December 12, 2016

Ruth Welch, State Director
Bureau of Land Management
Colorado State Office
2850 Youngfield Street
Lakewood, CO 80215

3508

SENT VIA FAX (303-239-3799)

Re: Lease Sale Protest Regarding Tres Rios February 9, 2017 Oil and Gas Lease Sale
PARCEL ID: 7787 SERIAL #: COC78173

Dear Ms. Welch:

Under regulation 43 CFR 3120.1-3, the Chama Peak Land Alliance hereby submits this protest letter concerning the Bureau of Land Management's lease offering of parcel number 7787 (SERIAL #: COC78173) that is 383.130 acres in Archuleta County, Colorado.

The Chama Peak Land Alliance (CPLA) is a diverse group of conservation-minded landowners committed to embracing and practicing responsible land, water and wildlife stewardship in southern Colorado and northern New Mexico for the benefit of our tri-cultural heritage and for generations to come. Members of the Alliance represent a land area that ranges from 7,000 feet to over 12,000 feet including portions of the Continental Divide covering approximately 250,000 acres (please see map on page 9).

STATEMENT OF REASON

Per our scoping comments submitted on June 8, 2016, the Chama Peak Land Alliance and our mission of conservation and private lands stewardship in the region will be greatly impacted by leasing in the San Juan Sag because the parcel resides in a shallow target reservoir in close proximity to groundwater, puts community values such as wildlife and water at risk, and is in conflict with the Colorado Oil & Gas Conservation Commission Practices and Procedures: *Stimulation at Depths 2,000 Feet or Less (October 24, 2014)*. It has also come to our attention that the parcel has been nominated as an Area of Critical Environmental Concern (ACEC) and it should

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therefore be removed from consideration for leasing until that nomination request has been finalized.

Shallow Target Reservoirs in Close Proximity to Groundwater

The target formations in Archuleta County proposed for leasing in the February 2017 lease sale are situated at very shallow depths. The fractured Mancos shale rises to less than 1,000 feet of the surface in the Chromo area and therefore poses an extraordinary risk to groundwater. We have expressed these concerns as part of the comment and protest period for the Tres Rios February 2013 Oil and Gas Lease Sale; Parcels: 6401 - SERIAL #: COC75910 and 6402 - SERIAL #: COC75911[1] (please see Appendix A). And yet, lease nominations in this high-risk area continue to occur. As a result, we are providing these comments *again* to the BLM for your review and are also including new information that supports our concerns:

> "The primary reservoirs are the Dakota and possible fractured shale of the Mancos... The Dakota and fractured Mancos Shale potential is considered to be high in this part of the planning area where Cretaceous outcrops and subcrops are not covered by tertiary volcanic rocks."[2]

An increasing body of scientific evidence points to the hazards of hydraulic fracturing at shallow depths. As explicitly noted in the Background section (p. 7 & 8) of the "REVIEW OF HYDRAULIC FRACTURING TECHNOLOGY AND PRACTICES" Hearing before the COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY HOUSE OF REPRESENTATIVES, ONE HUNDRED TWELFTH CONGRESS, MAY 11,2011 Serial No. 112-17:

> "The use of hydraulic fracturing has raised questions regarding the potential effect of this technology on drinking water supplies. The purpose of injecting fracking fluids into the ground is to create enough pressure to fracture subsurface structures. There are two distinct areas of concern regarding this process: first, the injection itself, or the creation of subsurface fractures, could allow fracking fluid to contaminate underground sources of water, and second, the handling and disposal of fracking fluids to the surface."

The risk of contamination of underground water sources is managed in different ways. Risks associated with leakage of the fracking fluid during the injection and fracturing job are reduced by: adherence to state well construction requirements; the vertical distance between the fractured zone and ground water, and, the presence of vertically impermeable zones between the fractured zone and the deepest ground water; and the presence of vertically impermeable formation that act as geologic barriers to the movement of fluid from the fractured zone into ground water resources." [Department of Energy, State Oil and Gas Regulations Designed to Protect Water Resources. May 2009]

[1] CPLA letter dated December 12, 2012. *Appendix A.*
[2] 2013 San Juan National Forest Land & Resource Management Plan Final Environmental Impact Statement, p. 485.

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The Center for Sustainable Shale Development (March, 2013) recommends that prior to fracking:

> "Operators shall establish an Area of Review (AOR), prior to drilling a well, which encompasses both the vertical and horizontal legs of the planned well. Within the AOR, the operator must conduct a comprehensive characterization of subsurface geology, including a risk analysis that demonstrates the presence of an adequate confining layer(s) above the production zone that will prevent adverse migration of hydraulic fracturing fluids. As part of the risk analysis, and before proceeding with hydraulic fracturing, the operator must also conduct a thorough investigation of any active or abandoned wellbores within such area of review or other geologic vulnerabilities (e.g., faults) that penetrate the confining layer and adequately address identified risks." (http://0371866.netsolhost.com/site/wp-content/uploads/2013/03/CSSD-Performance-Standards-3-27-GPX.pdf)

The US GAO (September 2012) finds:

> "[T]he risk of induced fractures extending out of the target formation into an aquifer—allowing gas or other fluids to contaminate water—may depend, in part, on the depth separating the fractured formation and the aquifer. For example, according to a 2012 Bipartisan Policy Center report, the fracturing process itself is unlikely to directly affect freshwater aquifers because fracturing typically takes place at a depth of 6,000 to 10,000 feet, while drinking water tables are typically less than 1,000 feet deep."

In parts of New Mexico and southern Colorado, however, there is no such protection between the aquifer and the targeted Mancos formation. Geologic conditions here are different than in other places where the Mancos and other shale layers are being developed.

We submit as an attachment in Appendix A a geologic analysis of Chromo, CO that details the rise of the Mancos formation to shallow depths creating an unusual hazard in the development of this resource through the use of hydraulic fracturing entitled "Hydraulic Fracturing in the Chromo Area," by Marvin Johnson[3].

> In Chromo, the risk of shallow fracking is further exacerbated by the presence of numerous faults, seismic activity, hot springs, old water and oil and gas wells. In addition, there is a Bureau of Reclamation tunnel located on the Navajo River, which carries water into New Mexico and that could be at risk if fracking were to occur. The Bureau of Reclamation also protested the Tres Rios February 2013 Oil and Gas Lease Sale as a result (please see protest letter in Appendix A)[4].

[3] Marvin Johnson. Hydraulic Fracturing in the Chromo Area. *Appendix A.*
[4] Bureau of Reclamation letter dated December 13, 2012. *Appendix A.*

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Natural Resource and Community Values at Risk

While oil and gas development can bring economic benefits and energy independence, the development of these resources must be considered in the context of other community and natural resource values. Thoughtful planning and careful execution can significantly reduce conflicts and impacts.

As such, the Chama Peak Land Alliance worked in collaboration with local landowners, Rio Arriba and Archuleta Counties, Future West, and Ground Truth Geographics to identify and map important community values. These values include water supplies, agricultural production areas, critical wildlife habitat, and cultural and historic sites.

The goal of the community mapping project was to minimize potential energy development impacts by identifying and mapping important values on the landscape that are in need of protection, such as municipal water supplies, acequias, moradas, high-value recreation, wildlife, and agricultural production areas. The community values map produced now creates a basis for landscape-scale planning that incorporates important community values in order to lead to better planning outcomes from a variety of perspectives.

At workshops in July of 2013 in Tierra Amarilla, NM and Pagosa Springs, CO, community members participated in a weighting and ranking exercise where they attributed numbers to community values and indicated how important these values were to them when considering energy development. A representative sampling of community interests or stakeholders were identified to ensure that we received input from a variety of perspectives. Follow-up meetings were held in both locations in October 2013. At these meetings, we asked community members to review the results of their worksheet entries and discuss next steps.

The final scores of the survey process are depicted below in Figure 1. The results for both counties are remarkably similar in their extremely high valuation of water, agricultural, and wildlife resources. The main difference between the two counties appears in their value of "cultural resources," with Rio Arriba County placing an extremely high value on cultural resources and Archuleta County assigning them a lower value. This preference was actually balanced by the "landscape" theme, which was heavily valued in Archuleta County, and less so in Rio Arriba County.

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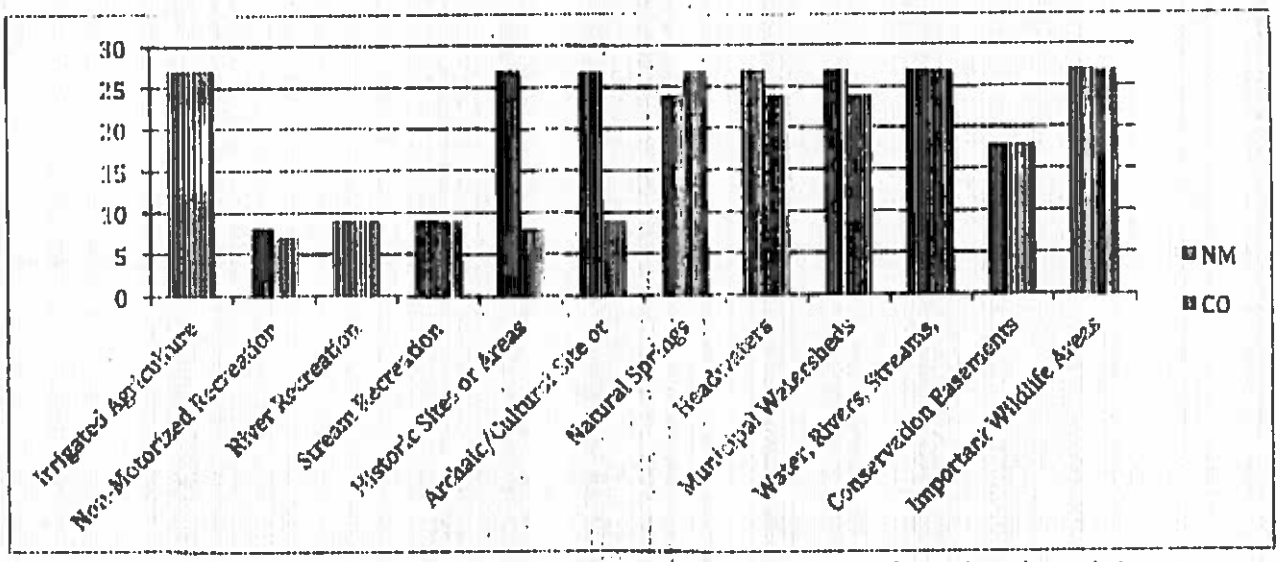

Figure 1. A histogram of the community values of greatest importance for Colorado and New Mexico.

