order to ensure effectiveness. Application rates and frequencies are different for each material.

4. RESULTS

4.1 Test Strip #1

Pennz Suppress was used to complete the base material stabilization and topical treatments for Test Strip #1 (TS1), as outlined above. The pulverized base was treated and then capped with a topical treatment.

Initially the pulverizer was used to assist with mixing the suppressant into the pulverized material. This process brought new material into the mix with each pass of the machine, creating an undesirable effect. This occurred in a 1,500-foot-long section of TS1 immediately south of the cattle guard. Mixing with a grader is a more consistent method of mixing the suppressants into the pulverized subgrade material. The remainder of TS1 was mixed using a grader utilizing more traditional methods. This seemed to work much better and this method was used for the other test strips.

Observations of TS1 revealed the section of road where the pulverizer was used to mix the suppressant into the subgrade was less stable than other sections within TS1. The roadway rippled and developed deformations characteristic of soft subgrade materials. This was likely due to lack of compaction and less than optimum water content at depth where the new materials were being inadvertently incorporated by the pulverization process.

This material suppressed the dust very well. Dust monitoring showed no detection one week following the topical application. The amount of dust collected by the gravimetric filtration devices gradually increased as time went on, indicating maintenance applications may be required to maintain effectiveness. Please find the summarized test results for Test Strip #1 in Table 4 below and also in Appendix C.

Based on the observed performance of the Pennz Suppress topical treatment, it appears this section of roadway will be difficult to maintain with this suppressant until drainage is addressed. Storms tend to wash sediment into the roadway, which is incised at many locations. Pennz Suppress, because it is a resin, is not easily reshaped or regraded. Disturbance of the stabilized material results in loss of suppression capacity.

4.2 Test Strip #2

Permazyme 11X was used to provide the base stabilization and Pennz Suppress was used for the topical treatment for Test Strip #2 (TS2). The pulverized base was treated and then capped with a topical treatment.

Mixing was completed at TS2 using a grader and utilizing traditional windrowing methods. This seemed to work well and provided a relatively uniform mixture.

This material combination suppressed the dust very well. Dust monitoring showed no detection one week following the topical application. The amount of dust collected by the gravimetric filtration devices gradually increased as time went on, indicating maintenance applications may be required to maintain effectiveness. Please find the summarized test results for Test Strip #2 in Table 4 below and also in Appendix C.

Enzyme materials are excellent for base stabilization but are not dust suppressants. Once applied, enzymes cannot be rejuvenated or re-emulsified as would be required in a reshaping or regrading effort. For reasons outlined in Section 6, enzyme would be an excellent and very economical solution for base stabilization once the drainage issues are completely addressed. Until then, a more malleable solution is recommended.

Based on the observed performance of the Pennz Suppress topical treatment and the required maintenance treatments, it appears this section of roadway will be difficult to maintain with this suppressant until drainage is addressed. Storms tend to wash sediment into the roadway, which is incised at many locations. Resins and enzymes cannot be reshaped or regraded without losing the desired suppressant properties.

4.3 Test Strip #3

LignoSulfonate was used to provide the base stabilization and topical treatments for Test Strip #3 (TS3). The pulverized base was treated and then capped with a topical treatment.

Mixing was completed at TS3 using a grader and utilizing more traditional windrowing methods. This seemed to work well and provided a relatively uniform mixture. The product representative was on site and assisted in coordinating the mixing and application procedures.

This material suppressed the dust very well. Dust monitoring showed no detection one week following the topical application. The amount of dust collected by the gravimetric filtration devices gradually increased as time went on, indicating maintenance applications may be required to maintain effectiveness. Please find the summarized test results for Test Strip #3 in Table 4 below and also in Appendix C.

Based on the observed performance of the lignin sulfonate material, it appears this material is an excellent candidate for use in the corridor. It can be reworked and regraded as necessary to maintain a proper and safe roadway. This is an attractive property due to the atmospheric conditions that deposit sediment on the roadways, requiring regrading efforts. It appears to hold up well to the truck traffic when properly maintained. This material is recommended for further use and consideration within the study area.

Table 4 Gravimetric dust monitoring results (NIOSH Method 0500)

Test Strip	Product	Sample	Result (mg/m ³)	Volume (L)	Rate (L/min)
Sampling Event #1					
#1	Pennz Suppress D	1a	<0.25	120	0.25
		1b	<0.29	105	0.25
		1c	<0.25	120	0.25
#2	Permazyme & Pennz Suppress D	2a	<0.25	120	0.25
		2b	<0.25	120	0.25
		2c	<0.25	120	0.25
#3	Lignosulfonate	3a	<0.29	105	0.25
		3b	<0.25	120	0.25
		3c	<0.29	105	0.25
Sampling Event #2					
#1	Pennz Suppress D	1a	<0.25	120	0.25
		1b	<0.25	120	0.25
		1c	<0.25	120	0.25
#2	Permazyme & Pennz Suppress D	2a	0.33	120	0.25
		2b	0.29	240	0.5
		2c	0.15	240	0.5
#3	Lignosulfonate	3a	0.38	240	0.5
		3b	0.22	210	0.5
		3c	0.16	240	0.5
Sampling Event #3					
#1	Pennz Suppress D	1a	<0.25	120	0.25
		1b	<0.27	112.5	0.25
		1c	<0.25	120	0.25
#2	Permazyme & Pennz Suppress D	2a	<0.27	112.5	0.25
		2b	0.68	120	0.25
		2c	<0.31	97.5	0.25
#3	Lignosulfonate	3a	<0.25	120	0.25
		3b	<0.27	112.5	0.25
		3c	0.28	112.5	0.25

4.4 Test Strip #4

Permazyme 11X and TerraLOC were used to provide the base stabilization and topical treatments, respectively, for Test Strip #4 (TS4). Untreated base course was imported and treated with Permazyme 11X and then capped with a topical treatment of TerraLOC.

Mixing was completed at TS4 using a grader and utilizing more traditional windrowing methods. This seemed to work well and provided a relatively uniform mixture. The product representative was on site and assisted in coordinating the mixing and application procedures.

Observations of this test strip (also shown as the Gravel section on the plans found in Appendix B) revealed that this material suppressed the dust very well and met the performance criteria.

Based on the observed performance of the TerraLOC, it appears this material is an excellent candidate for use in the project area. It can be reworked and regraded as necessary to maintain a proper and safe roadway. This is an attractive property due to the atmospheric conditions that deposit sediment on the roadways, requiring regrading efforts. This material is recommended for further use and consideration within the study area. The shortfalls of Permazyme 11X in this situation have been outlined in Section 4.2 above. It would be an excellent base stabilization material once the drainage issues are completely addressed.

4.5 Other Observations

Dust suppression materials were applied during the summer of 2008. Pennz Suppress was topically applied on Nine Mile Canyon Road between Gate and Harmon Canyons (approximately 5 miles). Pennz Suppress was also topically applied at Harmon Canyon from Nine Mile Canyon Road to the traffic monitor station (approximately 0.6 mile).

This suppressant performed well when newly applied and before storms introduced sediment onto the roadway. Due to the fact this material cannot be reworked or regraded after the base application, the only options to maintain the dust suppression was carefully and mechanically remove the sediment. Maintenance suppressant applications were then required to attach the loose sediments to the underlying original suppressant material. Drainage is still a primary issue within this corridor. Photos of this section can be found in Appendix E.

4.6 Results Summary

All of the tested dust suppressant materials met the standard for dust suppression as imposed by the BLM for the summer drilling program. The BLM issued the following dust restrictions that should be met in order to continue work within the study area: "...dust would be considered controlled when (1) no dust is generated above the cab of the vehicle, or (2) there are no hanging dust plumes". Additional information on these standards can be found in Appendix F.

Ambient dust levels exist in the study area with or without oil and gas traffic. No advanced dust suppressant technologies, such as those tested in this study, have been utilized in the past or are likely to be utilized in the future in the project area by county maintenance operations. It is very possible that the net effect of this dust treatment plan is that there will be less dust in the study area with the industrial traffic than if the project did not proceed.

5. COST SUMMARY

Bill Barrett Corporation expended approximately \$550,000 to test and properly evaluate dust suppression alternatives in order to mitigate the dust issues within the study area. Estimated initial and ongoing costs have been summarized in the following table.

Table 5. Probable costs to meet dust suppressant performance criteria

Opinion of Probable Construction Costs					
Product	Base Treatment Cost	Maintenance Treatment Cost	Maintenance Applications	First Year Total Cost (w/ Base Application and 2 maintenance apps)	Ongoing Annual Cost
	per mile	per mile	per year		
LignoSulfonate	\$ 90,000.00	\$ 10,000.00	4	\$ 120,000.00	\$ 40,000.00
TerraLOC	\$ 85,000.00	\$ 12,000.00	4	\$ 116,000.00	\$ 48,000.00
Pennz Suppress	\$ 90,000.00	\$ 10,000.00	8	\$ 160,000.00	\$ 80,000.00

6. West Tavaputs Plateau Development Dust Suppression Plan

6.1 General Guidance

Several factors affect efforts to maintain a suitable road surface and suppress dust in the project area. Rainstorms are intense and produce significant road damage during spring and monsoon seasons. Winter introduces sub freezing temperatures in the canyons, causing the subgrade to change strength characteristics and heave. Adapting to prevailing conditions will be necessary to maintaining the roadway corridors at reasonable cost while achieving the required environmental protections.

This Plan provides initial recommendations for dust suppression for roads in the canyons areas that are proximal to the highest concentrations of archeological resources. The following plan is not to be considered fixed or inflexible. All of the tested suppression technologies are effective – it is a matter of optimizing the use of suppressants considering the soil conditions, roadway utilization, and capital and operating costs. This Plan, however, suggests dust suppression methodologies that, based on the engineering judgment, observations and measurements made during the dust suppression study, will be effective at the least cost.

While application of the recommended dust suppressants alone can be effective, a properly ditched and crowned road can dramatically increase the longevity of suppressants. Storm water runoff and snowmelt can cause loss of suppression effectiveness. Consideration should be given to maintain or improve roadway drainage properties in order to protect the investment in dust suppressants. Raising the roadway in incised areas to prevent runoff promotes a well drained surface that will minimize maintenance requirements and improve dust suppression performance.

In general, each of the dust suppressants tested demonstrated the ability to successfully control dust and meet the BLM performance criteria within the study area. Therefore, the primary decision-making factors for road repairs and dust suppression are economic in nature. None of the tested products have published environmental affects or concerns and are currently in use at other sensitive locations.

In general, as evidenced by the performance of the gaps between the test strips, topical applications do not perform as well as the sections of roadway where the subgrade has been treated, that is, suppressant/stabilizer mixed into the pulverized material. A topical treatment of dust suppressant over a treated/stabilized subgrade is most effective. Finally, stabilizing the subgrade by pulverization and reworking or placement of granular materials, as was done near the mouth of Cottonwood Canyon, is beneficial to the life of the suppressant.

Polyvinyl alcohol polymer dust suppressants such as TerraLOC may be considered for use on pulverized or imported granular material sections. This material has reshaping and reworking properties similar to lignin sulfonate, making it a viable option for use in areas that exhibit drainage problems and will likely be subject to frequent grading. It also creates a more cohesive mass that resists erosion

There may be other products that were not tested or that may be developed in the future that meet the BLM's performance criteria for dust suppression and environmental compatibility that are more economical. Presently there are dry products in development that are mixed into the subgrade materials and activated by water application. These and other products should be considered for use within the study area upon review and approval by Carbon and/or Duchesne Counties, the BLM, and other entities with proper jurisdictional authority. Test strips should be established to evaluate performance and verify effectiveness within the study area.

Maintenance requirements will depend on the above factors and traffic volumes. The frequency of maintenance applications as predicted below are based on the performance of the products on the test strips. The actual maintenance requirements will be based on the loss of effective suppression as determined by monitoring described in Section 4.

Based on the observations from the study, it is apparent the roadways would be better maintained if workable, gradable suppressant materials are used until the drainage issues are completely addressed and solved. Suppressant material suppliers have varying opinions on the matter, but these findings are based on field conditions within the study area.

6.2 Dust Suppressant Recommendations

In general, dust suppression materials, application techniques, and road maintenance/repair decisions will be based on pre-existing road conditions, existing in-place road materials, offsite variables (eg. drainage areas, wind, side roadways, etc), availability and overall cost (including suppressant, road repairs, O&M, etc.) of dust suppressant technologies, and availability and cost of imported road repair materials. Specific road sections are outlined below with recommended dust suppression materials, application techniques, and/or road repair suggestions. In most cases, topical application of any of the tested dust suppressants will meet the BLM dust performance criteria, but the recommended approaches may provide better long term value for the specific sections or road types.

