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State of Utah
DEPARTMENT OF NATURAL RESOURCES
Division of Water Rights

MICHAEL R. STYLER KENT L. JONES
Executive Director *State Engineer/Division Director*

JUN 13 2013

ORDER OF THE STATE ENGINEER
For Application to Appropriate Water Number 92-674 (F79183)

Application to Appropriate Water Number 92-674 (F79183), in the name of Pinnacle Potash International, Ltd (PPI), was filed on September 30, 2011, to appropriate 20,000 acre-feet (af) of water from proposed 6-inch wells, 1000-3000 feet deep to be located within T22S, R19E, SLB&M as follows:

- (1) South 4500 feet and West 1000 feet from the NE Corner of Section 22;
- (2) South 1000 feet and East 2000 feet from the N $\frac{1}{4}$ Corner of Section 36;
- (3) South 2100 feet and West 2200 feet from the NE Corner of Section 22;
- (4) South 300 feet and East 300 feet from the N $\frac{1}{4}$ Corner of Section 36;
- (5) South 4000 feet and East 1000 feet from the NW Corner of Section 23;
- (6) South 1000 feet and East 1500 feet from the NW Corner of Section 27;
- (7) South 3500 feet and West 1000 feet from the NE Corner of Section 26;
- (8) South 1000 feet and East 1000 feet from the NW Corner of Section 25;
- (9) North 100 feet and West 1100 feet from the E $\frac{1}{4}$ Corner of Section 22;
- (10) South 3000 feet and East 4500 feet from the NW Corner of Section 27;
- (11) South 1000 feet and East 1000 feet from the NW Corner of Section 23;
- (12) South 1000 feet and East 4500 feet from the NW Corner of Section 25;
- (13) South 4500 feet and East 2000 feet from the N $\frac{1}{4}$ Corner of Section 36;
- (14) South 4500 feet and East 4500 feet from the NW Corner of Section 25;
- (15) South 1000 feet and East 4000 feet from the NW Corner of Section 23; and
- (16) South 4000 feet and East 4000 feet from the NW Corner of Section 23.

The water is to be used for year-round mining, at the Crescent Project, for muriate of potash, potash, potassium chloride, potassium compounds, potassium salts, and other useful minerals. The application was filed as an Application to Appropriate, however, the applicant has clarified their intent and requested that this application be subject to the provisions of Utah Code Ann. §73-3-8(2) which allows development of water for a fixed time period.

Notice of the application was published in The Times-Independent on October 27 and November 3, 2011, and protests were received from US Department of the Interior, Office of Solicitor; Living Rivers; Grand Water and Sewer Service Agency; William E. Love; US Bureau of Reclamation; and Canyonlands Watershed Council. A hearing was held on May 9, 2012.

Protestants to the application referred to the statutory criteria for approval or rejection of an application contained in Utah Code Ann. §73-3-8(1), provided their views of the approval criteria, and argued the application should not be approved. Other concerns raised in the protests related to storage water releases from Flaming Gorge Reservoir. The applicant provided

testimony at the hearing arguing that the application meets all criteria for approval. The protestants and applicant submitted additional written information after the hearing.

Action on an application to appropriate by the State Engineer is governed by the provisions of Utah Code Ann. §73-3-8(1), which states:

- (1) (a) It shall be the duty of the state engineer to approve an application if:*
- (i) there is unappropriated water in the proposed source;*
 - (ii) the proposed use will not impair existing rights or interfere with the more beneficial use of the water;*
 - (iii) the proposed plan is physically and economically feasible, unless the application is filed by the United States Bureau of Reclamation, and would not prove detrimental to the public welfare;*
 - (iv) the applicant has the financial ability to complete the proposed works; and*
 - (v) the application was filed in good faith and not for purposes of speculation or monopoly.*
- (b) (i) If the state engineer, because of information in the state engineer's possession obtained either by the state engineer's own investigation or otherwise, has reason to believe that an application to appropriate water will interfere with its more beneficial use for irrigation, domestic or culinary, stock watering, power or mining development, or manufacturing, or will unreasonably affect public recreation or the natural stream environment, or will prove detrimental to the public welfare, it is the state engineer's duty to withhold approval or rejection of the application until the state engineer has investigated the matter.*
- (ii) If an application does not meet the requirements of this section, it shall be rejected.*