This type of planning by communities fills an important need and can compliment and enhance the BLM's analysis and planning. By working together, we can create a more seamless interface between federal, state and local planning efforts, particularly in a region where so many important resource values are at stake. A final report with associated GIS shapefiles of community values was published in December 2013 and can be found online.[5] Ultimately, these maps can be utilized to minimize potential energy development impacts to critical community resources and should be taken into consideration in the Environmental Assessment for the February 2017 lease sale.

Colorado Oil & Gas Conservation Commission Practices and Procedures:
Stimulation at Depths 2,000 Feet or Less (October 24, 2014)

In response to the shallow fracking concerns stated above, the Colorado Oil & Gas Conservation Commission (COGCC) adopted a shallow fracking policy entitled *Stimulation at Depths 2,000 Feet or Less*[6]. This policy makes it clear that regions such as the south San Juan basin where oil and gas activities are shallow and in close proximity to useable ground water resources need special attention "to ensure oil and gas drilling and completion activities (including hydraulic fracturing) do not impact groundwater resources," as detailed in the full guidance document in Appendix A.

> "When developing oil and gas resources at depths shallower than 2,000 feet the COGCC considers that there are increased risks and concerns associated with the reduced distance separating oil and gas objectives from

[5] Community Mapping in the San Juan – Chama Region. December 2013. Found online at: http://chamapeak.org/programs/energy/community-based-mapping-process-in-the-san-juan-rio-grande/

[6] Colorado Oil & Gas Conservation Commission, *Stimulation at Depths 2,000 Feet or Less, October 24, 2014*. Found online at: http://cogcc.state.co.us/documents/reg/OpGuidance/Fracturing%20and%20Zones%20at%20Shallow%20Depths_20141024.pdf

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> useable groundwater. There may be less, fewer and thinner intervening impermeable strata. The possible existence of any enhanced permeability pathways is also an increased concern. Some potential pathways may include faults, joints, fractures, volcanic intrusions, steeply dipping bedding, old or abandoned wells, deep water wells, and mining exploration boreholes."

As such, the new guidance requires that as part of the drilling permit process, the operator shall meet with COGCC engineering staff to discuss and provide the flowing topical assessments:

(1) Geology and Aquifer Assessment,
(2) Engineering Assessment, and
(3) 1,500 feet Offset Well Review and Assessments.

The BLM has an obligation to protect human health and environmental resources and to evaluate the risks posed by potential development. And yet, no similar federal guidelines or regulations exist to insure that the development of these resources using new technologies is safe in terms of public and environmental health. As such, the BLM should heed the recently adopted shallow fracking guidance as well as promulgate its own rules and/or policies that mirror these sound state regulations.

Parcel #7787 Has Been Nominated as an ACEC

Another reason we strongly object to the inclusion of parcel #7787 in the lease sale is that the parcel falls within an Area of Critical Environmental Concern (ACEC) proposed by The Wilderness Society, San Juan Citizens Alliance, and Rocky Mountain Wild in scoping comments on the Tres Rios ACEC Resource Management Plan (RMP) Amendment. As described in their comments:

> The proposed "Navajo River" ACEC is comprised of slopes and rims of the Navajo River Canyon, giving it outstanding scenic values. It also neighbors roughly a dozen private ranch conservation easements that were acquired over the span of 15 years by the Great Outdoors Colorado's Navajo Watershed Project. Because drilling and development might compromise the ACEC qualities of the area, and would interfere with conservation protections already in place, we ask that BLM defer leasing Parcel 7787 until it evaluates our Navajo River ACEC proposal through the RMP Amendment process.

Conclusion

Our landowners, the conservation achievements in the Navajo River Valley to date, and our ongoing work and the health and welfare of our community, will be directly impacted by the development of parcel #7787.

It should not fall to individual landowners, non-profit organizations, local governments, and industry to carry the burden and cost of addressing this concern on a well-by-well basis at the APD stage. If the area is unsuitable for hydraulic fracturing because of high potential risk to water

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chamapeak@gmail.com | www.chamapeak.org | 1-888-445-7708

resources or for unacceptable impacts to other community values this should be identified and addressed up front, prior to leasing. The BLM has failed to and continues to fail to address these concerns.

The BLM has a mandate to protect natural resources, including water. However, no federal analysis, regulations or guidelines exist to evaluate or mitigate the potential environmental impacts of the use of these technologies at shallow depths and in close proximity to water supplies. The Chama Peak Land Alliance is deeply concerned that without such analysis or guidelines, hydraulic fracturing operations at such shallow depths pose a very high risk to critical water resources.

The specific geologic conditions present in the San Juan Sag create a uniquely unsuitable condition for the application of hydraulic fracturing. Exploration and development in this location could permanently compromise critical water resources. Until it is soundly established that hydraulic fracturing will not pose a threat in this circumstance, it would violate not only the BLM's mandate to protect water resources but common sense as well.

In closing, we would like to reiterate that the BLM has failed to consider our previous comments on shallow fracking and is therefore neglecting its mandate to protect natural resources and respond to previously stated and valid community concerns. As such, we are requesting that the BLM remove parcel #7787 from consideration as well as:

1. Consider heading and promulgating federal shallow fracking rules similar to the Colorado Oil & Gas Commission policy entitled *Stimulation at Depths 2,000 Feet or Less (October 24, 2014).*
2. Based on these identified concerns and policies, remove the entire San Juan Sag region from leasing nomination until these issues can be resolved.

If you have any questions about these comments, please contact Monique DiGiorgio, CPLA's Executive Director at chamapeak@gmail.com or 970-385-8174. Thank you for your consideration.

Sincerely,

Frank Simms, Chair

Tim Haarmann, Vice-Chair

Frank Simms, Chair and Tim Haarmann, Co-Chair are authorized to submit these comments on behalf of the Chama Peak Land Alliance.

1309 East Third Ave, #8 | Durango, CO 81301
chamapeak@gmail.com | www.chamapeak.org | 1-888-445-7708

c.c.

1. Archuleta County, CO Board of Commissioners: CLucero@archuletacounty.org, mwhiting@archuletacounty.org, SWadley@archuletacounty.org
2. Jimbo Buickerood, San Juan Citizens Alliance: jimbo@sanjuancitizens.org
3. Lesli Allison, Western Landowners Alliance: lesli@westernlandowners.org
4. Darlene Marcus, Congressman Scott Tipton's Office: Darlene.Marcus@mail.house.gov
5. Jennifer Loraine and Betsy Bair, Senator Cory Gardner's Office: jennifer_loraine@gardner.senate.gov, Betsy_Bair@gardner.senate.gov
6. John Whitney, Senator Bennet's Office: John_Whitney@bennet.senate.gov
7. Patricia Dominguez, Senator Martin Heinrich: patricia_dominguez@heinrich.senate.gov
8. Michele Jacquez-Ortiz, Senator Tom Udall: Michele_jacquez-ortiz@tomudall.senate.gov
9. Colorado Oil and Gas Commission: Matt.Lepore@state.co.us

1309 East Third Ave. #8 | Durango, CO 81301
chamapeak@gmail.com | www.chamapeak.org | 1-888-445-7708

APPENDIX A

1309 East Third Ave. #8 | Durango, CO 81301
chamapeak@gmail.com | www.chamapeak.org | 1-888-445-7708

COLORADO
Oil & Gas Conservation Commission
Department of Natural Resources

1120 Lincoln Street, Suite 801
Denver, CO 80203

Practices and Procedures
Stimulation at Depths 2,000 Feet or Less
October 24, 2014

There are regions in Colorado where the oil and gas activities are shallow and in close proximity to useable groundwater resources. Colorado Oil and Gas Conservation Commission considers that in these cases additional requirements should apply to ensure oil and gas drilling and completion activities (including hydraulic fracturing) do not impact groundwater resources. In order to discuss proposed additional requirements this Practices and Procedure for **Stimulation at Depths of 2,000 Feet or Less** is presented.

The COGCC has in place extensive rules and regulations to safeguard and protect fresh water resources. They have been developed through many years of regulating the oil and gas industry, and draw on proven industry experience. For example COGCC Rules and procedures require casing and cement programs to ensure fluid isolation of oil & gas and groundwater resources. In simple terms we require cement behind steel casing at least 200 feet above oil and gas bearing zones, and at least 50 feet above and below fresh water zones. The Rules also require casing programs that prevent oil, gas or water from migrating from one horizon to another.

Most oil and gas resources are found deeper than 2,000 feet and the current existing rules are adequate. Typically thousands of feet of rock formations separate the oil and gas objective form useable groundwater resources. When developing oil and gas resources at depths shallower than 2,000 feet the COGCC considers that there are increased risks and concerns associated with the reduced distance separating oil and gas objectives from useable groundwater. There may be less, fewer and thinner intervening impermeable strata. The possible existence of any enhanced permeability pathways is also an increased concern. Some potential pathways may include faults, joints, fractures, volcanic intrusions, steeply dipping bedding, old or abandoned wells, deep water wells, and mining exploration boreholes.