6.2.1 Nine Mile Canyon Road

This section refers to the Nine Mile Canyon Road between Harmon Canyon Road on the west end and Cottonwood Canyon Road to the east. As discussed above, this roadway is the main corridor to the project area. Lignin sulfonate is best suited for use along this corridor. The critical property of lignin sulfonate leading to this recommendation is that treated materials can be graded and reworked as needed without losing material properties. Suppressants with re-emulsification and regrading properties similar to lignin sulfonate (such as soluble polymers) could be considered for use on this road.

Pulverization and base stabilization should be considered between Gate Canyon and Cottonwood Canyon since there is no conflict with phone lines or other utilities buried in the road. This is an economic decision as base stabilization appears to extend the life of the topical and maintenance treatments. The existence of buried utility facilities between Harmon Canyon and Gate Canyon require importing on-site granular material or untreated base course to provide the option to crown and raise the roadway prism.

Petroleum resins can be used to control dust on this reach with the understanding that any reshaping defeats the suppressant capacity and would require retreatment.

On sections where drainage issues are remedied, petroleum resins are effective for topical treatment and maintenance applications. They seem to work very well as long as free sediment is minimized and the roadway surface is relatively clean. Sediment washed into the roadway from storm events and snow melt complicate the use of impermeable resin materials that cannot be reworked.

6.2.2 Harmon Canyon Road

This section refers to the Harmon Canyon Road between Nine Mile Canyon Road on the north end and extending approximately 1-mile up Harmon Canyon Road to the south. Recommendations for Harmon Canyon are the same as those for Nine Mile Canyon Road. The first mile south of the Nine Mile Canyon Road intersection is most susceptible to dust given the road base materials. That section of the road is also a good candidate for pulverization and regrading given the lack of utilities beneath the road and the nature of road base materials.

6.2.3 Gate Canyon Road

This section refers to the Gate Canyon Road between Nine Mile Canyon Road on the south end and extending approximately 1-mile up Gate Canyon Road to the north. Recommendations for this roadway are the same as for Harmon Canyon Road. Please refer to section 6.2.2 for further discussion.

Dust suppressant materials should be applied on Gate Canyon Road for the first mile immediately north of the Nine Mile Canyon Road intersection.

6.2.4 Cottonwood Canyon Road

This section refers to the Cottonwood Canyon Road between Nine Mile Canyon Road on the north end and extending approximately 1-mile up Cottonwood Canyon Road to the south. Recommendations for

this roadway are the same as for Harmon Canyon Road. Please refer to section 6.2.2 for further discussion.

Dust suppressant materials should be applied on Cottonwood Canyon Road for the 8 miles immediately south of the Nine Mile Canyon Road intersection (at the Cottonwood Canyon bridge).

6.2.5 Suppressant and Maintenance Summary

See Table 6 below for a summary of the recommended dust suppressant material with the corresponding roadway corridors.

Table 6. Summary of Recommended Dust Suppressant Usage

Roadway	*Recommended Dust Suppressant Material Type	Approximate Length	*Maintenance Application Frequency
		Miles	Months
Nine Mile Canyon	Lignin Sulfonate or Soluble Polymer	12	3 months or depending on site conditions
Harmon Canyon	Lignin Sulfonate or Soluble Polymer	1	3 months or depending on site conditions
Gate Canyon	Lignin Sulfonate or Soluble Polymer	1	3 months or depending on site conditions
Cottonwood Canyon	Lignin Sulfonate or Soluble Polymer	8	3 months or depending on site conditions
TOTAL		22	

*Assumes base stabilization followed by topical and maintenance treatments

6.3 Suppressant Application Methods

Suppressants should be applied according to the supplier recommendations. Liquids can be applied with a common water truck and a spreader bar is recommended but not required. It is recommended that a meter or other means be used to accurately measure the volume of suppressant product being used.

Other application methods such as a distributor truck or dry mixing should be considered as long as manufacturer recommendations are followed and results are verified in the field by qualified personnel.

Base stabilization should be completed using traditional patrol mixing methods. Using the pulverizer to do the mixing did not yield effective results due to issues outlined in Section 4.1. Pulverization or granular material placement followed by a windrow mixing process with a road grader is the most effective method of achieving the desired mixing and performance.

6.4 Contingency Measures

Floods, wind, and other natural means are primarily responsible for introducing sediment and dust into the project area and onto the subject roadways. Secondary contributors include uncovered loads, agricultural activities, and other items that are typically imported in the project area. Loose or deposited sediment on roadways tends to become airborne. Best management practices should be implemented to prevent introduction of sediment into the system.

Materials could be stored on-site in frac tanks, totes, or other facilities in order to expeditiously treat the roads in the event of loss of dust suppression if the dust control standards are not met.

Safety and public transportation should be restored initially and as the top priority, followed by dust suppression efforts as soon as it is prudent and feasible.

6.5 Dust Monitoring

The pre-EIS threshold for dust suppression as imposed by the BLM for the summer drilling program in order to work within the study area is: "...dust would be considered controlled when (1) no dust is generated above the cab of the vehicle, or (2) there are no hanging dust plumes".

As described in Section 3.3, all of the dust suppressant technologies require ongoing maintenance applications. Because of this requirement, a threshold for the requirement to reapply dust suppressant is necessary.

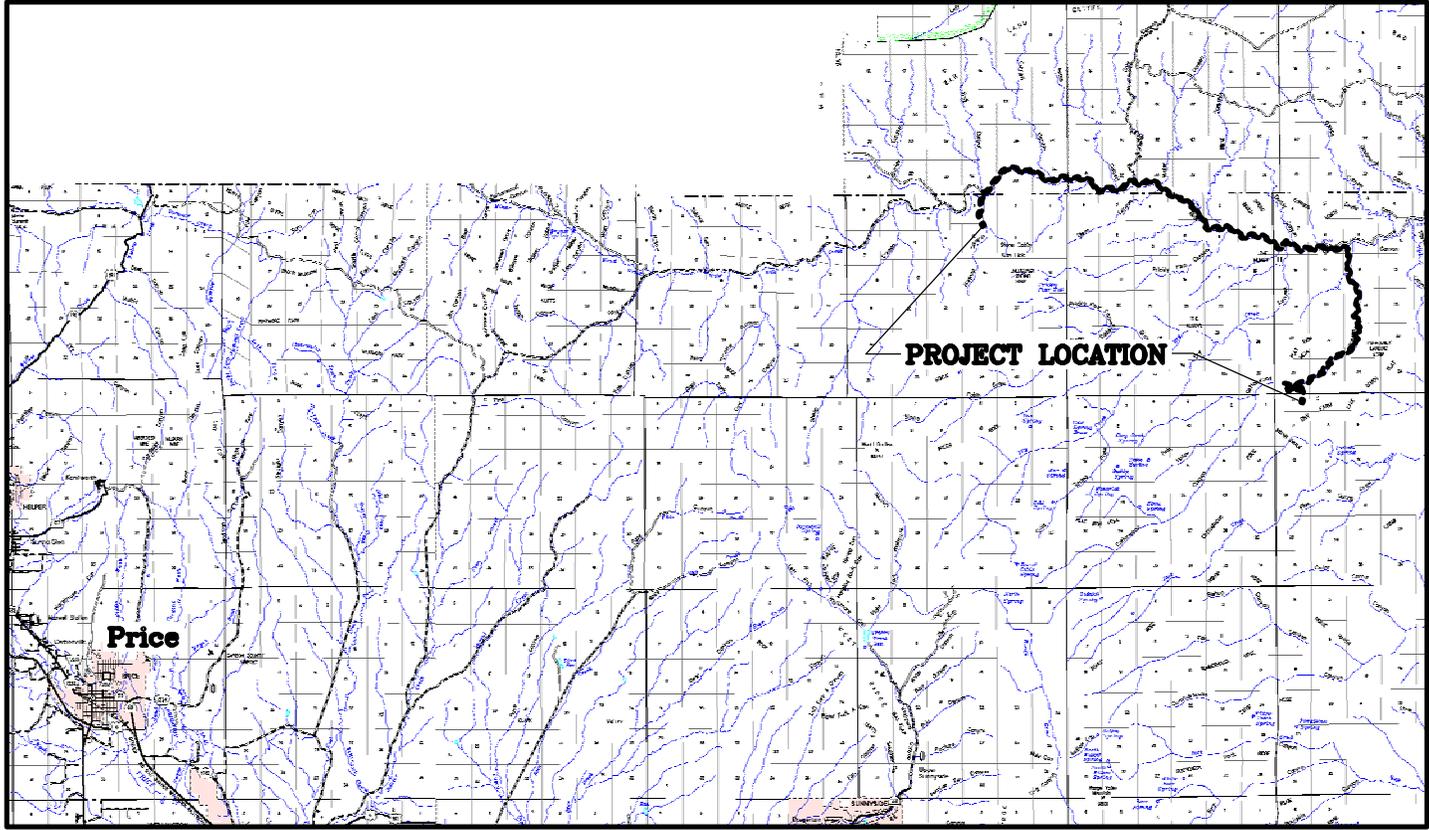
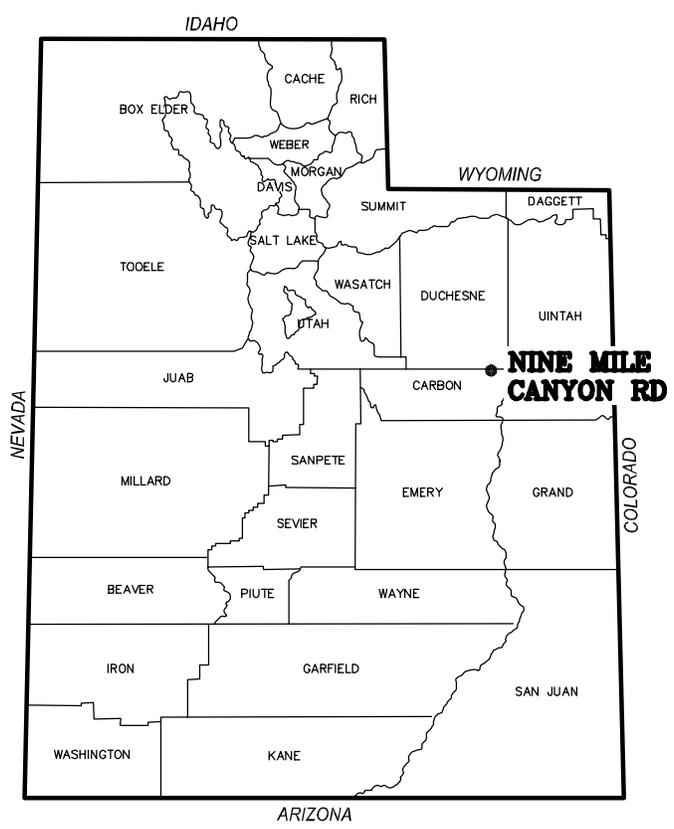
A threshold that recognizes reasonable limits and ambient dust, utilizing opacity as the objective, standard should be developed for post-EIS operations in the area. The tested dust suppressant materials and an appropriate dust threshold, including monitoring of dust appropriate levels, will provide adequate protection for the project area roadways, waterways, and rock art. A cooperative agreement on a future dust threshold, appropriate monitoring, and implementation between the BLM, Carbon County and the proponent will be developed for post-EIS operations in the study area. This must provide a reasonable but measurable threshold as well as the ability to require road treatment or other actions when thresholds are exceeded, or require suspension of operations until such time as the approved dust thresholds can be met.

The proponent should be responsible for determining when additional dust treatment or road repairs are necessary according to the agreed standards. BLM and County officials also have the ability to monitor dust levels and prescribe dust treatment if the applicable thresholds are exceeded.

Until alternate standards can be implemented, dust monitoring should continue according to the requirements set forth in Section 2.1 and as contained in Appendix F.