The State Engineer has reviewed the application, the information provided in the various submittals prepared in support and in protest of the proposed project, the information provided at the hearing, the written testimony submitted after the hearing, and has conducted additional investigation as directed by statute. The standard by which the State Engineer evaluates applications seeking approval is the "reason to believe standard" outlined in *Searle v. Milburn Irrigation Co.*, 2006 UT 16, 133 P.3d 382.

All of these issues along with the State Engineer's analysis are summarized and discussed in the following subsections listed by the individual criterion cited in §73-3-8(1) UCA.

§73-3-8 (1)(a)(i) Unappropriated Water in the Proposed Source

Several of the protests assert that there is insufficient unappropriated water in the proposed source, which is groundwater located within the Colorado River Basin. Protestants contend that the Colorado River Basin is over-appropriated and that the original Colorado River apportionment exceeds the current annual average flow of the river. Protestants contend that an appropriation of such a large volume of water would exceed the recharge capacity of the aquifer and result in mining of groundwater resources causing an overall decline in the regional water table. The future availability of water is also questioned. Protestants cited the possible negative effects of potential greater climate variability.

Colorado River Allocation and Climate Variability

The Colorado River is managed and operated under compacts, Federal laws, court decisions and decrees, contracts, and regulatory guidelines collectively known as the "Law of the River." When the Colorado River Compact of 1922 (Compact) was negotiated, the river's average annual flow from 1896 to 1921 at Lee Ferry was thought to be about 17 million acre-feet. Recent evaluations show the river's naturalized annual flow at Lee Ferry¹ to be about 15.0 million ac-ft over the period 1906-2008.² Utah may deplete 23% of the flow allocated to the Upper Colorado River Basin States. The Compact apportions to the Upper Basin States 7.5 million acre-feet of depletion per year provided that, in effect, an average of 7.5 million acre-feet per year is available to the Lower Colorado River Basin States, as measured at Lee Ferry, and treaty obligations to Mexico are satisfied. Considering current hydrology, Mexican treaty obligations, and other law of the river issues, Utah's share of the river is currently estimated to be about 1.4 million acre-feet per year. To date, the Upper Basin States have met all of their downstream obligations under the Compact and Law of the River.

Stream flow estimates for the Colorado River Basin, reconstructed from tree ring records spanning hundreds of years, appears to show greater variability in the hydrologic cycle than what has been documented in the historical record of flow measurements.³ The reconstructed flow record appears to show periods of extreme drought sustained over longer periods of time than any drought documented since the late nineteenth century and estimate annual flow (1568-1961) at Lee Ferry from 13.0 million to 14.7 million acre-feet annually. The two most recent reconstructions, Woodhouse et al., published in 2006, (1490-1997) and Meko et al., published in 2007 (762-2005) both arrive at 14.7 million acre-feet as the long term mean flow.⁴ Climate

¹ Also sometimes referred to as Lees Ferry or Lee's Ferry. Data for the stream gage at this location from 1921 to present can be obtained from the USGS (the gage is named USGS 09380000 Colorado River at Lees Ferry, AZ).

² U.S. Department of the Interior, Bureau of Reclamation. 2011. *Interim Report No. 1, Colorado River Basin Water Supply and Demand Study, Status Report*. p. SR-2

On the Web at: <http://www.usbr.gov/lc/region/programs/crbstudy/Report1/StatusRpt.pdf>

³ Meko, D.M., C.A. Woodhouse, C.A. Baisan, T. Knight, J.J. Lukas, M.K. Hughs, and M.W. Salzer. 2007. *Medieval Drought in the Upper Colorado River Basin*. *Geophysical Research Letters* 2007 34(5), L10705, doi: 10.1029/2007GL029988.