Many oil and gas reservoirs require hydraulic fracturing to produce economically. Hydraulic fracturing increases the degree and extent of fracturing near the wellbore. If the hydraulic fracture treatment caused hydraulic communication of the oil and gas resource with groundwater both could be negatively impacted. Where hydraulic fracturing would be necessary at these shallow depths COGCC may establish increased cementing criteria, based on local geology and engineering parameters. These criteria may be in excess of the 50 foot and 200 foot casing and cementing standards stated in Rule 317 for aquifer and hydrocarbon isolation. COGCC may also restrict the stimulation of certain pay zones.

The reason we have taken 2000' to be the defining depth is because hydraulic fractures tend to be oriented vertically at deeper depths and horizontally at shallower depths. This transition is at about 2,000 feet. This happens because at depths deeper than 2,000 feet the weight of the overburden becomes the principle stress. The fracture plane will orient perpendicular to the direction of least principle stress. Deeper fractures are generally oriented in a vertical plane. Shallower fractures tend to open in a horizontal plane. The fractures will also orient along existing zones of weakness, in alignment with the rock fabric, and follow the path of least

resistance to fluid flow. For example, this could tend to be along bedding planes if the rocks are horizontally layered, or along a fault or fractured zone, or through an un-isolated borehole.

As part of the drilling permit process, the operator shall meet with COGCC engineering staff to discuss and provide the flowing topical assessments:

(1) Geology and Aquifer Assessment,
(2) Engineering Assessment, and
(3) 1,500 feet Offset Well Review and Assessments.

Geology & Hydrogeology Assessment:

Operator shall characterize and assess the local geology and groundwater resources within a ½ mile area of the proposed oil and gas well. The discussion should include the following:

a. Oil & gas objective(s)
b. Stratigraphic units, rock types, formation tops
c. Geologic mapping, cross-sections
d. Identify groundwater resources (water wells, springs and water seeps)
e. Identify hydrocarbon oil and gas seeps.
f. Fluids Sampling & Analysis
    i. Water wells, springs and water seeps.
    ii. Oil and gas seeps

Engineering Assessment

The operator shall describe the proposed drilling process, well design, completion/ stimulation details, production methods and facilities. Discuss any risks to the environment and how they are to be prevented, minimized and mitigated.

1500 feet Offset Well Review and Assessments

This is to verify zonal fluid isolation in existing wells.

Hydraulic Fracturing in the Chromo Area

Marvin Johnson [2]

Location

Chromo, SE Archuleta County, Colorado; T32N1E, T33N1E, T33N1E, T33N2E

Background

There has been drilling in the Chromo Anticline & Navajo River valley area since the early 1930s based primarily on surface geology. The area is dominated by the asymmetric Chromo Anticline which is cored in the Cretaceous Lower Mancos shale. Three field areas have been delineated

> Price Gramps (Field Code 70600): Oil production from an asymmetric anticline in the Cretaceous Dakota sandstone at about 1100'. Basement was penetrated above TD 1172'. The field was discovered in 1935 and production ceased in the 1930s. [1]
>
> Chromo (Field Code 11100): Small amounts of oil and gas discovered in drilling from the early 1930s to 1960. Shows and production were from the Cretaceous Mancos shale at depths of 500' – 600'. (2&3)
>
> Navajo (Field Code 57110): Minor production averaging 150 bbl/month/well from the Cretaceous Mancos shale at depths of 800 – 1000'. [2,3]

Geology

The area is on the east flank of the prolific San Juan Basin, one of the country's largest gas fields. Most of the associated producing formations (Fruitland Coal, Pictured Cliffs, Mesa Verde and Dakota) have been eroded away or are very shallow due to significant uplift & tectonic deformation. Exposures of the producing Fruitland and Pictured Cliffs formations outcrop several miles to the west of the Chromo area.

As mentioned previously, the area is dominated by the asymmetric Chromo Anticline, a major component of the Gallina-Archuleta Arch (also known as the Archuleta Anticlinorium) which separates the San Juan Basin from the Chama Basin (also known as the Chama Platform) and has a dramatic cliff forming surface expression due to the cap rock of Cretaceous Mesa Verde sandstone around the edges. The west flank of the Chromo Anticline dips about 10° to the west and the east flank dips 60-80°. The anticline is cored with Cretaceous Mancos shale. Near the axis of the anticline, the Cretaceous Dakota sandstone was reported at a depth of 263' in the Crowley #4 (API 05-007-05203, SENW14-32N1E). Off the east flank of the anticline, the top Mancos shale is reported at a depth of 724' in the PC Crowley Heirs #1 (API 05-007-05016, NESE7-32N-2E). Further east, the Price Gramps field was drilled on a faulted, asymmetric anticline with production from the Dakota sandstone at a depth of about 1100'. There is a very thin remnant of Jurassic Morrison and Entrada formations between the Dakota and Precambrian basement. [2,3,4,5,6,7]

The main conclusions to be drawn are that the Cretaceous Mancos & Dakota producing formations are very shallow and highly faulted.

Concerns about Hydraulic Fracturing in the Chromo Area

While there is production from the lower Mancos shale, as noted above, the rates are very low. It would seem logical for a company to try horizontal drilling and/or Hydraulic Fracturing to to improve the production rates. Hydraulic Fracturing is a well known stimulation technique that pumps water, a proppant (usually sand) and a variety of chemicals under high pressure down the well bore to fracture and/or enlarge existing fractures in a specific formation or interval. The most common formulation is approximately 90% water, 9% proppant and 1% various chemicals.

The Chromo area is a very rural and mostly ranching community with some areas of retirement homes. Everyone depends on shallow wells for their drinking water. One of the main concerns about hydraulic fracturing is the possibility of fluids moving from the well bore and induced fractures into the overlying water table. As explicitly noted in the Background section (p. 7 & 8) of the "REVIEW OF HYDRAULIC FRACTURING TECHNOLOGY AND PRACTICES" Hearing before the COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY HOUSE OF REPRESENTATIVES, ONE HUNDRED TWELFTH CONGRESS, MAY 11,2011 Serial No. 112-17:

> *"The use of hydraulic fracturing has raised questions regarding the potential effect of this technology on drinking water supplies. The purpose of injecting fracking fluids into the ground is to create enough pressure to fracture subsurface structures. There are two distinct areas of concern regarding this process: first, the injection itself, or the creation of subsurface fractures, could allow fracking fluid to contaminate underground sources of water, and second, the handling and disposal of fracking fluids to the surface.*
>
> *The risk of contamination of underground water sources is managed in different ways. Risks associated with leakage of the fracking fluid during the injection and fracturing job are reduced by: adherence to state well construction requirements; the vertical distance between the fractured zone and ground water, and, the presence of vertically impermeable zones between the fractured zone and the deepest ground water; and the presence of vertically impermeable formation that act as geologic barriers to the movement of fluid from the fractured zone into ground water resources." [Department of Energy, State Oil and Gas Regulations Designed to Protect Water Resources. May 2009]*

The direction, size and extent of hydraulically induced fractures depend on the stress field in the formation being fracked which is controlled by the lithology, depth of burial and tectonic stresses. The characterization of fractures is a rapidly evolving science but most recent work using reservoir modeling, downhole tiltmeters and microseismic analysis suggests that most induced fractures have a half length of 400' – 1500' (distance from wellbore to tip of fracture) and a height of 100'-300' (vertical distance) in both vertical and horizontal wells. [8, 9, 10]

However, nearly all hydraulic fracturing has been performed in formations that are significantly deeper than in the Chromo area. For instance, the average depth of the fracturing horizon is 4500' for the Fayetteville Shale; 7400' for the Barnett shale, 9000' for the Eagleford shale and 7100' for the Marcellus shale. [8, 9] In addition, these shale plays are relatively flat and unstructured. It is noted that in the Barnet shale play, horizontal wells often cross small faults. Even when the perforations for fracking are placed away from the faults, microseismic activity was still concentrated around the

fault planes and fracturing was influenced by these faults. [11] As noted previously, the Chromo area has been subjected to significant tectonic activity and contains many faults which may be both a focus for increased fracturing and leakage.

Recommendation

Hydraulic Fracturing should be avoided in the Chromo area as it fails to satisfy the criteria set forth in the Congressional Hearing referenced above:

the vertical distance between the fractured zone and ground water – this is clearly not the case in the Chromo area where the distance between groundwater and the fracked formation may be as little as 200', clearly in the half fracture height zone.

the presence of vertically impermeable zones between the fractured zone and the deepest ground water – the Mancos shale is does not contain any significant impermeable zones.

the presence of vertically impermeable formation that act as geologic barriers to the movement of fluid from the fractured zone into ground water resources - given the tectonic activity (faulting and folding) and uplift any impermeability inherent in the Mancos shale is very likely to have been breached. This is evidenced by 'hot springs' and oil seeps in the area.