APPENDIX A

LOCATION AND STUDY AREA MAPS




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 Phone (435) 896-8266 Fax (435) 896-8268
 www.jonesanddemille.com



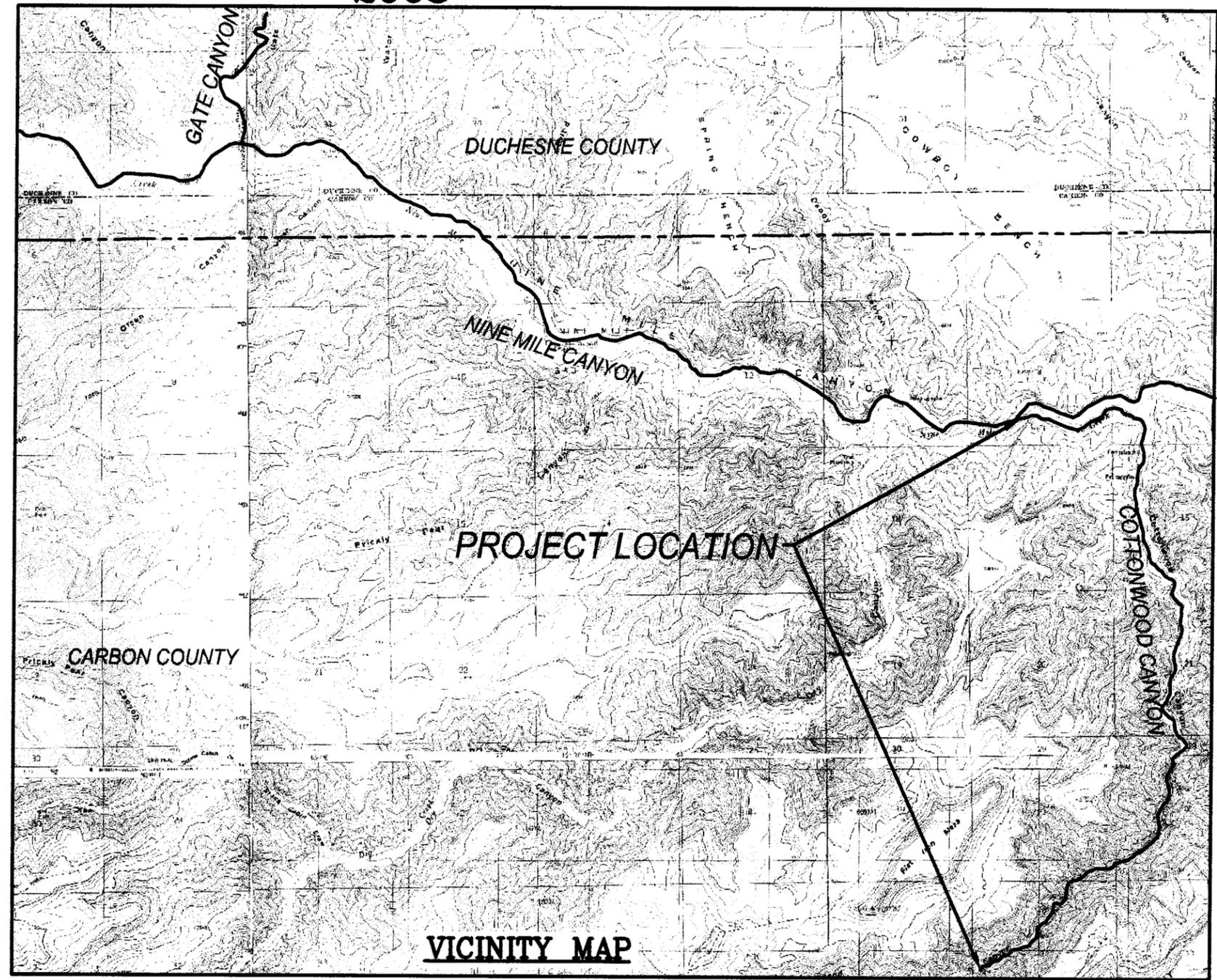
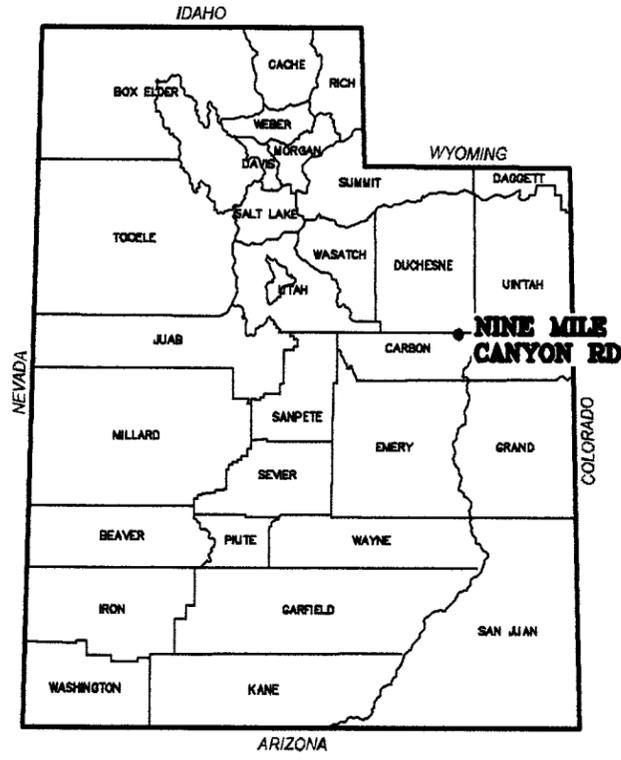
SCALE: NONE

Bill Barrett Corporation		FIGURE: 1	
Nine Mile Canyon Road			
DUST SUPPRESSION STUDY			
DRAWN: B.L. 10-08	PEN TBL: _1stndrd4r2800.cib	PROJECT: 0805-212	SHEET:
CHECK: B.B. 10-08	FILE: TITLE	LAST UPDATE: 10/9/2008	1of2

APPENDIX B
PLAN SHEETS

BILL BARRETT CORPORATION NINE MILE CANYON ROAD DUST SUPPRESSION STUDY CARBON COUNTY, UTAH 2008

PROJECT NO.	SHEET NO.
0805-212	1



SHEET INDEX	
TITLE	TITLE SHEET
TS-01 to TS-02	TYPICAL SECTION
PL-01 to PL-03	PLAN SHEET

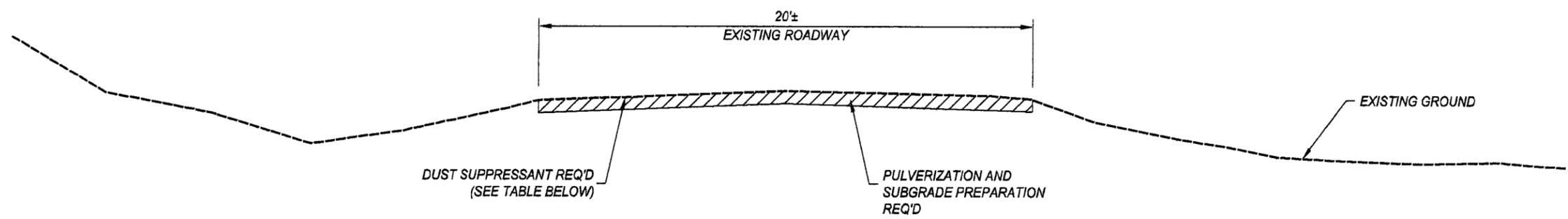
APPROVAL

RECOMMENDED FOR APPROVAL:	
_____	DATE
ENGINEER	
APPROVED:	
_____	DATE
BILL BARRETT CORPORATION	

VICINITY MAP



Jones & DeMille Engineering
1535 South 100 West - Richfield, Utah 84701
Phone (435) 896-8266
Fax (435) 896-8268
www.jonesanddemille.com



TYPICAL SECTION #1
PULVERIZATION - TEST STRIPS 1,2,3
 (SEE PLAN SHEETS FOR LOCATION)

NOTE:

1. APPLY DUST SUPPRESSANT PRODUCTS ACCORDING TO MANUFACTURER RECOMMENDATIONS OR AS DIRECTED BY ENGINEER.
2. DO NOT DISTURB TERRAIN OUTSIDE OF EXISTING APPROVED DISTURBANCE LIMITS.
3. GAPS BETWEEN TEST STRIPS TO BE TREATED WITH PRODUCTS SHOWN ON PLANS. TOPICAL ONLY
4. BASE APPLICATION IMPLIES MIXING OF SUPPRESSANT INTO PULVERIZED MATERIAL.
5. TOPICAL APPLICATION IMPLIES TOPICAL TREATMENT ON TOP OF FINISH GRADE PULVERIZED, UNTREATED BASE COURSE, OR NATURAL SUBGRADE MATERIAL.
6. GAPS BETWEEN TEST STRIPS TO BE GRADED, WATERED, COMPACTED PRIOR TO TOPICAL APPLICATION.
7. DUST CONTROL AND WATERING ARE REQUIRED AT ALL TIMES TO MAINTAIN "ZERO - DUST" THRESHOLD.

TEST STRIP	PRODUCT
#1	PENNZ SUPPRESS D (BASE & TOPICAL)
#2	PERMAZYME (BASE) & PENNZ SUPPRESS D (TOPICAL)
#3	LIGNOSULFONATE (BASE & TOPICAL)
UBC	TERRALOC (TOPICAL)

Jones & DeMille Engineering
 1335 South 100 West, Provo, Utah 84701
 Phone: (435) 886-2266 Fax: (435) 886-9208
 www.jonesandmille.com

REVISIONS

NO.	DATE	DESIGN REV. BY	PARS/ETS REVISED BY	REMARKS

ORIGINAL SUBMISSION FOR AUTHORIZATION

DWG NAME: TS-01
 SHY SET: 0805-212
 DWG CREATED: 06/10/08
 PEN TBL: jones442804c
 LAST UPDATE: 7/23/2008

NINE MILE CANYON ROAD

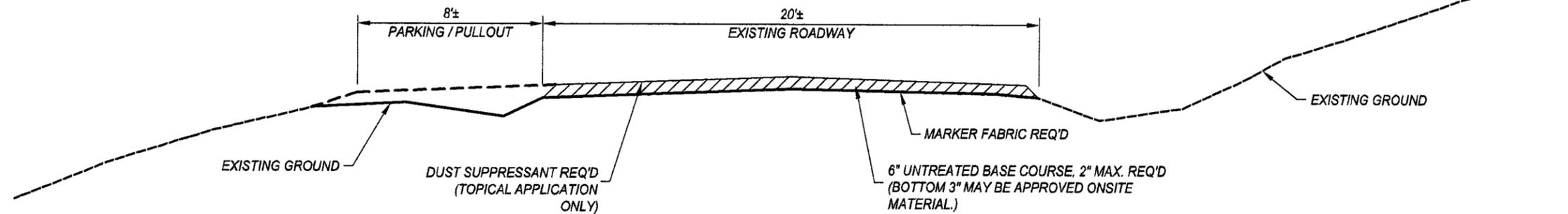
DUST SUPPRESSION STUDY

TYPICAL SECTION

PROJECT NUMBER: 0805-212

CARBON
 COUNTY

SHEET NO. TS-01



TYPICAL SECTION #2
 UNTREATED BASE COURSE
 (SEE PLAN SHEETS FOR LOCATION)

NOTES:

1. NO EXCAVATION ALLOWED THROUGHOUT GRAVEL (UBC) SECTION.
2. APPLY DUST SUPPRESSANT PRODUCTS ACCORDING TO MANUFACTURER RECOMMENDATIONS OR AS DIRECTED BY ENGINEER.
3. DO NOT DISTURB TERRAIN OUTSIDE OF EXISTING APPROVED DISTURBANCE LIMITS.
4. TOPICAL APPLICATION IMPLIES TOPICAL TREATMENT ON TOP OF FINISH GRADE PULVERIZED UNTREATED BASE COURSE, OR NATURAL SUBGRADE MATERIAL.
5. DUST CONTROL AND WATERING ARE REQUIRED AT ALL TIMES TO MAINTAIN "ZERO - DUST" THRESHOLD.
6. MARKER FABRIC MATERIAL MUST BE APPROVED BY BBC, BLM, AND CARBON COUNTY PERSONNEL PRIOR TO INSTALLATION. TO BE USED ONLY BETWEEN EXIST. "NO BLADING" SIGNS.
7. PARKING / PULLOUT AREAS TO BE INSTALLED ONLY AT APPROVED LOCATIONS, AS STAKED.
8. UNTREATED BASE COURSE TO BE OBTAINED FROM APPROVED CARBON COUNTY PIT.

SENSITIVE AREA NOTIFICATION:
 AREAS IMMEDIATELY ADJACENT TO GRAVEL / UNTREATED BASE COURSE SECTION ARE ENVIRONMENTALLY SENSITIVE. CAUTION MUST BE TAKEN AT ALL TIMES TO AVOID DISTURBANCE OUTSIDE OF ESTABLISHED DISTURBED CORRIDOR.