⁴ Western Water Assessment, *Colorado River Streamflow, A Paleo Perspective*, Comparison of the Lees Ferry Reconstructions: Online, <http://wwa.colorado.edu/treeflow/lees/difference.html>, accessed September 2012.

projection models appear to predict a wide range of future climate conditions. Predictions from current models range from a slight increase in Colorado River Basin precipitation to a greater than 30% decrease in annual runoff.⁵

Sub-Section Conclusions – Colorado River Allocation and Climate Variability

Water right laws in Utah were written specifically to address shortages in water supply and establish a priority system to protect senior rights during times of shortage. In times of physical water shortage, water rights in Utah are regulated according to the Prior Appropriation Doctrine. As stated in statute, “*the one first in time shall be first in rights,*” §73-3-1 Utah Code Ann. The Prior Appropriation Doctrine is the statutory directive used by the State Engineer to address variability in water supply whether it is a seasonal shortage, annual shortage, potential Compact shortage, or the potential for reduced water supply due to greater climate variability.

The State of Utah recognized some time ago the highly variable nature of flow in the Colorado River and set reasonable expectations for the total volume of water it may be able to develop. More than ten years ago the former director of the Utah Division of Water Resources wrote, “Subtracting the compact and treaty guaranteed annual apportionments to the Lower Basin of 7.5 million acre-feet and Mexico of 1.5 million acre-feet, and recognizing the impacts of sustained drought periods, the Upper Basin is left with an estimated dependable supply of about 6.0 million acre-feet. As a result, Utah’s allocated share is reduced from 1.7 million acre-feet to approximately 1.4 million acre-feet (Anderson, 2002).”⁶ The State Engineer believes Utah will be able to develop its 23% share of 6.0 million acre-feet, which is approximately 1.4 million acre-feet. If climatic conditions and the Law of the River require a reduction in use, the priority system of the Prior Appropriation Doctrine will come into play. It is estimated that Utah water users currently deplete approximately 1.0 million acre-feet annually.

The Bureau of Reclamation completed “*Colorado River Basin Water Supply and Demand Study*” in December of 2012. The purpose of the study “was to define current and future imbalances in water supply and demand in the Basin...over the next 50 years (through 2060) and to develop and analyze adaptation and mitigation strategies to resolve those imbalances.”⁷ The study did not result in a decision on how these imbalances should be met but provides a technical foundation and a range of solutions that may be considered by water managers throughout the Basin. The study recognized that the 1922 Compact overestimated the flow of the river, shortages are dealt with based on the availability of annual streamflow, and that the demand in Lower Division States is currently above their 7.5 million acre-feet basic apportionment. It estimates that 60% of the increased demand from 2015 to 2060 will be from the Lower Basin.

⁵ Bureau of Reclamation. 2011. *SECURE Water Act, Section 9503(c) – Reclamation Climate Change and Water 2011*. p. 25-36; see also: National Research Council. 2007. *Colorado River Basin Water Management – Evaluating and Adjusting to Hydroclimate Variability*. The National Academies Press. p. 85-91

⁶ Anderson, D.L., *Utah’s Perspective, The Colorado River*. Utah Division of Water Resources, 2nd Edition, May 2002, p. 5

⁷ *Colorado River Basin Water Supply and Demand Study*, U.S. Department of the Interior, Bureau of Reclamation, December 2012, p. ES-2

The study estimates that even under a rapid growth scenario Utah's demand would grow by 300,000 acre-feet by 2060.⁸ If the study is correct and Utah continues to grow rapidly over the next 50 years, Utah's total estimated usage would be 1.3 million acre-feet in 2060, short of the 1.7 million acre-feet allocated by the Compact and still 100,000 acre-feet short of the 1.4 million acre-feet the State Engineer believes Utah can currently use. The study indicates that targeted investment in water conservation, reuse and augmentation can improve the reliability and sustainability of the Colorado River system to meet current and future water needs through 2060 and beyond.

This application will be subject to the provisions of Utah Code Ann. §73-3-8(2) for fixed time appropriations and will not be considered for approval as a perpetual right. If approved, once the essential purpose of a fixed time application has been satisfied or Utah reaches full utilization of its share of the Colorado River allocation and such water is no longer available for use, such rights expire.