Citations

(1) W. Donovan, "Oil and Gas Fields of the Four Corners Area, Volumes I-II", 1978
(2) Colorado Oil and Gas Conservation Commission
(3) www.eser.org
(4) Wood, G. H. et al., "Geology of the southern part of Archuleta County, Colorado, USGS, Oil and Gas Investigations Preliminary Map 81",1948
(5) L. Woodward, "Tectonics of Central Northern New Mexico", New Mexico Geol. Soc. Guidebook, 25th Field Conf., Ghost Ranch (Central-Northern N.M.", 1974
(6) W. Muehlberger, "Structure of the Central Chama Platform, Northern Rio Arriba County, New Mexico", New Mexico Geol. Soc., Eleventh field Conference
(7) W. Muehlberger, et al, "Stratigraphy of the Chama Quadrangle, Northern Rio Arriba County, New Mexico", New Mexico Geol. Soc., Eleventh field Conference
(8) EPA Hydraulic Fracturing Workshop, March 10 – 11, 2011 by Chesapeake Energy
(9) S. Maxwell," Hydraulic Fracture Height Growth", CSEG Recorder, November 2011
(10) G. Waters, etal,"The Effect of Mechanical Properties Anisotrophy in the Generation on Hydraulic Fractures in Organic Shales", SPE 146776, Society of Petroleum Engineers Annual Technology Conference, 30 October-2 November 2011
(11) L. Bennett, etal, "The Source for Hydraulic Fracture Characterization", Oilfield Review, Winter 2005/2006
(12) M. Johnson, BS Geophysical Engineering, Colorado School of Mines and 35 years experience as an Exploration/Producing Geophysicist for a major oil company. Mr. Johnson can be contacted at PO Box 330, Chromo, CO 81128

December 12, 2012

Helen Hankins, State Director
Bureau of Land Management
Colorado State Office
2850 Youngfield Street
Lakewood, CO 80215

SENT VIA FAX (303-239-3799) AND CERTIFIED MAIL

Re: DOI-BLM-CO-S010-2012-0061
Protest Regarding Tres Rios February 2013 Oil and Gas Lease Sale
Parcels: 6401 - SERIAL #: COC75910 and 6402 - SERIAL #: COC75911

Dear Ms. Clementson and Ms. Hankins:

The Chama Peak Land Alliance hereby submits this protest letter concerning the Bureau of Land Management's lease offerings of two parcels (6401 -SERIAL #: COC75910, and 6402 -SERIAL #: COC75911) located in southern Archuleta County.

The Chama Peak Land Alliance ("CPLA") is an association of conservation-minded landowners working collaboratively to practice and promote ecologically and economically sound land management in the southern San Juan Mountains of Colorado and northern New Mexico. Members of the Alliance represent a land area that ranges from 7,000 feet to over 12,000 feet including portions of the Continental Divide covering approximately 200,000 acres (see map on page 4).

Our landowners, the conservation achievements in the Navajo River Valley to date, our ongoing work and the health and welfare of our community, will be directly impacted by the development of proposed leases 6401 and 6402.

The Chama Peak Land Alliance submitted comments and concerns regarding the Environmental Assessment (EA) on the proposed leases. Since that time, it has come to our awareness that the exploration and development of these leases may pose an extraordinary threat to human and environmental health due to the specific geology of the area[1].

[1] Please see Appendix: Hydraulic Fracturing in the Chromo Area by Marvin Johnson.

PO Box 22717 | Santa Fe NM 87502
chamapeak@gmail.com | www.chamapeak.org

The known reservoirs in the area surrounding the leases are all situated at very shallow depths. The fractured Mancos shale, which is identified as a primary target of exploration in the current draft Resource Management Plan (RMP) for the San Juan Public Lands, rises to less than 1,000 feet of the surface in the Chromo area.

> "The primary reservoirs are the Dakota and possible fractured shale of the Mancos. The Dakota and fractured Mancos Shale potential is considered to be high in this part of the SJPL where Cretaceous outcrops and subcrops are not covered by thick volcanic flows." [2]

An increasing body of scientific evidence points to the hazards of hydraulic fracturing at shallow depths. As explicitly noted in the Background section (p. 7 & 8) of the "REVIEW OF HYDRAULIC FRACTURING TECHNOLOGY AND PRACTICES" Hearing before the COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY HOUSE OF REPRESENTATIVES, ONE HUNDRED TWELFTH CONGRESS, MAY 11,2011 Serial No. 112-17:

> "The use of hydraulic fracturing has raised questions regarding the potential effect of this technology on drinking water supplies. The purpose of injecting fracking fluids into the ground is to create enough pressure to fracture subsurface structures. There are two distinct areas of concern regarding this process: first, the injection itself, or the creation of subsurface fractures, could allow fracking fluid to contaminate underground sources of water, and second, the handling and disposal of fracking fluids to the surface.
>
> The risk of contamination of underground water sources is managed in different ways. Risks associated with leakage of the fracking fluid during the injection and fracturing job are reduced by: adherence to state well construction requirements; the vertical distance between the fractured zone and ground water; and, the presence of vertically impermeable zones between the fractured zone and the deepest ground water; and the presence of vertically impermeable formation that act as geologic barriers to the movement of fluid from the fractured zone into ground water resources."
> (Department of Energy, State Oil and Gas Regulations Designed to Protect Water Resources. May 2009)

In Chromo, the risk of shallow fracking is further exacerbated by the presence of numerous faults, seismic activity, hot springs, old water, and oil and gas wells. In addition, there is a Bureau of Reclamation tunnel located on the Navajo River, which carries water into New Mexico and that could be at risk if fracking were to occur.

None of these potential hazards have been evaluated in the outdated San Juan Public Lands RMP, the EA for the Tres Rios lease sale, or in the new draft RMP/EIS for the San Juan Public Lands. No guidelines or regulations exist to insure that the development of these resources using new

[2] Draft Resource Management Plan, San Juan Public Lands, pp. 3.261 – 3.263

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technologies is safe in terms of public and environmental health. There are no guidelines or requirements of which we are aware to address this concern at any point in the leasing, exploration, or development process. The BLM has an obligation to protect human health and environmental resources and to evaluate the risks posed by potential development. By omitting any consideration of these threats in its analysis, it has failed in this requirement.

Based on the available science and experience to date, it seems to us prudent to refrain from the use of hydraulic fracturing where known reservoirs are not insulated by vertically impermeable zones or of sufficient vertical distance from groundwater, and where potential conduits for leakage and contamination exist and raise the risk of irreversible damage to water supplies and human health.

In the absence of adequate analysis, guidance or regulation, and in light of the clear threat to our community and its water supply, we request the BLM withdraw parcels 6401 and 6402 from the February 14, 2013 lease sale and that no further leases be offered until this concern is addressed and resolved.

If you have any questions or comments about this protest, please contact Lesli Allison, CPLA's Program Director at lallison30@gmail.com or 970-759-5741 with any questions or comments you have.

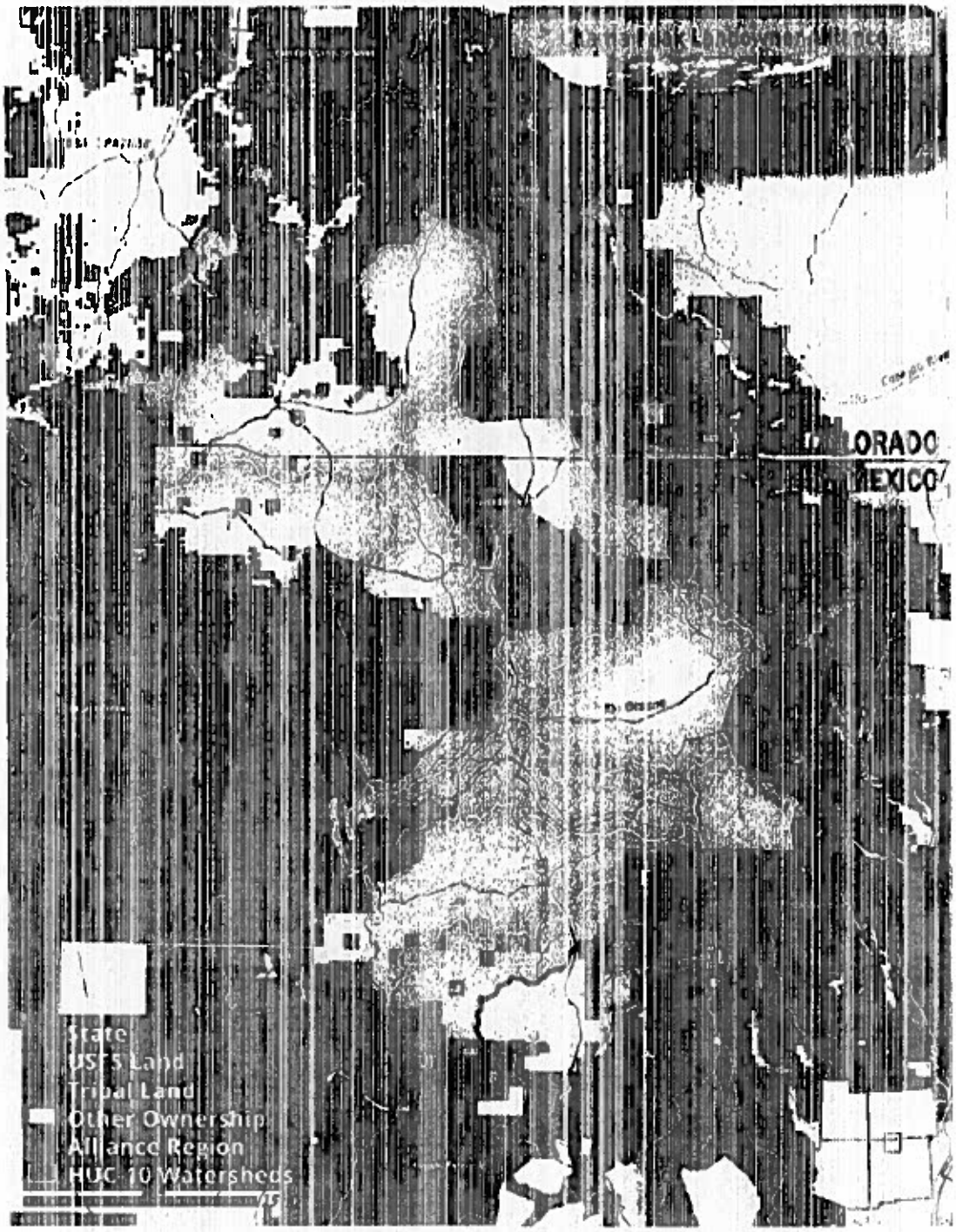
Sincerely,

/s/Richard Gooding, Chair /s/Jeb Binkley, Co-Chair

Richard Gooding, Chair and Jeb Binkley, Co-Chair are authorized to submit these comments on behalf of the Chama Peak Land Alliance.