TEST STRIP	PRODUCT
#1	PENNZ SUPPRESS D (BASE & TOPICAL)
#2	PERMAZYME (BASE) & PENNZ SUPPRESS D (TOPICAL)
#3	LIGNOSULFONATE (BASE & TOPICAL)
UBC	TERRALOC (TOPICAL)

DWC CREATED: 06/08/08
 LAST UPDATE: 7/28/2008
 PEN TBL: Junda42280a.c
 SCALE: 1"=5'
 DWG NAME: 18-01
 SIT SET: 0805-212

REVISIONS

NO.	DATE	DESIGN REV. BY	PARS/ELS REQUESTED BY	REMARKS

ORIGINAL SUBMISSION FOR AUTHORIZATION

REVIEW

DESIGN	BB	06-08	CHECK	BB	06-08	REVIEW	DATE	BY

DRAWN

DESIGN	BB	06-08	CHECK	KJ	06-08	QUANT	DATE	BY

PROJECT DESIGNER/ENGINEER

APPROVAL	DATE	APPROVER	DATE

PROJECT DESIGNER/ENGINEER

APPROVER

DATE

DATE

PROJECT NUMBER: 0805-212

TYPICAL SECTION

DUST SUPPRESSION STUDY

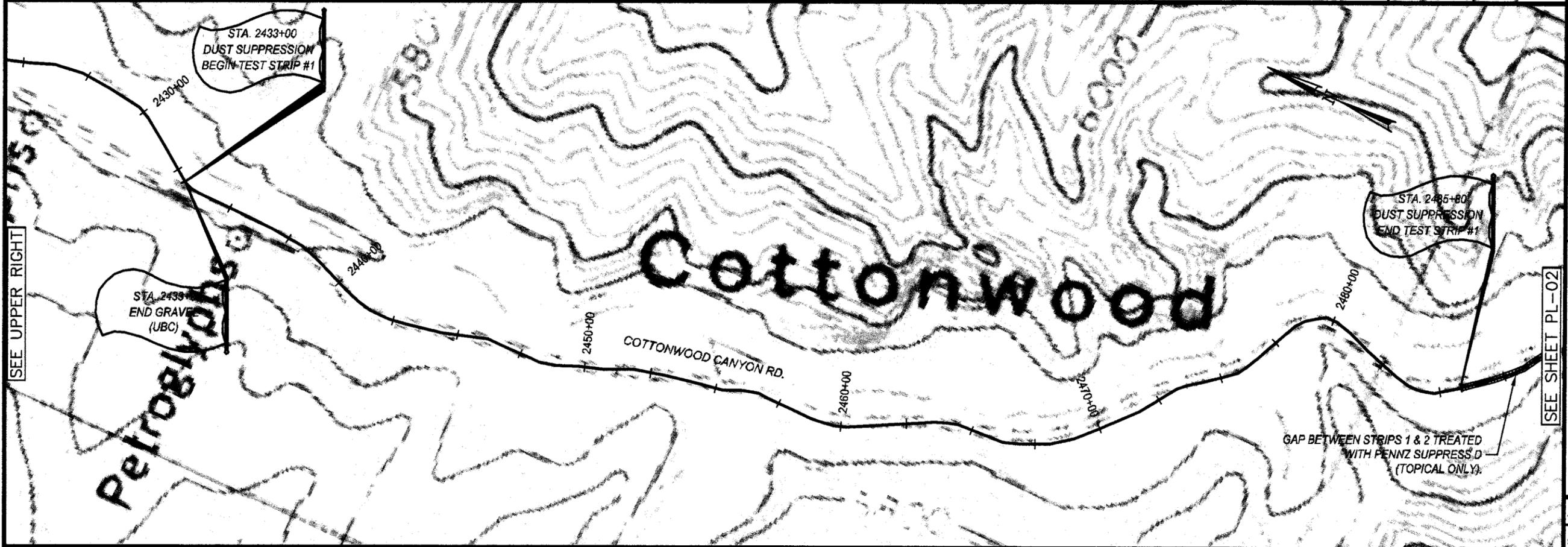
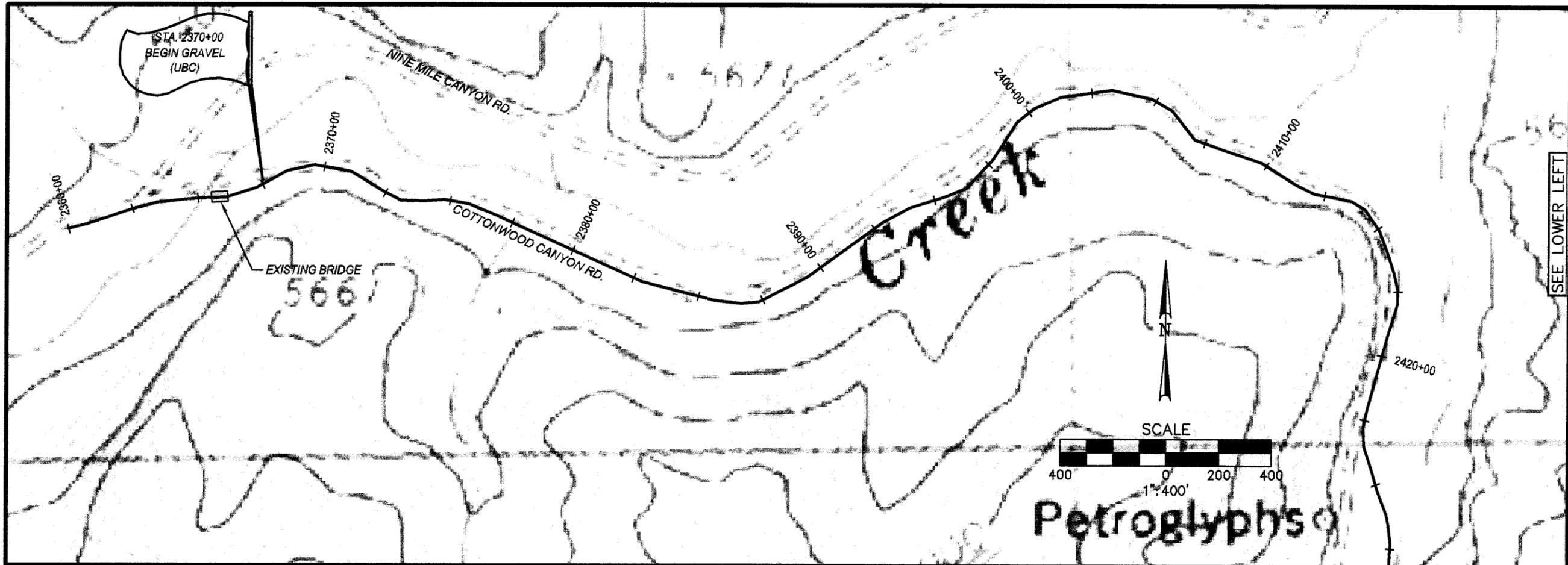
NINE MILE CANYON ROAD

CARBON COUNTY

SHEET NO. TS-02

Jones & DeMille Engineering
 1835 South 100 West - Richfield, Utah 84701
 Phone (435) 896-8266 Fax (435) 896-8268
 www.jonesanddemic.com





SEE LOWER LEFT

SEE UPPER RIGHT

SEE SHEET PL-02

INDEX

NO.	DATE	REVISIONS

ORIGINAL SUBMISSION FOR AUTHORIZATION

SCALE: 1"=400'

DWG NAME: NTR
DWS CREATED: 06/10/08
SHT SET: 0805-212
PEN TBL: L:\2008\0805-212

REVIEW

BB	06-08	BB	06-08
BB	06-08	BB	06-08
KJ	06-08	BB	06-08
BB	06-08	BB	06-08

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NINE MILE CANYON ROAD

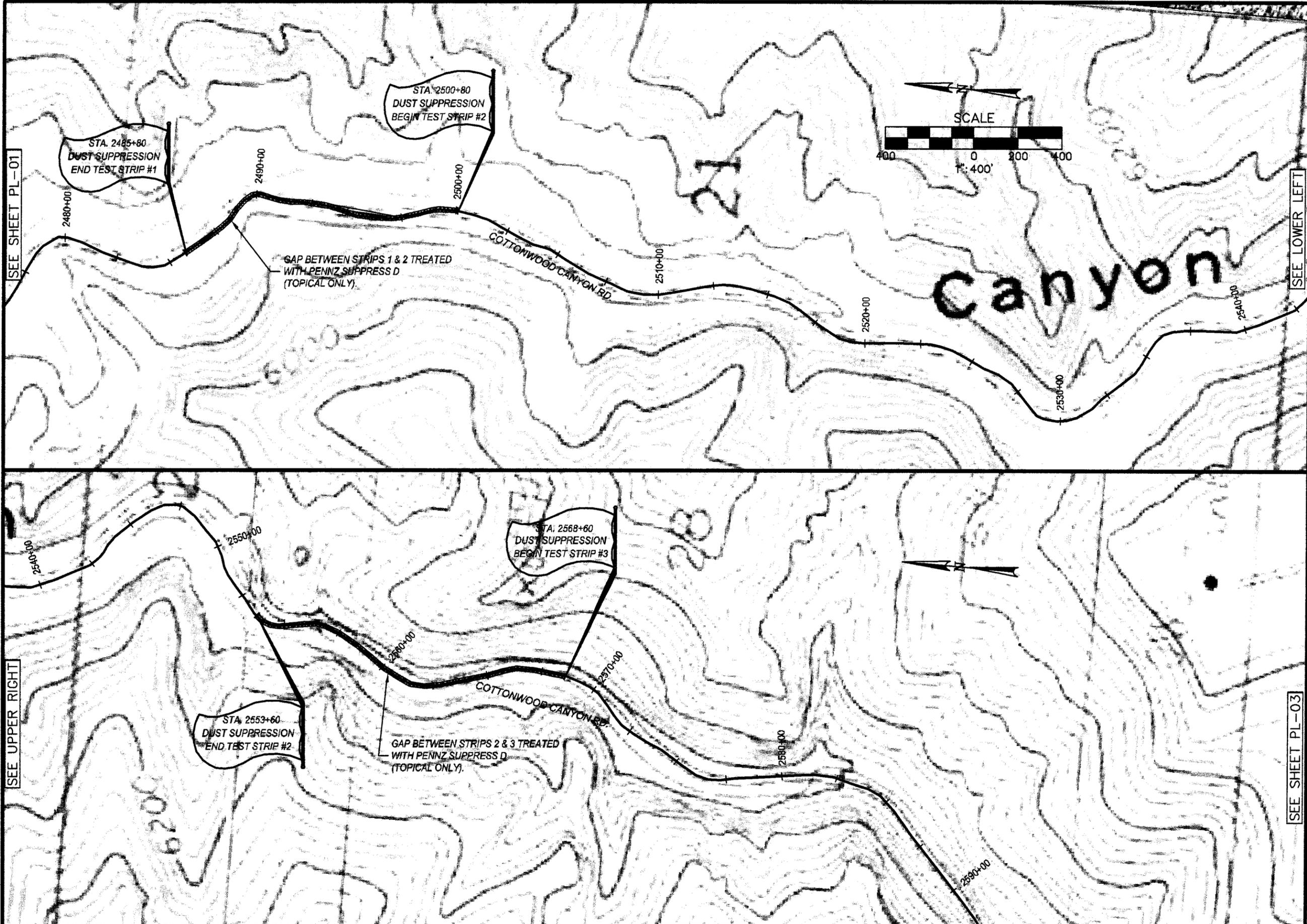
DUST SUPPRESSION STUDY

PLAN SHEET

PROJECT NUMBER: 0805-212

CARBON COUNTY

SHEET NO. PL-01



SEE SHEET PL-01

SEE LOWER LEFT

SEE UPPER RIGHT

SEE SHEET PL-03

<p>Jones & DeMille Engineering 1535 South 100 West - Richfield, Utah 84701 Phone (435) 866-6286 Fax (435) 866-6288 www.jonesanddemille.com</p>		<p>APPROVAL: DATE: ORIGINAL SUBMISSION FOR AUTHORIZATION: REVISIONS: DWG NAME: 7/22/2006 1"=400' SHEET SET: 0805-212 PEN TBL: 10/22/2006 LAST UPDATE: 7/22/2006</p>	
DESIGNER: BB	CHECKER: BB	REVIEWER: BB	DATE: 06-08
DRAWN: KJ	CHECKER: BB	REVIEWER: BB	DATE: 06-08
DATE: 06-08	DATE: 06-08	DATE: 06-08	DATE: 06-08
<p>NINE MILE CANYON ROAD</p>		<p>CARBON COUNTY</p>	
<p>DUST SUPPRESSION STUDY</p>		<p>PLAN SHEET</p>	
<p>PROJECT NUMBER: 0805-212</p>		<p>SHEET NO. PL-02</p>	

APPENDIX C

**GRAVIMETRIC FILTRATION
MONITORING RESULTS**



October 9, 2008

Mr. Brian Barton
Jones & DeMille Engineering
1535 South 100 West
Richfield, UT 84701

Dear Mr. Barton,

JBR Environmental (JBR) was contracted by Jones and DeMille Engineering, Inc. to collect samples and evaluate the relative effectiveness of the three different dust suppressant agents for unpaved haul roads. This was accomplished by collecting air samples by conducting a 'total nuisance dust' analysis on three occasions. JBR collected a total of 27 air samples over the course of three sampling events from three test strips on Nine-Mile Canyon Road, sampled at points ¼ mile apart. The test strips and sampling locations were chosen and marked by Jones and DeMille prior to JBR's arrival at the site.