Ground Water Resources near Crescent Junction, Utah - Summary of Investigation

The U.S. Geological Survey produced a report describing the regional hydrology of the area in 1982.⁹ The focus of this report was to identify areas that might be suitable for storage of radioactive waste and not an in-depth study of water related resources of the area. Other water related information has been derived from exploration borings for potential energy and mineral development in the area. The closest of these wells are a series of nine wells near the southeast corner of the project site drilled by the U.S. Geological Survey (with funding provided by the U.S. Department of Energy). However, very few water wells have been completed in the subject area and there is not an abundance of specific information related to the underground water resources. Other studies are related to the uranium tailings disposal area north of Crescent Junction and to Arches National Park south of the project site.

There are two distinct hydrologic settings within the proposed well field for this application. Within the Salt Valley Anticline, collapsed caprock, consisting of residual interbed material of the Paradox Member, overlie thick sequences of evaporite salt deposits. Generally, hydraulic testing of the caprock has yielded very low hydraulic conductivity values and a minimal ability for this material to yield water to wells. Typically, salt beds transmit little, if any, ground water and are generally considered nearly impermeable. West of the anticline, Mesozoic rock layers consist of a thick sequence of 11 mostly sandstone units providing both perched aquifers and a large, regional flow system in units below the altitude of the Green and Colorado Rivers. The 1982 USGS report suggests that there is an even deeper Paleozoic aquifer made up of Mississippian dolomites located below the salt deposits (Rush, et al., 1982).

⁸ *Colorado River Basin Water Supply and Demand Study, Technical Report C – Water Demand Assessment*, U.S. Department of the Interior, Bureau of Reclamation, December 2012, p. C-26

⁹ Rush, F.E. et al., 1982, *Regional Hydrology of the Green River-Moab Area, Northwestern Paradox Basin, Utah*: U.S Geological Survey Open File Report 82-107.

The DOE wells are located in Salt Valley on the Salt Valley Anticline approximately 1.5 miles southeast of the nearest proposed PPI well. The first salt bed was encountered at depths ranging from about 535 feet to 630 feet below ground surface. Moisture was first encountered at depths ranging from 355 feet to 365 feet below land surface in the cap rock. The static water level was measured at approximately 370 feet below the land surface. The measured yield in the caprock, based on pumping tests, were between 0.02 gallon per minute and 7.2 gallons per minute. Water quality testing suggested a dissolved solids content (tds) in the upper part of the saturated caprock ranging from about 1,200 mg/L to 6,770 mg/L. Deeper samples typically had higher tds than shallower water.

The USGS postulates, from its investigations, a downward northwest trending groundwater flow along the axis of the valley. At the northern end of the valley the local gradient probably becomes the same as the regional gradient, which is southwest toward the Green River.¹⁰ Pumping tests of the saturated caprock yielded hydraulic conductivity values as low as 0.00031 feet/day indicating a limited ground water flow through the material. The reports noted that the biggest problem in cleaning the wells was created by the small water yields. The wells could only be pumped for a short period of time before water levels declined to the pump intake requiring the pump to be turned off for several hours to allow the water level in the well to recover. A slug-injection test was made on the salt sequence below a depth of 660 feet that again indicates very-low transmissivity and hydraulic conductivity.¹¹

The proposed well depths for this project are between 1000 – 3000 feet below ground surface. The wells for the project are at approximately 4800 feet in elevation although one is about 5200 feet. So the bottom of the wells would be between 4200 feet and 1800 feet above mean sea level. The wells appear to be located within or east of the Salt Valley Anticline except for two in Section 27 (points of diversion 6 and 10 from page one above) and one in Section 36 (point of diversion 4 from page one above). Both the Green River to the west and the Colorado River to the southeast of the project site are at approximately elevation 4000 feet. The bottom of Lake Powell at the Arizona border is at approximately 3100 feet in elevation. Well depths below the altitude of the Colorado and Green Rivers would likely be tapping water located within the regional groundwater aquifer. The applicant will likely explore development from whatever aquifer is encountered and at least some of the water used in development and production will likely need to be fresh, potable water for on-site drinking water and other domestic type demands.