c.c. Tres Piedras Office of the BLM via e-mail tres_rios_lease_sale@blm.gov
Senator Tom Udall (NM) – via e-mail Michael_Lopez@tomudall.senate.gov, Andrew_Wallace@tomudall.senate.gov
Congressman Martin Heinrich (NM) – via e-mail maya.hermann@mail.house.gov
Senator Mark Udall (CO) – via e-mail Wanda_Cason@markudall.senate.gov
Senator Michael Bennet (CO) - via e-mail John_Whitney@bennet.senate.gov
Congressman Ben Ray Luján (NM) – via e-mail jennifer.manzanares@mail.house.gov
Congressman Scott Tipton (CO) – via e-mail Darlene.Marcus@mail.house.gov
Archuleta Board of County Commissioners – via e-mail CLucero@archuletacounty.org, mwhiting@archuletacounty.org, SWadley@archuletacounty.org, TStarr@archuletacounty.org
Colorado Oil and Gas Commission – via e-mail Matt.Lepore@state.co.us

PO Box 22717 | Santa Fe NM 87502
chamapeak@gmail.com | www.chamapeak.org



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chamapeak@gmail.com | www.chamapeak.org

Hydraulic Fracturing in the Chromo Area

Marvin Johnson [2]

Location

Chromo, SE Archuleta County, Colorado; T32N1E, T33N1E, T33N1E, T33N2E

Background

There has been drilling in the Chromo Anticline & Navajo River valley area since the early 1930s based primarily on surface geology. The area is dominated by the asymmetric Chromo Anticline which is cored in the Cretaceous Lower Mancos shale. Three field areas have been delineated:

> Price Gramps (Field Code 70600): Oil production from an asymmetric anticline in the Cretaceous Dakota sandstone at about 1100'. Basement was penetrated above TD 1172'. The field was discovered in 1935 and production ceased in the 1990s. [1]
>
> Chromo (Field Code 11100): Small amounts of oil and gas discovered in drilling from the early 1930s to 1960. Shows and production were from the Creteceous Mancos shale at depths of 500' – 600'. (1&3)
>
> Navajo (Field Code 57110): Minor production averaging 150 bbl/month/well from the Cretaceous Mancos shale at depths of 800 – 1000'. [2,3]

Geology

The area is on the east flank of the prolific San Juan Basin, one of the country's largest gas fields. Most of the associated producing formations (Fruitland Coal, Pictured Cliffs, Mesa Verde and Dakota) have been eroded away or are very shallow due to significant uplift & tectonic deformation. Exposures of the producing Fruitland and Pictured Cliffs formations outcrop several miles to the west of the Chromo area.

As mentioned previously, the area is dominated by the asymmetric Chromo Anticline, a major component of the Gallina-Archuleta Arch (also known as the Archuleta Anticlinorium) which separates the San Juan Basin from the Chama Basin (also known as the Chama Platform) and has a dramatic cliff forming surface expression due to the cap rock of Cretaceous Mesa Verde sandstone around the edges. The west flank of the Chromo Anticline dips about 10° to the west and the east flank dips 60-80°. The anticline is cored with Cretaceous Mancos shale. Near the axis of the anticline, the Cretaceous Dakota sandstone was reported at a depth of 263' in the Crowley #4 (API 05-007-05203, SENW14-32N1E). Off the east flank of the anticline, the top Mancos shale is reported at a depth of 724' in the PC Crowley Heirs #1 (API 05-007-05016, NESE7-32N-2E). Further east, the Price Gramps field was drilled on a faulted, asymmetric anticline with production from the Dakota sandstone at a depth of about 1100'. There is a very thin remnant of Jurassic Morrison and Entrada formations between the Dakota and Precambrian basement. [2,3,4,5,6,7]

The main conclusions to be drawn are that the Cretaceous Mancos & Dakota producing formations are very shallow and highly faulted.

Concerns about Hydraulic Fracturing in the Chromo Area

While there is production from the lower Mancos shale, as noted above, the rates are very low. It would seem logical for a company to try horizontal drilling and/or Hydraulic Fracturing to to improve the production rates. Hydraulic Fracturing is a well known stimulation technique that pumps water, a proppant (usually sand) and a variety of chemicals under high pressure down the well bore to fracture and/or enlarge existing fractures in a specific formation or interval. The most common formulation is approximately 90% water, 9% proppant and 1% various chemicals.

The Chromo area is a very rural and mostly ranching community with some areas of retirement homes. Everyone depends on shallow wells for their drinking water. One of the main concerns about hydraulic fracturing is the possibility of fluids moving from the well bore and induced fractures into the overlying water table. As explicitly noted in the Background section (p. 7 & 8) of the "REVIEW OF HYDRAULIC FRACTURING TECHNOLOGY AND PRACTICES" Hearing before the COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY HOUSE OF REPRESENTATIVES, ONE HUNDRED TWELFTH CONGRESS, MAY 11,2011 Serial No. 112-17:

> *"The use of hydraulic fracturing has raised questions regarding the potential effect of this technology on drinking water supplies. The purpose of injecting fracking fluids into the ground is to create enough pressure to fracture subsurface structures. There are two distinct areas of concern regarding this process: first, the injection itself, or the creation of subsurface fractures, could allow fracking fluid to contaminate underground sources of water, and second, the handling and disposal of fracking fluids to the surface.*
>
> *The risk of contamination of underground water sources is managed in different ways. Risks associated with leakage of the fracking fluid during the injection and fracturing job are reduced by: adherence to state well construction requirements; the vertical distance between the fractured zone and ground water, and, the presence of vertically impermeable zones between the fractured zone and the deepest ground water; and the presence of vertically impermeable formation that act as geologic barriers to the movement of fluid from the fractured zone into ground water resources." [Department of Energy, State Oil and Gas Regulations Designed to Protect Water Resources. May 2009]*

The direction, size and extent of hydraulically induced fractures depend on the stress field in the formation being fracked which is controlled by the lithology, depth of burial and tectonic stresses. The characterization of fractures is a rapidly evolving science but most recent work using reservoir modeling, downhole tiltmeters and microseismic analysis suggests that most induced fractures have a half length of 400' – 1500' (distance from wellbore to tip of fracture) and a height of 100'-300' (vertical distance) in both vertical and horizontal wells. [8, 9, 10]

However, nearly all hydraulic fracturing has been performed in formations that are significantly deeper than in the Chromo area. For instance, the average depth of the fracturing horizon is 4500' for the Fayetteville Shale; 7400' for the Barnett shale, 9000' for the Eagleford shale and 7100' for the Marcellus shale. [8, 9] In addition, these shale plays are relatively flat and unstructured. It is noted that in the Barnet shale play, horizontal wells often cross small faults. Even when the perforations for fracking are placed away from the faults, microseismic activity was still concentrated around the

fault planes and fracturing was influenced by these faults. [11] As noted previously, the Chromo area has been subjected to significant tectonic activity and contains many faults which may be both a focus for increased fracturing and leakage.

Recommendation

Hydraulic Fracturing should be avoided in the Chromo area as it fails to satisfy the criteria set forth in the Congressional Hearing referenced above:

the vertical distance between the fractured zone and ground water – this is clearly not the case in the Chromo area where the distance between groundwater and the fracked formation may be as little as 200', clearly in the half fracture height zone.

the presence of vertically impermeable zones between the fractured zone and the deepest ground water – the Mancos shale is does not contain any significant impermeable zones.

the presence of vertically impermeable formation that act as geologic barriers to the movement of fluid from the fractured zone into ground water resources - given the tectonic activity (faulting and folding) and uplift any impermeability inherent in the Mancos shale is very likely to have been breached . This is evidenced by 'hot springs' and oil seeps in the area.

Citations

(1) W. Donovan, "Oil and Gas Fields of the Four Corners Area, Volumes I-II", 1978
(2) Colorado Oil and Gas Conservation Commission
(3) www.eser.org
(4) Wood, G. H. etal, "Geology of the southern part of Archuleta County, Colorado, USGS, Oil and Gas Investigations Preliminary Map 81",1948
(5) L. Woodward, "Tectonics of Central Northern New Mexico", New Mexico Geol. Soc. Guidebook, 25th Field Conf., Ghost Ranch (Central-Northern N.M.", 1974
(6) W. Muehlberger, "Structure of the Central Chama Platform, Northern Rio Arriba County, New Mexico", New Mexico Geol. Soc., Eleventh field Conference
(7) W. Muehlberger, et al, "Stratigraphy of the Chama Quadrangle, Northern Rio Arriba County, New Mexico", New Mexico Geol. Soc., Eleventh field Conference
(8) EPA Hydraulic Fracturing Workshop, March 10 – 11, 2011 by Chesapeake Energy
(9) S. Maxwell," Hydraulic Fracture Height Growth", CSEG Recorder, November 2011
(10) G. Waters, etal,"The Effect of Mechanical Properties Anisotrophy in the Generation on Hydraulic Fractures in Organic Shales", SPE 146776, Society of Petroleum Engineers Annual Technology Conference, 30 October-2 November 2011
(11) L. Bennett, etal, "The Source for Hydraulic Fracture Characterization", Oilfield Review, Winter 2005/2006
(12) M. Johnson, BS Geophysical Engineering, Colorado School of Mines and 35 years experience as an Exploration/Producing Geophysicist for a major oil company. Mr. Johnson can be contacted at PO Box 130, Chromo, CO 81128

5-12-1987 LR

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12/12	[illegible]	400
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Classification	WTR-4.40	
Project	365	
Control No.		
Folder I.D.		