Summary

Sampling events took place on August 18, September 12, and October 3, 2008. On each of the sampling events, three samples were collected from each of three test strips over a period of eight hours. The samples were analyzed for total nuisance dust using NIOSH Method 0500, which quantifies dust particles 5µm and smaller.

Weather for each of the events was mild with high temperatures ranging from 70 to 80 degrees Fahrenheit. Winds were calm for each event and no precipitation fell during sampling periods. A significant rain storm occurred the night previous to sampling event #2, which caused the test strips to be wet and muddy during a few hours of sampling.

Sample pumps and filters were placed alongside the haul road no more than 2-3 feet from vehicle traffic. No other background samples were taken during any of the sampling events.

Analytical results were collected by Datachem Laboratories, Inc., located in Salt Lake City, Utah. Chain of Custody was followed for each set of sample filters relinquished to Datachem.

The results of the three sampling events are presented in Table 1. Table 1 shows the test strip, product, sampling event, results, volume and rate. Results are expressed in mg/m³, volume is expressed in Liters, and rate is expressed in L/minute. The volume is the amount of air that has passed through the filter. This is calculated by multiplying the amount of time the pump was running by the rate at which it was set.

Table 1

Test Strip	Product	Sample	Result (mg/m ³)	Volume (L)	Rate (L/min)
Sampling Event #1					
#1	Pennz Suppress D	1a	<0.25	120	0.25
		1b	<0.29	105	0.25
		1c	<0.25	120	0.25
#2	Permazyme & Pennz Suppress D	2a	<0.25	120	0.25
		2b	<0.25	120	0.25
		2c	<0.25	120	0.25
#3	Lignosulfonate	3a	<0.29	105	0.25
		3b	<0.25	120	0.25
		3c	<0.29	105	0.25
Sampling Event #2					
#1	Pennz Suppress D	1a	<0.25	120	0.25
		1b	<0.25	120	0.25
		1c	<0.25	120	0.25
#2	Permazyme & Pennz Suppress D	2a	0.33	120	0.25
		2b	0.29	240	0.5
		2c	0.15	240	0.5
#3	Lignosulfonate	3a	0.38	240	0.5
		3b	0.22	210	0.5
		3c	0.16	240	0.5
Sampling Event #3					
#1	Pennz Suppress D	1a	<0.25	120	0.25
		1b	<0.27	112.5	0.25
		1c	<0.25	120	0.25
#2	Permazyme & Pennz Suppress D	2a	<0.27	112.5	0.25
		2b	0.68	120	0.25
		2c	<0.31	97.5	0.25
#3	Lignosulfonate	3a	<0.25	120	0.25
		3b	<0.27	112.5	0.25
		3c	0.28	112.5	0.25

Traffic counts were conducted by Jones and Demille along Nine-Mile Canyon Road near test strip #3. Vehicles consisted primarily of haul trucks, pick-up trucks, and a few passenger cars. Table 2 shows traffic counts for each sampling event.

Table 2

Sampling Event	Date	Traffic Count
#1	8/18/2008	144
#2	9/12/2008	108
#3	10/3/2008	65

Results

The results from sampling event #1 show that each of the suppressants significantly reduced all forms of fugitive dust generation such that no results triggered any detection limits. Traffic counts for sampling event #1 also show the highest amount of traffic for any of the three sampling events.

For sampling event #2, the Pennz Suppress D showed a slightly better effectiveness than the other suppressants. However, it should be noted that, due to the significant rains the night previous to this sampling event, test strip #1 appeared wetter than the other test strips. This may have caused an advantage to the Pennz Suppress D in this case. Wet conditions aside, once the day dried out, overall data shows that Pennz Suppress D outperformed the other suppressants for this sampling event.

Data from sampling event #3 shows very few detections of dust for any of the test strips. Minor detections were found on test strip #2 and #3, however, no significant differences between the suppressants were observed during either the first or third sampling events. Traffic counts were the lowest of any of the sampling events, which may have been the source of the low number of detections.

Conclusions

JBR has concluded that all three dust suppressants were effective at significantly reducing nuisance dust compared to untreated sections of the roadway, based on data collected and observations by field personnel.

JBR appreciates the opportunity to provide these services to Jones and Demille Engineering. Please feel free to call if you have any questions or need any additional information.

Sincerely,

Spencer Daines
Environmental Analyst I

cc: Dave Brown – JBR Environmental Consultants



ANALYTICAL REPORT

Report Date: August 20, 2008

David Brown
JBR Environmental Consultants, Inc.
8160 South Highland Drive
Suite A-4
Sandy, UT 84093

Phone: (801) 943-4144
Fax: (801) 942-1852

E-mail: dbrown@jbrenv.com

Client Project ID: **JBR 081908**
DCL Workorder: **8232025**
DCL Project Manager: Rand Potter

Analytical Results

Sample ID: 1a	Media: PVC Filter	Collected: 8/18/2008
Lab ID: 8232025001	Sampling Location: Jones&Demille Site	Received: 8/19/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 8/20/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	<0.030	<0.25	0.030

Sample ID: 1b	Media: PVC Filter	Collected: 8/18/2008
Lab ID: 8232025002	Sampling Location: Jones&Demille Site	Received: 8/19/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 105 L	Analyzed: 8/20/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	<0.030	<0.29	0.030

Sample ID: 1c	Media: PVC Filter	Collected: 8/18/2008
Lab ID: 8232025003	Sampling Location: Jones&Demille Site	Received: 8/19/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 8/20/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	<0.030	<0.25	0.030

Sample ID: 2a	Media: PVC Filter	Collected: 8/18/2008
Lab ID: 8232025004	Sampling Location: Jones&Demille Site	Received: 8/19/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 8/20/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	<0.030	<0.25	0.030

Sample ID: 2b	Media: PVC Filter	Collected: 8/18/2008
Lab ID: 8232025005	Sampling Location: Jones&Demille Site	Received: 8/19/2008



ANALYTICAL REPORT

Client Project ID: **JBR 081908**

DCL Workorder: **8232025**

DCL Project Manager: Rand Potter

Analytical Results

Sample ID: 2b	Media: PVC Filter	Collected: 8/18/2008	
Lab ID: 8232025005	Sampling Location: Jones&Demille Site	Received: 8/19/2008	
Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 8/20/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	<0.030	<0.25	0.030

Sample ID: 2c	Media: PVC Filter	Collected: 8/18/2008	
Lab ID: 8232025006	Sampling Location: Jones&Demille Site	Received: 8/19/2008	
Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 8/20/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	<0.030	<0.25	0.030

Sample ID: 3a	Media: PVC Filter	Collected: 8/18/2008	
Lab ID: 8232025007	Sampling Location: Jones&Demille Site	Received: 8/19/2008	
Method: NIOSH 0500	Sampling Parameter: Air Volume 105 L	Analyzed: 8/20/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	<0.030	<0.29	0.030

Sample ID: 3b	Media: PVC Filter	Collected: 8/18/2008	
Lab ID: 8232025008	Sampling Location: Jones&Demille Site	Received: 8/19/2008	
Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 8/20/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	<0.030	<0.25	0.030

Sample ID: 3c	Media: PVC Filter	Collected: 8/18/2008	
Lab ID: 8232025009	Sampling Location: Jones&Demille Site	Received: 8/19/2008	
Method: NIOSH 0500	Sampling Parameter: Air Volume 105 L	Analyzed: 8/20/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	<0.030	<0.29	0.030



ANALYTICAL REPORT

Report Authorization

Method: NIOSH 0500

Matthew Rawson

Analyst

Paul M. Megerdichian

Peer Review

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.

LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.

ND = Not Detected, Testing result not detected above the LOD or LOQ.

** No result could be reported, see sample comments for details.

< This testing result is less than the numerical value.

() This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

General Lab Comments

The results provided in this report relate only to the items tested.

Samples were received in acceptable condition unless otherwise noted.

Samples have not been blank corrected unless otherwise noted.

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DataChem Laboratories, Inc. provides professional analytical services for all samples submitted. DataChem Laboratories, Inc. is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.



ANALYTICAL REPORT

Report Date: September 16, 2008

David Brown
JBR Environmental Consultants, Inc.
8160 South Highland Drive
Suite A-4
Sandy, UT 84093

Phone: (801) 943-4144
Fax: (801) 942-1852

E-mail: dbrown@jbrenv.com

Client Project ID: **JBR Env. con. 091508**

DCL Workorder: **8259003**

DCL Project Manager: Rand Potter

Analytical Results

Sample ID: 1A	Media: PVC Filter	Collected: 8/12/2008
Lab ID: 8259003001	Sampling Location: Jones & Demille Site	Received: 9/15/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 9/15/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	<0.030	<0.25	0.030

Sample ID: 1B	Media: PVC Filter	Collected: 8/12/2008
Lab ID: 8259003002	Sampling Location: Jones & Demille Site	Received: 9/15/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 9/15/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	<0.030	<0.25	0.030

Sample ID: 1C	Media: PVC Filter	Collected: 8/12/2008
Lab ID: 8259003003	Sampling Location: Jones & Demille Site	Received: 9/15/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 9/15/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	<0.030	<0.25	0.030

Sample ID: 2A	Media: PVC Filter	Collected: 8/12/2008
Lab ID: 8259003004	Sampling Location: Jones & Demille Site	Received: 9/15/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 9/15/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	0.039	0.33	0.030

Sample ID: 2B	Media: PVC Filter	Collected: 8/12/2008
Lab ID: 8259003005	Sampling Location: Jones & Demille Site	Received: 9/15/2008



ANALYTICAL REPORT

Client Project ID: **JBR Env. con. 091508**

DCL Workorder: **8259003**

DCL Project Manager: **Rand Potter**

Analytical Results

Sample ID: 2B	Media: PVC Filter	Collected: 8/12/2008	
Lab ID: 8259003005	Sampling Location: Jones & Demille Site	Received: 9/15/2008	
Method: NIOSH 0500	Sampling Parameter: Air Volume 240 L	Analyzed: 9/15/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	0.070	0.29	0.030

Sample ID: 2C	Media: PVC Filter	Collected: 8/12/2008	
Lab ID: 8259003006	Sampling Location: Jones & Demille Site	Received: 9/15/2008	
Method: NIOSH 0500	Sampling Parameter: Air Volume 240 L	Analyzed: 9/15/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	0.035	0.15	0.030

Sample ID: 3A	Media: PVC Filter	Collected: 8/12/2008	
Lab ID: 8259003007	Sampling Location: Jones & Demille Site	Received: 9/15/2008	
Method: NIOSH 0500	Sampling Parameter: Air Volume 240 L	Analyzed: 9/15/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	0.090	0.38	0.030

Sample ID: 3B	Media: PVC Filter	Collected: 8/12/2008	
Lab ID: 8259003008	Sampling Location: Jones & Demille Site	Received: 9/15/2008	
Method: NIOSH 0500	Sampling Parameter: Air Volume 210 L	Analyzed: 9/15/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	0.047	0.22	0.030

Sample ID: 3C	Media: PVC Filter	Collected: 8/12/2008	
Lab ID: 8259003009	Sampling Location: Jones & Demille Site	Received: 9/15/2008	
Method: NIOSH 0500	Sampling Parameter: Air Volume 240 L	Analyzed: 9/15/2008	
Analyte	mg/sample	mg/m ³	RL (mg/sample)
Total Dust	0.039	0.16	0.030



ANALYTICAL REPORT

Report Authorization

Method: NIOSH 0500

Matthew Rawson

Analyst

Paul M. Megerdichian

Peer Review

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.

LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.

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< This testing result is less than the numerical value.

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General Lab Comments

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DataChem Laboratories, Inc. provides professional analytical services for all samples submitted. DataChem Laboratories, Inc. is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.



ANALYTICAL REPORT

Report Date: October 07, 2008

David Brown
JBR Environmental Consultants, Inc.
8160 South Highland Drive
Suite A-4
Sandy, UT 84093

Phone: (801) 943-4144

Fax: (801) 942-1852

E-mail: dbrown@jbrenv.com

Client Project ID: **JBR Environmental Cons.
100608**

DCL Workorder: **8280024**

DCL Project Manager: Rand Potter

Analytical Results

Sample ID: 1A	Media: PVC Filter	Collected: 10/3/2008
Lab ID: 8280024001	Sampling Location: Jones & Demille	Received: 10/6/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 10/7/2008
Analyte	mg/sample	mg/m ³ RL (mg/sample)
Total Dust	<0.030	<0.25 0.030

Sample ID: 1B	Media: PVC Filter	Collected: 10/3/2008
Lab ID: 8280024002	Sampling Location: Jones & Demille	Received: 10/6/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 112.5 L	Analyzed: 10/7/2008
Analyte	mg/sample	mg/m ³ RL (mg/sample)
Total Dust	<0.030	<0.27 0.030

Sample ID: 1C	Media: PVC Filter	Collected: 10/3/2008
Lab ID: 8280024003	Sampling Location: Jones & Demille	Received: 10/6/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 10/7/2008
Analyte	mg/sample	mg/m ³ RL (mg/sample)
Total Dust	<0.030	<0.25 0.030

Sample ID: 2A	Media: PVC Filter	Collected: 10/3/2008
Lab ID: 8280024004	Sampling Location: Jones & Demille	Received: 10/6/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 112.5 L	Analyzed: 10/7/2008
Analyte	mg/sample	mg/m ³ RL (mg/sample)
Total Dust	<0.030	<0.27 0.030



ANALYTICAL REPORT

Client Project ID: **JBR Environmental Cons.
100608**

DCL Workorder: **8280024**

DCL Project Manager: Rand Potter

Analytical Results

Sample ID: 2B	Media: PVC Filter	Collected: 10/3/2008
Lab ID: 8280024005	Sampling Location: Jones & Demille	Received: 10/6/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 10/7/2008
Analyte	mg/sample	mg/m ³ RL (mg/sample)
Total Dust	0.082	0.68 0.030

Sample ID: 2C	Media: PVC Filter	Collected: 10/3/2008
Lab ID: 8280024006	Sampling Location: Jones & Demille	Received: 10/6/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 97.5 L	Analyzed: 10/7/2008
Analyte	mg/sample	mg/m ³ RL (mg/sample)
Total Dust	<0.030	<0.31 0.030

Sample ID: 3A	Media: PVC Filter	Collected: 10/3/2008
Lab ID: 8280024007	Sampling Location: Jones & Demille	Received: 10/6/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 120 L	Analyzed: 10/7/2008
Analyte	mg/sample	mg/m ³ RL (mg/sample)
Total Dust	<0.030	<0.25 0.030

Sample ID: 3B	Media: PVC Filter	Collected: 10/3/2008
Lab ID: 8280024008	Sampling Location: Jones & Demille	Received: 10/6/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 112.5 L	Analyzed: 10/7/2008
Analyte	mg/sample	mg/m ³ RL (mg/sample)
Total Dust	<0.030	<0.27 0.030

Sample ID: 3C	Media: PVC Filter	Collected: 10/3/2008
Lab ID: 8280024009	Sampling Location: Jones & Demille	Received: 10/6/2008

Method: NIOSH 0500	Sampling Parameter: Air Volume 112.5 L	Analyzed: 10/7/2008
Analyte	mg/sample	mg/m ³ RL (mg/sample)
Total Dust	0.031	0.28 0.030



ANALYTICAL REPORT

Client Project ID: **JBR Environmental Cons.
100608**

DCL Workorder: **8280024**

DCL Project Manager: Rand Potter

Report Authorization

Method: NIOSH 0500

Matthew Rawson

Analyst

Paul M. Megerdichian

Peer Review

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.

LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.

ND = Not Detected, Testing result not detected above the LOD or LOQ.

** No result could be reported, see sample comments for details.

< This testing result is less than the numerical value.

() This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

General Lab Comments

The results provided in this report relate only to the items tested.

Samples were received in acceptable condition unless otherwise noted.

Samples have not been blank corrected unless otherwise noted.

This test report shall not be reproduced, except in full, without written approval of DataChem Laboratories, Inc.

DataChem Laboratories, Inc. is accredited by AIHA for specific fields of testing as documented in its current scope of accreditation (ID#101574) which is available on request by contacting your project manager or view on the internet at <http://www.aiha.org>. The quality systems implemented in the laboratory apply to all methods performed by DataChem regardless of this current scope of accreditation which does not include performance based methods, modified methods, and methods applied to matrices not listed in the methods.

DataChem Laboratories, Inc. provides professional analytical services for all samples submitted. DataChem Laboratories, Inc. is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

APPENDIX D

DUST SUPPRESSANT MATERIAL INFORMATION (MSDS)



1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product Number 5000
Product Name PennzSuppress D
Synonyms Dust suppressant
Chemical characterization Liquid.
Manufacturer, importer, supplier American Refining Group, Inc.
 Lubricants and Specialty Products Division
 77 North Kendall Avenue
 Bradford, PA 16701
EMERGENCY TELEPHONE NUMBER CHEMTREC: 1-800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

CAS	Chemical Name	% Weight	TSCA*	DSL - Canada*
T/S	Resins	50-60	Present	Present
7732-18-5	Water	10-30	Present	Present
T/S	Water soluble anionic surfactant	20-25	XU	Present
T/S	Non-ionic surfactant	1-5	XU	Present

* TSCA - United States - Section 8 (b) Inventory (TSCA)

* DSL - Canada - Domestic Substances List (DSL)

3. HAZARDS IDENTIFICATION

Emergency Overview:

- This product may be irritating to skin, eyes, nose, throat, and lungs. Use all necessary personal protection when handling this material.

Eye contact	<ul style="list-style-type: none"> In concentrated form this product was evaluated as having a toxicity category of IV and no adverse eye reactions were noted at any time during the study. Since the product is not applied in concentrated form but is diluted significantly with water, the diluted product is even less of a concern.
Skin contact	<ul style="list-style-type: none"> Prolonged or repeated exposure may cause irritation.
Inhalation	<ul style="list-style-type: none"> Can cause respiratory tract irritation. Avoid breathing vapors or mists
Ingestion	<ul style="list-style-type: none"> Ingestion may cause nausea, vomiting, and diarrhea.
General advice	<ul style="list-style-type: none"> As with any chemical, use caution when handling product.

4. FIRST AID MEASURES

General advice	<ul style="list-style-type: none"> Immediate medical attention is not required If exposure symptoms persist, seek medical attention. Show this safety data sheet to the doctor in attendance
Skin contact	<ul style="list-style-type: none"> Immediate medical attention is not required Wash off immediately with soap and plenty of water. Seek medical attention if effects persists.
Eye contact	<ul style="list-style-type: none"> Immediately flush with plenty of water. After initial flushing, remove any

	<ul style="list-style-type: none"> contact lenses and continue flushing for at least 15 minutes Keep eye wide open while rinsing If exposure symptoms persist, seek medical attention.
Inhalation	<ul style="list-style-type: none"> Immediate medical attention is not required Move to fresh air in case of accidental inhalation of vapours or decomposition products If exposure symptoms persist, seek medical attention.
Ingestion	<ul style="list-style-type: none"> Do not swallow. Rinse mouth with water and afterwards drink plenty of water. Do not induce vomiting without medical advice Never give anything by mouth to an unconscious person Consult a physician
Notes to physician	<ul style="list-style-type: none"> Treat symptomatically
Protection of first-aiders	<ul style="list-style-type: none"> Use necessary personal protective equipment
Aggravated Medical Conditions	<ul style="list-style-type: none"> Users with skin conditions (eczema, psoriasis, etc.) respiratory conditions (asthma, bronchitis, emphysema, etc.) or with chemical sensitivities should take protective precautions.

5. FIRE-FIGHTING MEASURES

Flash point	<ul style="list-style-type: none"> Not applicable
Suitable extinguishing media	<ul style="list-style-type: none"> carbon dioxide (CO2) water fog alcohol-resistant foam dry chemical
Specific hazards	<ul style="list-style-type: none"> None
Extinguishing media which must not be used for safety reasons	<ul style="list-style-type: none"> Water, except as fog
Special exposure hazards arising from the substance or preparation itself, its combustion products, or released gases	Keep product and empty container away from heat and sources of ignition.
Special protective equipment for firefighters	<ul style="list-style-type: none"> As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear
Specific methods	<ul style="list-style-type: none"> In the event of fire, cool tanks with water spray Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations
NFPA (National Fire Protection Association)	<ul style="list-style-type: none"> Health=1, Fire=0, Reactivity=0, Special=0

6. ACCIDENTAL RELEASE MEASURES

Personal precautions	<ul style="list-style-type: none"> Evacuate personnel to safe areas Keep people away from and upwind of spill/leak Wear personal protective equipment
Environmental precautions	<ul style="list-style-type: none"> Prevent further leakage or spillage if safe to do so Prevent product from entering drains
Methods for cleaning up	<ul style="list-style-type: none"> Dam up Soak up with inert absorbent material Pick up and transfer to properly labelled container for disposal. Absorb spill with inert material (e.g. dry sand or earth), then place in a chemical waste container

7. HANDLING AND STORAGE

Handling

Technical measures/Precautions	<ul style="list-style-type: none"> Use only in areas provided with adequate ventilation. Avoid contact with skin, eyes and clothing
---------------------------------------	---

Safe handling advice	<ul style="list-style-type: none"> ● Wear personal protective equipment ● Do not breathe vapours or spray mist. Ensure that ventilation is adequate before using this product. ● Avoid contact with skin and eyes. Take necessary personal protective precautions before using this product.
-----------------------------	---

Storage

Technical measures/Precautions	<ul style="list-style-type: none"> ● Keep containers tightly closed; discard any material that may be contaminated or, which may have changed composition. ● Keep away from heat ● Protect from light ● Keep in properly labelled containers.
Incompatible products	<ul style="list-style-type: none"> ● No information available

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures	<ul style="list-style-type: none"> ● Ensure adequate ventilation, especially in confined areas
Personal protective equipment	
Hand protection	<ul style="list-style-type: none"> ● Impervious gloves
Eye protection	<ul style="list-style-type: none"> ● Wear tightly fitting safety goggles or safety glasses with side-shields
Respiratory protection	<ul style="list-style-type: none"> ● In case of insufficient ventilation, wear suitable respiratory equipment
Skin and body protection	<ul style="list-style-type: none"> ● Long sleeved clothing
Hygiene measures	<ul style="list-style-type: none"> ● Handle in accordance with good industrial hygiene and safety practice ● Keep away from food, drink and animal feeding stuffs ● When using, do not eat, drink or smoke
Environmental exposure controls	<ul style="list-style-type: none"> ● No information available

9. PHYSICAL AND CHEMICAL PROPERTIES

General Information

Form	Liquid.
Colour	Brown.
Odour	Hydrocarbon oil.

Important Health Safety and Environmental Information

Boiling Point	>100°C / >212°F
Pour Point	6°C / 43°F
Melting point	-6°C / 21°F
Vapor Pressure	No information available.
Density	8.6 lbs/gallon
Vapour density	No information available.
Water solubility	Insoluble but emulsion can be suspended in water.
Specific Gravity	1.03.

10. STABILITY AND REACTIVITY

Stability	<ul style="list-style-type: none"> ● Stable under normal conditions ● Polymerization does not occur
Conditions to avoid	<ul style="list-style-type: none"> ● Heat, flames and sparks ● Strong oxidizing agents
Materials to avoid	<ul style="list-style-type: none"> ● Incompatible with strong oxidizers, such as hydrogen peroxide, bromine, and chromic acid
Hazardous decomposition products	<ul style="list-style-type: none"> ● When burned :carbon dioxide, carbon monoxide, hydrocarbons
Polymerization	<ul style="list-style-type: none"> ● No information available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Component Information

The concentrated form of PennzSuppress D has an LD50 of > 30,000 mg/kg, indicating that this product is non-toxic. Since the product is not applied in concentrated form but is diluted significantly with water, the diluted product is even less of a concern.

Product Information

PennzSuppress D has been found to be non-toxic to animal life, non-irritating to eyes, non-carcinogenic, and non-mutagenic.

There are no data to indicate that PennzSuppress D is carcinogenic; however, the Heavy Resins component of PennzSuppress D shares a CAS number with other substances, "extracts of steam-refined and air-refined bitumens," that have been classified as possibly carcinogenic to humans (Group 2B) by the International Agency for Research on Cancer (IARC). However, the heavy resins used in PennzSuppress are neither steam nor air refined; instead they fall in the IARC class, Bitumens-not classifiable as to their carcinogenicity (Group 3). Furthermore, manufacturer's product test data on the heavy resins are below the recognized levels that indicate carcinogenicity or mutagenicity. Further information on results of these screening tests (IP346 and modified Ames) are available from American Refining Group.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Non-hazardous to ground water and non-inhibiting to plant growth (EC50 of diluted product = 128,000 mg/kg)

Component Information

Product Information

Aquatic toxicity Low toxicity toward fish. Fathead minnow (chronic 96-hour) 130 mg/L (acute LC50) 510 mg/L. Rainbow trout (chronic 96-hour) 194 mg/L (acute LC50) 913 mg/L.