United States Department of the Interior

BUREAU OF RECLAMATION
Upper Colorado Region
Albuquerque Area Office
555 Broadway NE, Suite 100
Albuquerque, New Mexico 87102-2352

IN REPLY REFER TO:

DEC 13 2012

ALB-440
WTR-4.40

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Ms. Helen Hankins, State Director
Bureau of Land Management
Colorado State Office
2850 Youngfield St.
Lakewood, CO 80215

Subject: Protest of and Request to Remove Parcels from February, 2013 Oil and Gas Lease Sale, Parcel ID: 6401 (Serial # COC75910) & 6402 (Serial # COC75911) Archuleta County, Colorado

Dear Ms. Hankins:

This protest and request to the Bureau of Land Management (BLM) to remove the above listed parcels from the lease sale is made on behalf of the Bureau of Reclamation by the Area Manager with jurisdiction for the affairs in the geographic region affected by the nominated parcels shown above.

Reclamation operates a trans-basin water collection and delivery system known as the San Juan-Chama Project (Project). This Project was authorized under PL 87-483, in 1962. Water collected from this project is critical to the water supply of the City of Albuquerque, the City and County of Santa Fe, and fifteen other municipalities, Pueblos, and irrigation districts.

The land-base and sub-surface estate of the subject parcels are in close proximity to critical pieces of existing Federal water collection and diversion structures. These structures, lying atop and underneath the Navajo River, include the Oso Tunnel, the Oso Siphon, the Oso Diversion Dam, and the Azotea Tunnel.

Our reason for protest and request for removal of the subject parcels is the risk of interference or harm to our facilities, and also to avoid possibly subjecting downstream landowners to new issues of sedimentation, reduced fishery potential and poor water quality which the U.S., acting through the Bureau of Reclamation, has mitigated in prior years.

We are concerned with potential effects of all subsurface activities including, but not limited to, drilling, fracturing, buried pipe installation, buried powerlines, and temporary or permanent pits.

We are also concerned with potential effects of surface-disturbing activities including, but not limited to, construction of overland and over-river roads, increased off-road traffic, denuding of lands adjacent or near the Navajo River, overhead powerlines, high and low pressure surface lines for oil, produced water, or gas, the introduction of drilling chemicals to these lands, and the storage and transport of oil, waste, and produced water within and around these two parcels.

Please find the following enclosures:

1. Maps (3): Aerials x 2, Topo x 1.
2. BLM's legal description of subject parcels
3. Reclamation's San Juan Project data

Reclamation looks forward to working with the BLM to resolve these areas of concern prior to the February, 2013 sale date. For further discussion, please contact Mr. Randy Rust at 505-462-3589.

Sincerely,

MIKE A. HAMMAN

Mike Hamman
Area Manager

Enclosures - 3

bc: ALB-101, ALB-400, ALB-150, ALB 210, 241, ALB 421, ALB-430

WBR:SWoods:jgraham:12/6/2012:505-462-3606
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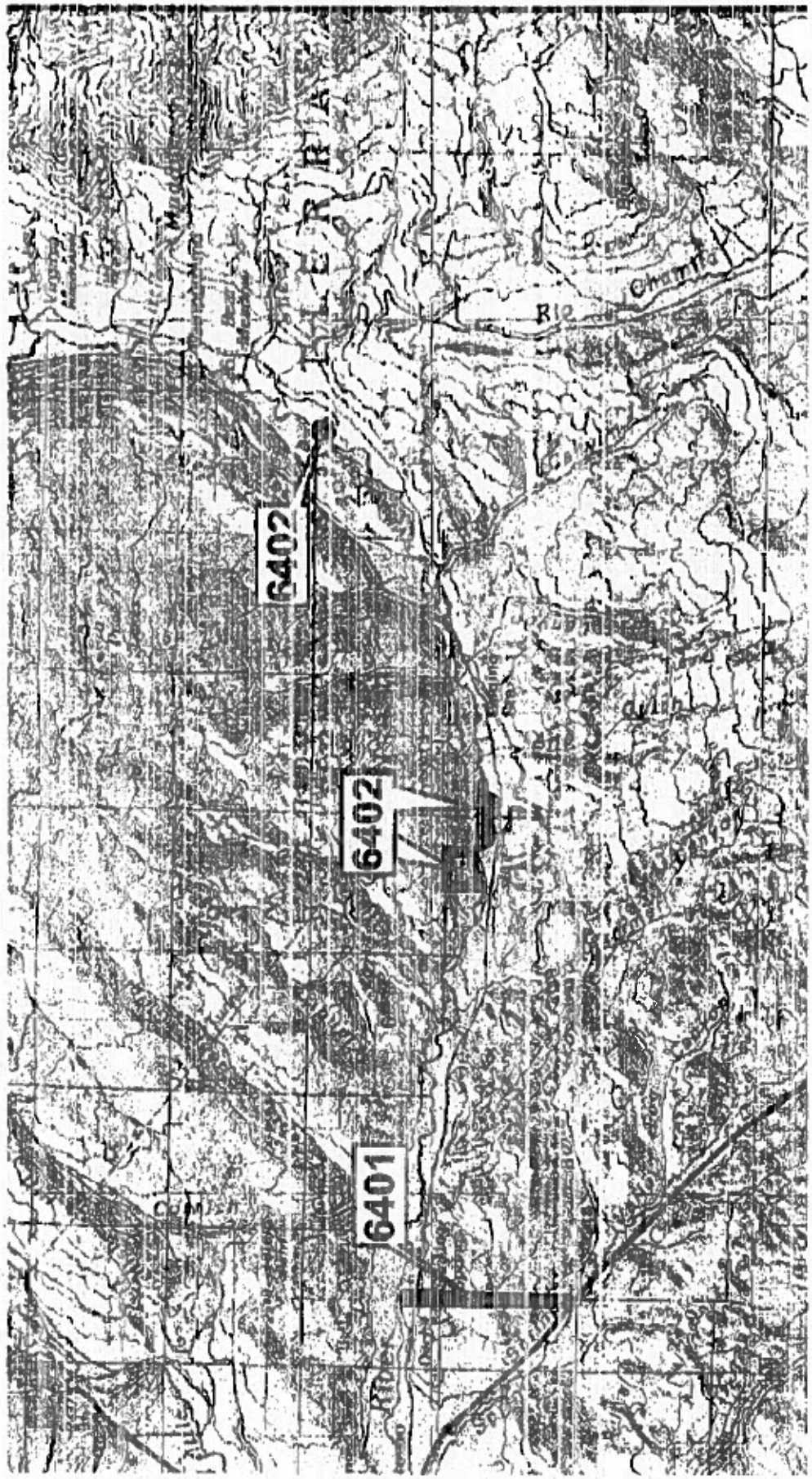
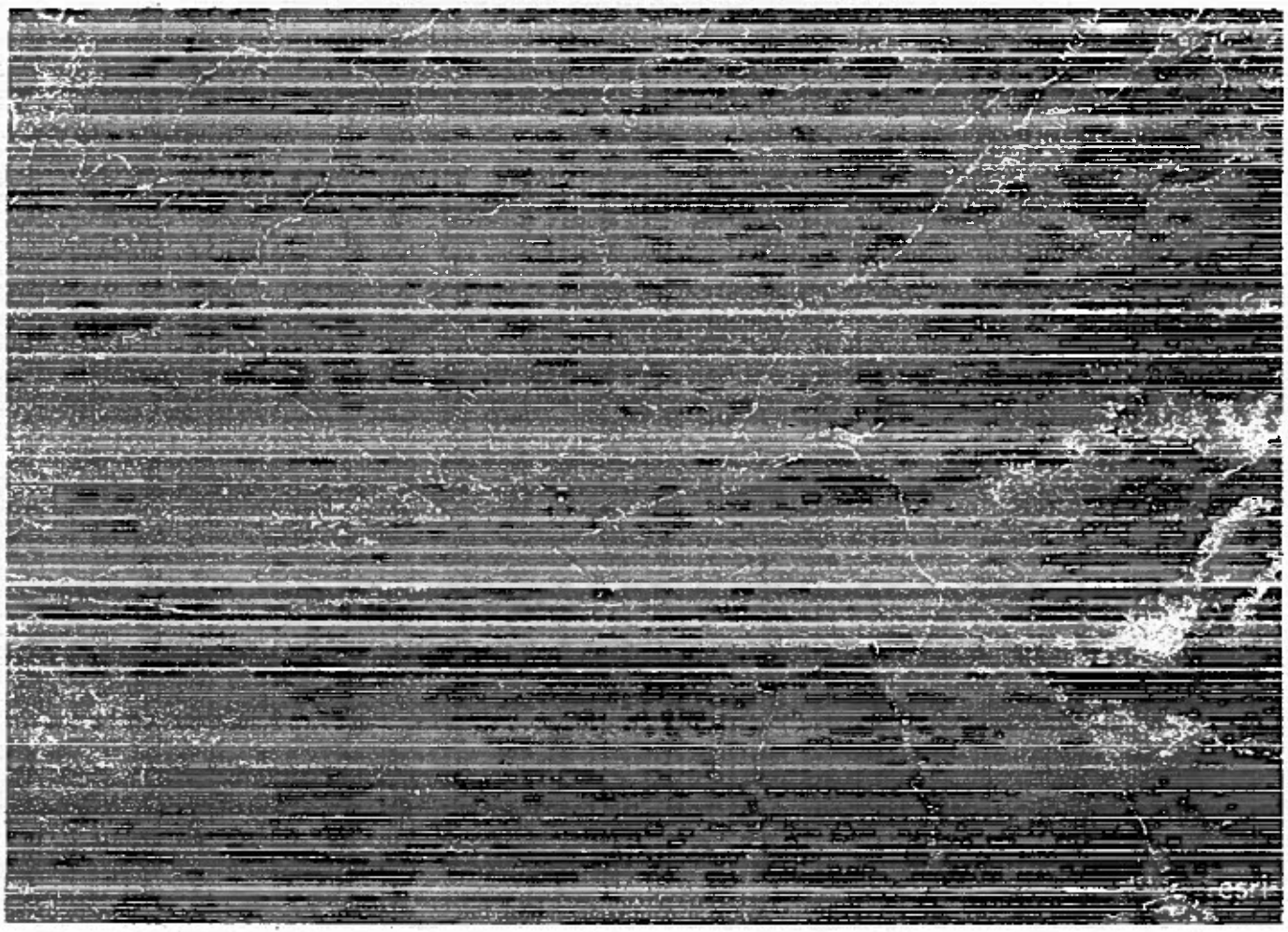
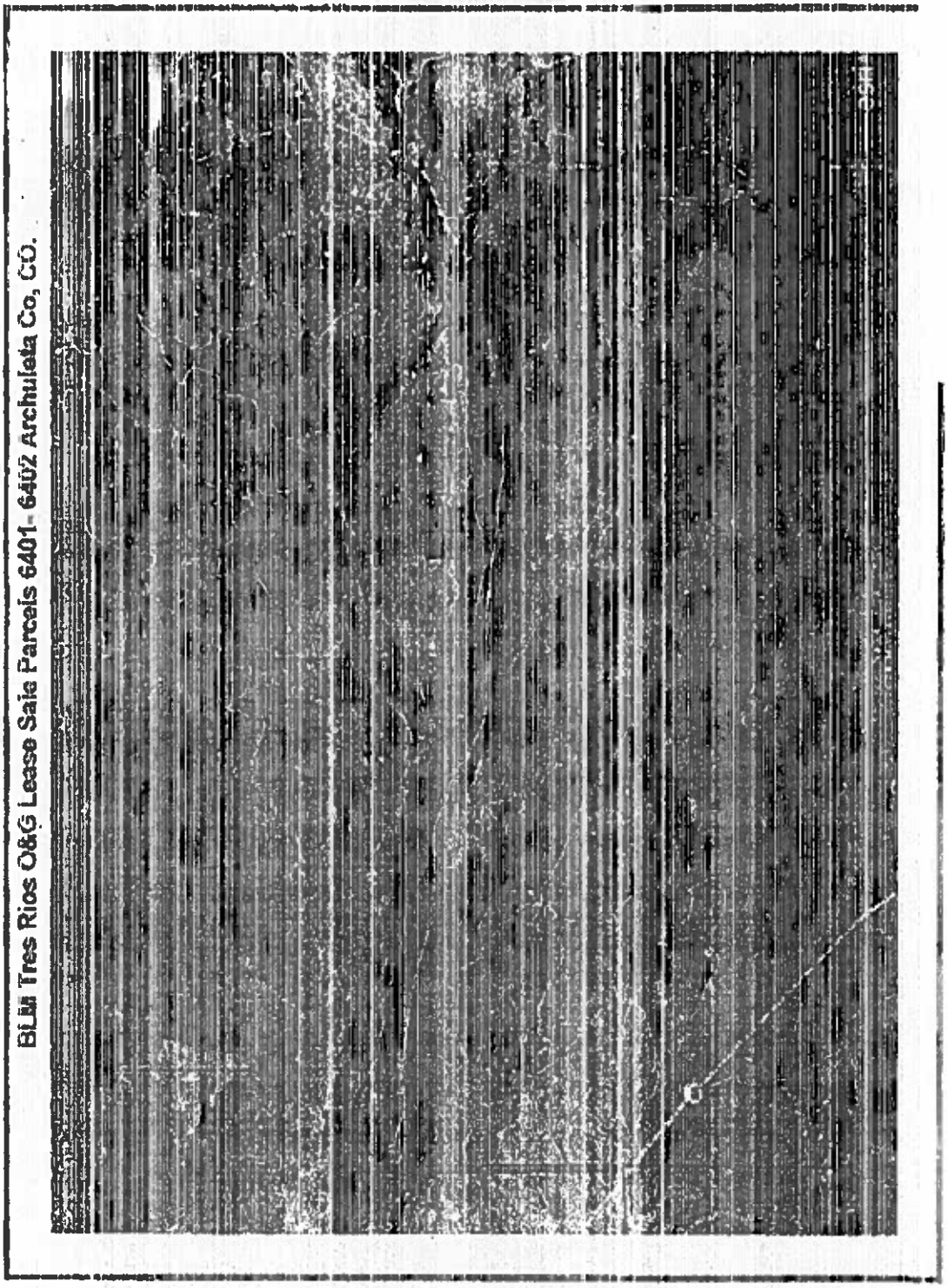


ENCLOSURE 1

BLM Tres Rios O&G Lease Sale Parcel 6402 Archuleta Co, CO.



ENCLOSURE 1


BLM Tres Rios O&G Lease Sale Parcels 6401-6402 Archuleta Co, CO.

ENCLOSURE 1

ENCLOSURE 2

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal.

All lands are subject to Exhibit CO-35 to protect cultural resources.

The following lands are subject to Exhibit LN-201 to protect slopes 25-40%:

T. 0420N., R. 0140W., NMPM
Sec. 17: NE, NENW, E2SW, SE;
Sec. 20: NE, NENW;
Sec. 21: NE, E2NW, NESW, NWSE;

PVT/BLM; COS: TRFO

PARCEL ID: 6533 SERIAL #: COC75909

T. 0390N., R. 0200W., NMPM
Sec. 25: TR 62;

Dolores County
Colorado 160.000 Acres

All lands are subject to Exhibit CO-03 to protect raptor nests.

All lands are subject to Exhibit CO-04 to protect bald eagle roosts or nests.

All lands are subject to Exhibit CO-06 to protect Mexican spotted owl roosts and nests.

All lands are subject to Exhibit CO-15 to protect grouse winter habitat.

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat.

All lands are subject to Exhibit CO-21 to protect Mexican spotted owl nesting and fledgling habitat.

All lands are subject to Exhibit CO-22 to protect bald eagle nesting habitat.

All lands are subject to Exhibit CO-30 to alert lessee of closure period for nesting grouse species.

All lands are subject to Exhibit CO-31 to alert lessee of sensitive species area inventory and mitigation requirements.

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal.

All lands are subject to Exhibit CO-39 to protect cultural resources.

All lands are subject to Exhibit CO-40 to alert lessee of potential Sage Grouse habitat.

PVT/BLM; COS: TRFO

PARCEL ID: 6401 SERIAL #: COC75910

T. 0320N., R. 0010E., NMPM

ENCLOSURE 2

Sec. 2: Lo 8;
Sec. 11: Lot 1-4;

Archuleta County
Colorado 23.810 Acres

All land are subject to Exhibit CO-03 to protect raptor nests.

All lands are subject to Exhibit CO-04 to protect bald eagle roosts or nests.

All lands are subject to Exhibit CO-08 to protect special status plant species.

The following lands are subject to Exhibit CO-09 to protect big game winter habitat:

T. 0320N., R 0010E., NMPM
Sec. 11: Lot 1-4;

The following lands are subject to Exhibit CO-10 to protect elk calving:

T. 0320N., R 0010E., NMPM
Sec. 11: Lot 1-4;

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat.

All lands are subject to Exhibit CO-22 to protect bald eagle nesting habitat.

The following lands are subject to Exhibit CO-23 to protect bald eagle winter roost sites:

T. 0320N., R 0010E., NMPM
Sec. 2: Lo: 8;

All lands are subject to Exhibit CO-31 to alert lessee of sensitive species area inventory and mitigation requirements.

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal.

All lands are subject to Exhibit CO-39 to protect cultural resources.

The following lands are subject to Exhibit SJ-07 to protect bald eagle winter concentration:

T. 0320N., R 0010E., NMPM
Sec. 2: Lot 8;

All lands are subject to Exhibit LN-101 to protect slopes 25-40%.

PVT/BLM; COS: TRFO

PARCEL ID: 6402 SERIAL #: COC75911

T. 0320N., R 0020E., NMPM
Sec. 2: Lot 1;
Sec. 8: Lot 2,5;
Sec. 9: Lot 5;

Archuleta County
Colorado 47,720 Acres

ENCLOSURE 2

All lands are subject to Exhibit CO-03 to protect raptor nests.

All lands are subject to Exhibit CO-04 to protect bald eagle roosts or nests.

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat.

All lands are subject to Exhibit CO-22 to protect bald eagle nesting habitat.

The following lands are subject to Exhibit CO-23 to protect bald eagle winter roost sites:

T. 032ON., R. 002OE., NMPM
Sec. 8: Lot 2,5;
Sec. 9: Lot 5;

All lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation.

All lands are subject to Exhibit CO-31 to alert lessee of sensitive species area inventory and mitigation requirements.

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal.

All lands are subject to Exhibit CO-39 to protect cultural resources.

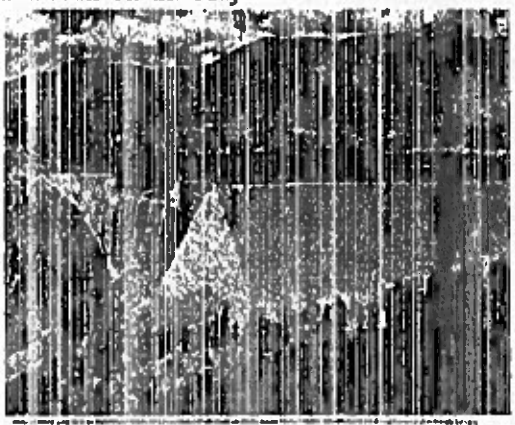
The following lands are subject to Exhibit SJ-07 to protect bald eagle winter concentration:

T. 0320N., R 0020E., NMPM
Sec. 8: Lot 2,5;
Sec. 9: Lot 5;

All lands are subject to Exhibit LN-101 to protect slopes 25-40%.