Other information:

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products	Dispose of in accordance with local regulations. This product is not characterized as hazardous according to federal regulations (TCLP-SAFE).
Contaminated packaging	Dispose of in accordance with local regulations.

14. TRANSPORT INFORMATION

DOT Not regulated.
UN-No
Proper shipping name
Hazard Class
Packing group

15. REGULATORY INFORMATION

U.S. Inventories

CAS	Chemical Name	% Weight	TSCA*
T/S	Resins	50-60	Present
7732-18-5	Water	10-30	Present
T/S	Water soluble anionic surfactant	20-25	XU
T/S	Non-ionic surfactant	1-5	XU

* TSCA - United States - Section 8 (b) Inventory (TSCA)

International Inventories

CAS	Chemical Name	% Weight	DSL - Canada *	EINECS *	ECL*	ENCS*	IECS – Invento ry of Existin g Chemica l Substa nces*	AICS - Austral ia*	PICCS*
T/S	Resins	50-60	Present	T/S	KE-019 54	T/S	Present	Present	Present
7732-18-5	Water	10-30	Present	231-791 -2	KE-354 00	N/A	Present	Present	Present
T/S	Water soluble anionic surfactant	20-25	Present	T/S	KE-045 72	T/S	Present	Present	Present
T/S	Non-ionic surfactant	1-5	Present	T/S	KE-262 44	T/S	Present	Present	Present

* DSL - Canada - Domestic Substances List (DSL)

* EINECS - European Inventory of Existing Commercial Substances (EINECS)

* ECL - Korea - Existing and Evaluated Chemical Substances (ECL)

* ENCS - Japan Existing and New Chemical Substances (ENCS)

* IECS – Inventory of Existing Chemical Substances - China

* AICS - Australia - Inventory of Chemical Substances (AICS)

* PICCS - Philippines - Inventory of Chemicals and Chemical Substances (PICCS)

16. OTHER INFORMATION

Prepared By

Monica C. Mathers, Product Safety Steward Leader.

Notice

We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.

End of Safety Data Sheet

MATERIAL SAFETY DATA SHEET



Date Issued: 03/10/2006
 MSDS No: TerraLOC®
 Date-Revised: 04/03/2007
 Revision No: 7

TerraLOC® - 8% and 16% Solution

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: TerraLOC® - 8% and 16% Solution

MANUFACTURER

MonoSol, LLC
 1701 County Line Road
 Portage IN 46368
Service Number: (219) 762-3165

24 HR. EMERGENCY TELEPHONE NUMBERS

24-Hour Emergency Hotline - CHEMTREC:
 From outside the U.S.: 00 +1.703.527.3887
 From within the U.S.: 1.800.424.9300

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

PHYSICAL APPEARANCE: Slightly viscous liquid.

IMMEDIATE CONCERNS: None

SIGNS AND SYMPTOMS OF OVEREXPOSURE

CARCINOGENICITY: Not Listed by NTP. Not Listed by IARC. Not Listed by OSHA.

ROUTES OF ENTRY: Eyes, skin, ingestion and inhalation.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	Wt. %
Water-based non-hazardous proprietary mixture	100

4. FIRST AID MEASURES

EYES: Flush eyes with plenty of water. If irritation develops, seek medical attention.

SKIN: Remove from skin with soap and water.

INGESTION: If a large amount is ingested, seek medical attention.

INHALATION: It is advisable to wear a particle mask when working in areas with a high concentration of airborne respirable droplets.

5. FIRE FIGHTING MEASURES

FLASHPOINT AND METHOD: > (200°F) Closed Cup

EXTINGUISHING MEDIA: Water spray, carbon dioxide, dry chemical.

FIRE FIGHTING PROCEDURES: This product is a nonflammable substance. However, hazardous decomposition and combustion products may be formed in a fire situation.

6. ACCIDENTAL RELEASE MEASURES

COMMENTS: Spill response: If spilled indoors, obtain approval from local wastewater treatment plant to rinse down the drain. If spilled outside, either recover product, or flush area with water to dilute and disperse. If in an area where you do not desire dust control, absorb material and dispose of according to local, state, and federal regulations.

7. HANDLING AND STORAGE

GENERAL PROCEDURES: Read MSDS before using this product.

STORAGE: Avoid freezing. If possible, store at room temperature.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Although this product is non-hazardous, it is safe practice to wear safety glasses and a particulate mask when working around a high concentration of airborne droplets.

SKIN: Gloves are not required under normal conditions. Take into consideration how the product is being used and hazards associated with other materials used in conjunction with this product.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: Liquid

ODOR: Slight fatty odor.

COLOR: Colorless or slightly yellow

pH: 7-8

FLASHPOINT AND METHOD: > (200°F) Closed Cup

SOLUBILITY IN WATER: Infinitely soluble

SPECIFIC GRAVITY: 1.05 g/cc

COMMENTS: VOC content: <10 ppm (<0.001%)

10. STABILITY AND REACTIVITY

STABILITY: The product is stable under normal ambient conditions of temperature and pressure.

POLYMERIZATION: Will not occur

CONDITIONS TO AVOID: Temperatures above 200° C (392° F).

HAZARDOUS DECOMPOSITION PRODUCTS: Irritating and toxic fumes at elevated temperatures from burning, heating or reaction with other materials.

INCOMPATIBLE MATERIALS: Oxidizing agents (i.e. perchlorates, nitrates etc.)

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS: Information representative of the major component indicates that the powder and aqueous solutions are slightly irritating to rabbit eyes, irritation subsided by 48 hours after exposure.

SKIN EFFECTS: In powder form the major component, polyvinyl alcohol, was nonirritating to rabbit skin. In aqueous solution, slight irritation to rabbit skin was noted. Not a skin sensitizer in guinea pigs when dosed as a 10% aqueous solution.

CARCINOGENICITY

Notes: Not listed by IARC, NTP, or OSHA as a carcinogen.

12. ECOLOGICAL INFORMATION

COMMENTS: The acute exposure results for biological acute toxicity at a typical 8:1 dilution is as follows:

Earthworm: 7-day LC50 >10,000 mg/L 14-day LC50 >10,000 mg/L

Daphnia magna: 24-hr EC50 >8,000 mg/L 48-hr EC50 2,732 mg/L 48-hr NOEC 2,000 mg/L

Fathead minnow: 48-hr LC50 4,925 mg/L 96-hr NOEC 4,000 mg/L

Green Alga P. Subcapita: 72-hr LC50 190 mg/L 72-hr NOEC 75 mg/L

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Product is water-soluble and non-hazardous. Product is normally accepted by local wastewater treatment plants. Obtain prior approval before disposal. For large quantities: reclaim, dilute and disperse (if in dust suppressant application area), or absorb and place in waste containers for disposal.

14. TRANSPORT INFORMATION

COMMENTS: Not regulated by DOT, IATA, IMDG, or ADR.

15. REGULATORY INFORMATION**UNITED STATES**

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

FIRE: No **PRESSURE GENERATING:** No **REACTIVITY:** No **ACUTE:** No
CHRONIC: No

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA REGULATORY: We certify that all components are either on the TSCA inventory or qualify for an exemption.

16. OTHER INFORMATION

REASON FOR ISSUE: revision

APPROVED BY: Andrew Verrall **TITLE:** Director of Research & Development

PREPARED BY: Melanie C. Kroczek, CHMM

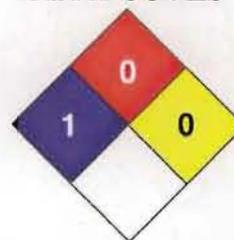
INFORMATION CONTACT: Melanie C. Kroczek

REVISION SUMMARY: Revision #: 7 This MSDS replaces the January 22, 2007 MSDS. Any changes in information are as follows: In Section 9 Comments

HMIS RATING

HEALTH:	<input type="checkbox"/>	1
FLAMMABILITY:		0
PHYSICAL HAZARD:		0
PERSONAL PROTECTION:		B

NFPA CODES



MANUFACTURER DISCLAIMER: Information given herein is offered in good faith as accurate, but without guarantee. Conditions of use and suitability of the product for particular uses are beyond our control; all risks of use of the product are therefore assumed by the user. Nothing is intended as a recommendation for uses which infringe valid patents or as extending license under valid patents. Appropriate warnings and safe handling procedures should be provided to handlers and users.



MATERIAL SAFETY DATA SHEET

SECTION I: MATERIAL IDENTIFICATION

Chemical Name: **Ammonium Lignin Sulfonate (Lignosulfonate) RTU (Ready to Use)**

Distributor: *EnviroTech Services, Inc.* Manufacturer: *Tembec Inc. – Chemicals Group*
Address: *1140 38th Avenue, Suite 1* *33 Kipawa Road*
Greeley, CO 80634 *Temiscaming, QC Canada J0Z 3R0*

Telephone: *(970) 346-3900* *(819) 627-4322*
Fax: *(970) 346-3959* ***In Case of Emergency Call:***
Date Prepared: *April 9, 1999* *(819) 627-3200*
Date Updated: *April 7, 2005*

SECTION II: HAZARDOUS INGREDIENTS / IDENTITY INFORMATION

No Hazardous Ingredients

C.A.S. No.: *8061-53-8*

SECTION III: PHYSICAL/CHEMICAL CHARACTERISTICS

pH: *4.5-6.5 As Received*
Boiling Point: *212 °F*
Vapor Density: *Not Applicable*
Solubility in Water: *100%*
Specific Gravity: *1.10-1.170*
Melting Point: *Not Applicable*
Appearance and Odor: *Dark brown liquid with woody odor*

SECTION IV: FIRE AND EXPLOSION HAZARD DATA

Flammability: *N/A Not Flammable or combustible*
Upper Explosion Limit: *N/A*
Lower Explosion Limit: *N/A*
Fire Fighting Procedures: *Product not flammable. Use appropriate fire fighting procedures for surrounding fires and combustible materials.*

SECTION V: REACTIVITY DATA

Stability:	<i>Stable under normal temperatures and pressures</i>
Incompatibilities:	<i>Strong oxidizing agents, concentrated acids, Nitric acid.</i>
Hazardous Decomposition Products:	<i>Thermal decomposition may release toxic oxides of carbon, sulfur and nitrogen. (CO₂, CO, NO_x).</i>
Hazardous Polymerization:	<i>Will not occur.</i>

SECTION VI: HEALTH HAZARD DATA

Routes of Entry:

Eye Contact:	<i>Avoid. Any foreign material in the eyes can cause irritation.</i>
Skin Contact:	<i>Prolonged contact may cause light skin irritation in sensitive individuals.</i>
Inhalation:	<i>N/A</i>
Ingestion:	<i>None</i>
Toxicity:	<i>LD50, Toxicological studies on lignosulfonates indicate that they are non toxic. In literature, LD50 for lignosulfonates has been reported to be 20,000 mg/kg body weight by ingestion. Materials with LD50 values of 5,000 mg/kg of body weight and greater are considered to be non toxic.</i>

Emergency and First Aid Procedures:

Eye Contact:	<i>Flush eyes with luke warm flowing water, holding eyelids open intermittently, for at least 20 minutes. Contact physician if irritation persists.</i>
Skin Contact:	<i>Wash with flowing water. Normal hygiene practices.</i>
Inhalation:	<i>N/A</i>
Ingestion:	<i>Not normally applicable unless copious quantities ingested. Drink large amounts of water. Do not induce vomiting. Do not give water to unconscious person. Contact a physician if irritation persists.</i>

SECTION VII: PRECAUTION FOR SAFE HANDLING AND USE

Spill and leak procedures:	<i>Small spills flush with water. Large spills dyke and reclaim product or store for disposal as solid waste.</i>
Waste Disposal Method:	<i>Dispose in accordance with federal, state, or local regulations.</i>
Personal Protective Equip:	<i>Impervious or rubber gloves recommended for prolonged exposure. Safety glasses with side shields required to prevent eye contact. Work clothes changed daily. Follow normal hygiene procedures.</i>
Ventilation:	<i>Not normally required.</i>
Respiratory Protection:	<i>Not normally required.</i>

The information contained in this Material Safety Data Sheet is, to the best of our knowledge, accurate and reliable. No warranty of any kind is either expressed or implied.

This information should be provided to all individuals handling this product. Federal, state, and local regulations should be followed when handling this product.

Home Products Contact Us
Perma-Zyme 11X AGZyme HCZyme Petro-ffin



English

Perma-Zyme 11X



Русский

What is Perma-Zyme 11X Uses Benefits Evaluations

Material Safety Data Sheet Photographs

MATERIAL SAFETY DATA SHEET: Perma-Zyme 11X

PRODUCT IDENTIFICATION

Trade Name:	Perma-Zyme 11X
Chemical Name & Synonyms:	Enzyme Blend
Formula:	Proprietary Blend
D.O.T. Proper Shipping Name:	Non-Hazardous Liquid
D.O.T. Hazardous Class:	Non-Hazardous
D.O.T. Identification No.:	N/A

Hazard Rating (NFPA/HMIS)

		Rating Scale
Health	0*	minimal 0
Reactivity	0	slight 1
Fire	0	moderate 2
Special	None	serious 3
		severe 4

*Mild eye irritant, non-mutagenic and non-carcinogenic. None of the ingredients in Perma-Zyme 11X are regulated nor listed as potential cancer agents by Federal OSHA, NTP or IARC.

Use: A water-based nonhazardous and environmentally friendly enzyme liquid used for soil stabilization.

SAFE HANDLING INFORMATION

Fire/Explosion Hazard

Treat the same as water.

Reactivity Data

Perma-Zyme 11X is very stable. Avoid high temperatures as this will neutralize the enzymes. Avoid low or high pH substances (i.e., acids, caustics). Perma-Zyme 11X is compatible with most compounds. It will not polymerize or create hazardous byproducts. There are no specific conditions to avoid.

Storage and Transport

No special precautions are required. This product is nonhazardous for storage and transport according to the U.S. Department of Transportation Regulations.

Perma-Zyme 11X requires no special labeling or placarding to meet U.S. Department of Transportation requirements.

Spills and Disposal

Spill or Leakage Procedures: Recover usable material by convenient method; residual may be removed by wiping with absorbent material or wet mop. If necessary, unrecoverable material may be washed down to a sanitary drain with large amounts of water.

Waste Disposal: Perma-Zyme 11X is water soluble and biodegradable and will not harm sewage-treatment microorganisms if disposal by sewer or drain is necessary. Dispose of in accordance with all applicable local, state and federal laws.

PRECAUTIONS FOR USE**Exposure Limits**

Perma-Zyme 11X presents no health hazards to the user, other than mild eye irritancy.

Ventilation

No special ventilation is required during normal use.

Personal Protection

Precautionary Measures: No special requirements under normal use conditions, with the exception that eye protection is recommended during the handling of undiluted product.

Eye Protection: Caution, including reasonable eye protection, should always be used to avoid eye contact where splashing or exposure to concentrated product may occur.

Skin Protection: No special precautions required. Rinse completely from skin with water after contact.

Respiratory Protection: No special precautions required.

Work and Hygienic Practices: Wash or rinse hands before touching eyes or contact lenses. Follow standard hygienic practices for handling cleaning agents.

Symptoms of Overexposure and First Aid Treatment

Eye Contact: Reddening may develop. Immediately rinse the eye with large quantities of cool water. Continue 10-15 minutes or until material has been removed. Be sure to remove contact lenses, if present, and lift upper and lower lids during rinsing. Get medical attention if irritation persists.

Skin Contact: Minimal effects, if any. Rinse skin with water. Rinse shoes and launder clothing before reuse.

Swallowing: Essentially non-toxic. Product may cause a slight laxative condition. Give several glasses of water to dilute if swallowed. Do not induce vomiting. If stomach upset persists, consult a physician.

Inhalation: Non-toxic. Prolonged exposure to product in a mist form (not recommended) could cause a mild irritation of the nasal passages and throat. Remove to get fresh air. Get medical attention if irritation persists.

INGREDIENT INFORMATION

Perma-Zyme 11X contains no hazardous constituents. Its principal ingredients are miscellaneous enzymes produced from food products. Perma-Zyme 11X contains no known USEPA priority-pollutants, heavy metals or chemicals listed under RCRA, CERCLA, or CWA.

TOXICITY INFORMATION

Human Health Effects or Risks from Exposure

Adverse effects on human health are not expected from Perma-Zyme 11X, based on the ingredients. Perma-Zyme 11X is a mild eye irritant. Mucous membranes may become irritated if concentrate is inhaled.

Medical Conditions Aggravated by Exposure

No aggravation of existing medical conditions is expected.

Non-Human Toxicity

Acute Mortality Studies:

Oral LD50 (rats): #1 toxicity (death by drowning)

LC50 (brine shrimp): > 100 mg/l

Dermal Irritation: Dermal sensitivity tests on guinea pigs proved not sensitizing.

Eye Irritation: Mild irritation was noted in white rabbits without rinsing with water. Irritation scores in rabbits at 24 hours did not exceed 15 (mild irritant) on a scale of 110.

BIODEGRADABILITY AND ENVIRONMENTAL

Biodegradability:

Perma-Zyme 11X is readily decomposed by naturally occurring microorganisms.

Environmental Toxicity Information:

Perma-Zyme 11X is nontoxic to marine and estuarine test animals at concentrations less than 2,100 mg/l (2.10%).

OTHER INFORMATION

Physical Description and Properties:	PERMA-ZYME 11X
Appearance/Odor:	Brownish liquid with slight sweet odor.
Boiling Point:	212 Degrees F (100 Degrees C).
Flashpoint:	Not Applicable.
Specific Gravity:	1.07 @ 25 Degrees C.
Flammability Limits:	Not Applicable.
Freezing Point:	0 Degrees C.
Vapor Pressure:	Not Applicable.
Solubility in Water:	Complete.
Volatile Organic Compounds:	None

General Information:

Containers: Perma-Zyme 11X residues can be removed by rinsing with water. The container may be recycled or applied for other uses.

NOTICE

All information appearing herein is based on data obtained by the manufacturer and recognized technical sources. Judgments as to the suitability of information herein for purchaser's purposes are necessarily the purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of this information, Hobe Associates LLC or its distributors extends no warranties, makes no representations and assumes no responsibility as to the suitability of such information for application to the purchaser's intended purposes or for the consequences of its use.

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Last Updated: March 19, 2004

APPENDIX E

PHOTOS



Photo 1 – Test Strip #1 (Pennz Suppress)



Photo 2 – Test Strip #2 (Pennz Suppress and Permazyme 11X)



Photo 3 – Test Strip #3 (LignoSulfonate)



Photo 4 – Test Strip #4 (TerraLOC and Permazyme 11X)



Photo 5 – Pulverizer machine with cutting head



Photo 6 – Typical stabilization mixing (Test Strip #3 shown)



Photo 7 – Traffic counter location south of Test Strip #3



Photo 8 – Marker fabric used to prevent cutting through the no-blading zone at Test Strip #4



Photo 9 – Nine Mile Canyon Road (Pennz Suppress)



Photo 10 – Nine Mile Canyon Road drainage problems
(note the massive alluvial deposit on the road – typical)

APPENDIX F

COORDINATION & MISCELLANEOUS

Dust Suppression Plan Guidelines

In order to respond to public comments received on the DEIS and complete Section 106 consultation, the BLM has determined the FEIS must include a formal dust suppression plan specific to the WTP project.

With the above in mind, the final dust suppression plan must contain the information discussed below. Failure to include such information could unnecessarily delay the NEPA process.

- What suppressant(s) will be used (e.g., should include product information such as physical and chemical properties and environmental liabilities);
- When the suppressant(s) will be applied (e.g., every XX months in accordance with manufacture recommendations).
- Where the suppressant(s) selected will be applied (e.g., from Harmon Canyon to approximately XX miles up Cottonwood Canyon);
- Why the suppressant(s) proposed for use was selected (e.g., effectiveness and cost or results of the test study); and
- How the suppressant(s) selected will be applied (e.g., method of application).
- How will problem situations be dealt with that impact dust suppressant (e.g., flash floods, etc.)

Any environmental protection measure would be similar to the condition of approval attached to the most recent APDs. Namely, dust would be considered controlled when (1) no dust is generated above the cab of the vehicle, or (2) there are no hanging dust plumes. Inclusion of these standards would provide the BLM with an empirical method to evaluate the effectiveness of dust suppression efforts and dust impacts. Thus, the final dust suppression plan developed by the 9 Mile Canyon Road Committee should clearly meet these objectives.

The BLM understands that this plan needs to incorporate some flexibility in order to accommodate new information and technological improvements in the future. However, it is imperative that the plan include the level of specificity described above in order to adequately respond to public comments.

The BLM is currently in the process of converting the DEIS to a PFEIS. As has been discussed, the dust suppression plan, in conjunction with dust suppression test results, is one of the remaining items needed for this conversion. **October 10, 2008** is the deadline for receipt of the final plan. This date was established with the goals of 1) providing sufficient time to incorporate results of the dust suppression test project currently ongoing in the WTP; and 2) allow the contractor time to incorporate the dust suppression plan into the PFEIS without delaying the process.

The company shall furnish and apply water or other means satisfactory to the Authorized Officer for dust control. Dust is controlled when the following standards are met: (1) no dust is generated above the cab of the vehicle, or (2) no hanging dust plumes. These standards are applicable to Nine Mile Canyon between Harmon and Cottonwood Canyons, and in Harmon and Cottonwood Canyons. If dust exceeds these standards, operations shall be shut down until the standards are met.

The company shall supply a third party monitor to report directly to the BLM which shall monitor for dust on a daily basis as necessary. A written monitoring report shall be submitted to the BLM on a weekly basis, and a phone report shall be made to the authorized officer on a daily basis as necessary. If dust control standards are not met, operations shall be shut down.

MEMO

Date: October 20, 2008
To: Scot Donato
Bill Barrett Corporation
From: Brian Barton, PE
Jones & DeMille Engineering
Subject: Draft Outline of Considerations for Alternate Dust Suppression Standards for the West Tavaputs Plateau Development Dust-Critical Roadways

Dust suppression standards need to be technically sound and quantifiable for real world application. Opacity observations by trained personnel are a more objective method and should be considered to quantitatively measure compliance.

A. Existing Dust Control Standards

The BLM has issued the following conditions of approval for applications for permit to drill (APDs) issued under Section 390, Categorical Exclusion #2:

“The company shall furnish and apply water or other means satisfactory to the Authorized Officer for dust control. Dust is controlled when the following standards are met: (1) no dust is generated above the cab of the vehicle, or (2) no hanging dust plumes. These standards are applicable to Nine Mile Canyon between Harmon and Cottonwood Canyons, and in Harmon and Cottonwood Canyons. If dust exceeds these standards, operations shall be shut down until the standards are met.

The company shall supply a third-party monitor to report directly to the BLM which shall monitor for dust on a daily basis as necessary. A written monitoring report shall be submitted to the BLM on a weekly basis, and a phone report shall be made to the authorized officer on a daily basis as necessary. If dust control standards are not met, operations shall be shut down.”

B. Discussion of Existing Standards

Standards are important to be able to determine whether dust control efforts are effective and to ensure protection of sensitive areas. Compliance with these standards is difficult to measure due to the subjective nature of the present requirements. The standards lack detailed definition of terms and do not provide a readily quantifiable range of acceptable or unacceptable dust levels. A technically-sound method of determining compliance should be implemented.

ENGINEERING

Culinary Water

Irrigation

Wastewater

Drainage

Dams

Hydropower

Bridges

Structures

Highways

Airports

Environmental

Energy

SURVEYING

Boundaries

Construction

GIS

GPS

General Mapping

Minerals

Public Lands

Subdivision

Topographic

Water Proofs

MATERIALS TESTING

C. Past & Future Dust Suppression Efforts

Bill Barrett Corporation (BBC) and the local counties used magnesium chloride to suppress dust to accommodate safe transportation through the project area. BBC no longer uses magnesium chloride products to control dust due to concerns about its use near rock art sites. However, it should not be eliminated from consideration for dust suppression in the future in Nine Mile Canyon or near known rock art sites until there is clear evidence of damage to the subject sensitive sites. Magnesium chloride is commonly used throughout the US to control dust within federal, state, and private lands.

Future dust suppression should be implemented as outlined in the Dust Suppression Plan.

D. Recommendation to Consider Quantitative Dust Suppression Standards

There are quantifiable, measurable methods to determine compliance to dust suppression standards. For example, opacity is an EPA-approved method of determining the measure of impenetrability of visible light through fugitive dust plumes and other mediums. An opacity of 0% means that all light passes through (no dust), and an opacity of 100% means that no light can pass through (thickest dust). Opacity observations are made by certified personnel with necessary quality control and assurance measures in place.

Factors to be considered in the compiling an opacity-based standard would be frequency of opacity reading along the corridor, monitoring frequency, reporting frequency and content, supplemental dust monitoring and other factors that may arise during discussions on this issue. Monitoring frequencies should be adjusted based on precipitation and dust suppressant maintenance application events.

For more information on opacity observation methodology and procedure, see information in the Dust Suppression Plan appendices.