PVT/BLM;BLM; COS: TRFO

San Juan-Chama Project



Nambe Falls Dam

Project Links
Project History
Project Data
Contact Information

Related Facilities
Dams

Related Documents
San Juan-Chama Project History (68 KB) (pdf)

General Description | Plan | Development | Benefits

General Description

The San Juan-Chama Project consists of a system of diversion structures and tunnels for transmountain movement of water from the San Juan River Basin to the Rio Grande Basin. Authorized as a participating project of the Colorado River Storage Project, the San Juan-Chama Project provides an average annual diversion of about 110,000 acre-feet of water from the upper tributaries of the San Juan River. Primary purposes of the San Juan-Chama Project are to furnish a water supply to the middle Rio Grande Valley for municipal, domestic, and industrial uses. The project is also authorized to provide supplemental irrigation water and incidental recreation and fish and wildlife benefits.

Water is supplied for the following municipal, domestic, and industrial purposes: city of Albuquerque, 48,200 acre-feet; city and county of Santa Fe, 5,605 acre-feet; city of Los Alamos, 1,200 acre-feet; village of Los Lunas, 400 acre-feet; Twining Water and Sanitation District, 15 acre-feet; city of Espanola, 1,000 acre-feet, village of Taos, 400 acre-feet; town of Belen, 500 acre-feet; town of Bernalillo, 400 acre-feet; and Jicarilla Apaches, 6,500 acre-feet. Supplemental water is provided for irrigation of 89,711 acres in the Middle Rio Grande Conservancy District, 20,900 acre-feet; and 2,768 acres in the Pojoaque Valley Irrigation District, 1,030 acre-feet. An annual allocation of about 5,000 acre-feet is available for the Corps of Engineer's Cochiti Reservoir for fish and wildlife and recreation purposes to maintain a minimum pool of 1,200 surface acres. There is an allocated but as yet uncontracted supply of 4,990 acre-feet.

Reclamation has focused its planning efforts in the San Juan River Unit by preparing a planning report/environmental assessment for the Hammond Project. A final report on the Hammond Salinity Control Project was published in December 1994.

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Plan

ENCLOSURE 3

Collection System

The project takes water from the Navajo, Little Navajo, and Blanco Rivers, which are upper tributaries of the San Juan River, for use in the Rio Grande basin. Blanco Diversion Dam on the Rio Blanco diverts water to the Blanco Feeder Conduit, a closed conduit of 520 cubic feet per second capacity which conveys the water to Blanco Tunnel. Blanco Tunnel is a concrete-lined structure with 520 cubic feet per second capacity to carry water 8.54 miles from the Rio Blanco to a point near the Little Navajo River. Little Oso Siphon, a concrete siphon with a capacity of 520 cubic feet per second, carries water under Little Navajo River to Oso Tunnel. Little Oso Diversion Dam on the Little Navajo River upstream from the Little Oso Siphon diverts water from the Little Navajo River through the Little Oso Feeder Conduit, a closed conduit with a capacity of 150 cubic feet per second, to the Oso Tunnel.

The Oso Tunnel is a concrete-lined structure with a capacity of 650 cubic feet per second and a length of 5.05 miles. It carries water from Little Navajo River to a point near the Navajo River. The 650-cubic-foot-per-second Oso Siphon conveys water under the Navajo River where Oso Diversion Dam diverts water to the Oso Feeder Conduit. This conduit, with a capacity of 650 cubic feet per second, extends from Oso Diversion Dam to Azotea Tunnel.

The 12.8-mile-long concrete-lined Azotea Tunnel, with a capacity of 950 cubic feet per second, conveys water from Navajo River to Azotea Creek in the Rio Grande Basin. These imported waters flow down Azotea and Willow Creeks 11.78 river miles to Heron Reservoir.

Heron Dam

The regulating and storage reservoir is formed by Heron Dam on Willow Creek just above the point where Willow Creek enters the Rio Chama. The dam is an earthfill structure 269 feet high which forms a reservoir with a capacity of 401,320 acre-feet and a surface area of 5,950 acres. The spillway has a capacity of 660 cubic feet per second, and the outlet works has a capacity of 4,160 cubic feet per second. Storage from Heron Dam provides water for municipal, domestic, industrial, recreation, and fish and wildlife purposes and also provides supplemental water for irrigation.

Heron Reservoir is operated by Reclamation in compliance with applicable federal and state laws, including the San Juan-Chama Project authorization and the Rio Grande and Colorado compacts. Under these laws, only imported San Juan-Chama Project water may be stored in Heron Reservoir; there are no provisions for storing native Rio Grande water. Thus, all native Rio Grande water is released to the river below Heron Dam.

The outlet works for El Vado Dam, located 6 miles downstream of Heron Dam, were enlarged in 1965-1966 so that San Juan-Chama Project releases from Heron Reservoir could be passed unimpeded through El Vado Reservoir. The capacity of the outlet works is 6,600 cubic feet per second.

Pojoaque Tributary Unit

The Pojoaque Tributary Unit, a component of the project authorized under PL 87-483, provides 1,030 acre-feet of supplemental water for approximately 2,800 acres of irrigated land. Indian lands comprise about 34 percent of this total irrigated acreage. Nambe Falls Dam and Reservoir provide storage for this unit.

Nambe Falls Dam.

Pojoaque Irrigation Unit, made up of Nambe Falls Dam and storage reservoir, provides supplemental irrigation water for about 2,800 acres in the Pojoaque Valley. It serves the Pojoaque Valley Irrigation District and Indian pueblos of San Ildefonso, Nambe, and Pojoaque. The dam is a concrete and earth embankment structure 150 feet high which forms a reservoir with a capacity of 2,023 acre-feet.

Diversion Dams

Blanco Diversion Dam
Little Oso Diversion Dam
Oso Diversion Dam

Operating agencies

Reclamation operates Heron Dam as described above in the Heron Dam section. Operation and maintenance of Nambe Falls Dam and Reservoir is performed by the Pojoaque Valley Irrigation District, but Reclamation maintains oversight responsibilities.

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Development

History

Through prehistoric Indian activity at Sandia Cave northeast of Albuquerque, pueblo communities established before 600 A.D., Spanish settlement in 1598, and the homesteading development in the late 1840's, the Rio Grande Valley has accommodated and nurtured man. The waters provided by the San Juan-Chama Project flow to the descendants of these cultures, helping to continue the varied lifestyles represented.

Along the upper San Juan River drainage, the project's water source, a similar settlement pattern, with variations, developed. A desert culture base underlay the Anasazi development, but climatic conditions and the influx of the ancestors of the modern Navajo and Ute Indians limited pueblo development. Spanish exploration in the area is known as early as the search for gold in 1765, with settlement later in the century. Reports by trappers in the 1820's brought prospectors and miners, and eventually permanent settlers.

Investigation

Studies of the possibility of diverting San Juan River Basin waters into the Rio Chama, a tributary of the Rio Grande, began immediately following the first World War, but surveys of the features involved began in 1933, with the Bunger Survey. This survey was resumed in 1936, as a part of the Rio Grande Joint Investigations, to determine the need for the project.

The investigations established the basis for recognizing, in the Rio Grande Compact, the possibility of a transmountain diversion to bring water from the San Juan River into the Rio Grande Basin. The Colorado River Basin report, issued by the Bureau of Reclamation in 1946, established the quantity of water that was considered for the transmountain diversion during

the negotiation of the Upper Colorado River Basin Compact.

In 1950, in the interest of coordination, the Secretary of the Interior appointed a committee known as the San Juan River Technical Committee. A summary report was prepared in May 1950, and the committee presented progress reports in 1951 and 1952.

Field work on the San Juan-Chama Project was resumed at the beginning of 1951, and interim reports were prepared by the Bureau of Reclamation through 1955, when a feasibility study was prepared. This study was supplemented in 1957 and was followed by authorization of the project. Volume I of the definite plan report, covering the diversion and regulation elements of this project, was approved on August 10, 1964.

Authorization

The San Juan-Chama Project was authorized by Congress in 1962 through PL 87-483, which amended the Colorado River Storage Act of 1956 (PL 84-485) to allow diversion of Colorado River basin water into the Rio Grande basin of New Mexico. The original planning projections were for an ultimate diversion of 235,000 acre-feet per year, with an initial phase development for an average annual diversion of up to 110,000 acre-feet. Only the initial phase was authorized and subsequently constructed by Reclamation.

Construction

Construction of Azotea Tunnel began on April 22, 1964, and was completed on November 11, 1970. Other construction included Blanco Diversion Dam and Tunnel, awarded on May 11, 1965, and completed May 22, 1969; Little Oso and Oso Diversion Dams and Oso Tunnel awarded on February 1, 1966, and completed on November 11, 1970; Azotea Creek Channelization, awarded on August 14, 1967, and completed on December 6, 1968; Willow Creek Channelization, awarded on March 20, 1969, and completed on August 2, 1970; Heron Dam and relocation of State Highway 95, awarded August 8, 1967, and completed June 9, 1971.

Construction also included the enlargement of the outlet of existing El Vado Dam so Heron Reservoir releases could be bypassed through El Vado Reservoir. The contract was awarded on July 22, 1965, and completed December 29, 1966.

Construction of Nambe Falls Dam, part of the Pojoaque tributary irrigation unit, was awarded on June 13, 1974, and completed June 28, 1976.

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Benefits

Municipal, Domestic and Industrial Supplies	Acre-feet Provided
City of Albuquerque	48,200
Jicarilla Apache	6,500
City and County of Santa Fe	5,605
County of Los Alamos	1,200

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City of Espanola	1,000	
Town of Belen	500	
Village of Los Lunas	400	
Village of Taos	400	
Town of Bernalillo	400	
Town of Red River	60	
Twining Water & Sanitation District	15	
Irrigation Supplies		
Middle Rio Grande Conservancy District	20,900	Fish and Wildlife
Pojoaque Valley Irrigation District	1,030	and Recreation

The project provides a supplemental water supply for various communities, supplemental supply for irrigation, and substantial fish and wildlife and recreation benefits have been created at El Vado Reservoir, Heron Reservoir, Nambe Falls Reservoir, and Elephant Butte Reservoir and at Cochiti Reservoir an associated Corps of Engineers facility.

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