The applicant submitted a supplemental report on December 14, 2012, providing more detailed analysis of water resources at the project site and the surrounding area. The report indicated that water encountered during drilling operations in the salt dome anticline was limited and, generally speaking, wells located outside the anticline would produce higher volumes and better quality water. Aquifers identified for use included the Dakota, Cedar Mountain, Salt Wash, Tidwell,

¹⁰ Wollitz, L.E., et al., 1982, Results of Hydraulic Tests in the U.S. Department of Energy's Wells DOE-4, 5, 6, 7, 8, and 9, Salt Valley, Grand County, Utah: U.S. Geological Survey Open File Report 82-346.

¹¹ Rush, F.E., et al., 1980, Results of Hydraulic Tests in Wells DOE-1, 2 and 3, Salt Valley, Grand County, Utah: U.S. Geological Survey Open File Report 80-205.

Curtis, Entrada and Navajo. Recharge sources identified in the report include: 1) infiltration from precipitation falling directly on the Mancos Shale within the Crescent Junction area, 2) infiltration from precipitation falling on watersheds within the southern facing Book Cliff drainages north of the project site, 3) deep aquifer regional recharge believed to be from the Book Cliffs and Uintah Basin, and 4) infiltration from precipitation falling directly on exposed aquifer formations at the site. The report concluded with a summary of anticipated aquifer recharge from the aforementioned sources with 200 acre-feet as recharge through the Mancos formations near Crescent Junction; 4,790 acre-feet recharge from southern drainages in the Book Cliffs; 2,000 acre-feet or more of recharge into the regional groundwater table from sources in the Book Cliffs and Uintah Basin; and 200 acre-feet of recharge from direct precipitation on locally exposed bedrock formations on site for a total of 7,190 acre-feet.

Sub-Section Conclusions - Ground Water Resources near Crescent Junction

Statutes related to groundwater development direct the State Engineer to develop plans that limit groundwater withdrawals to safe yield. Safe yield is defined as the amount of groundwater that can be withdrawn from an aquifer without exceeding the long-term recharge of the basin or unreasonably affecting the basin's physical and chemical integrity. From the studies reviewed, it appears that there is a small volume of water within the caprock located in Salt Valley. On the flanks of the anticline in perched aquifers above the altitude of the Colorado and Green Rivers, there is a larger volume of water within several of the sandstone aquifers. Below the altitude of the rivers, there is postulated to be a large regional water table and below the salt beds there may be a very deep aquifer located in the Mississippian rock formations.

The State Engineer is of the opinion that there is some unappropriated water in the source available for development under a fixed-time application. However, recharge potential for the underlying aquifers is limited and the volume of water available for appropriation without mining the resource is unknown. A first-order estimation of recharge to this area made by the National Park Service came up with 4,100 acre-feet per year. PPI's consult, Dr. Hansen estimates approximately 7,190 acre-feet per year.

It appears from the studies completed and reviewed thus far that withdrawal of the full 20,000 acre-feet of water from the target aquifers may exceed the safe yield of the aquifers. However, none of the studies were comprehensive in nature and all of the studies used numerous assumptions to arrive at the conclusions presented. Based on these facts, the State Engineer does not have sufficient information either from the applicant or from the studies reviewed to date to determine with certainty whether the development of an additional 20,000 acre-feet of water from the target aquifers would exceed the safe yield of the aquifers. In order for full development of this application to occur, a much more rigorous hydrologic study and monitoring program must be completed to determine the availability of additional water sought for development.

The State Engineer is of the opinion that some volume of water is available for development by the applicant that will not exceed the safe yield of the target aquifers. The manner in which the State Engineer has dealt with this uncertainty in water supply in past decisions has been to limit the approved volume of water that would provide for some level of development and subsequently require the applicant to establish a monitoring plan that would detect whether mining of the groundwater resource was occurring. If a more comprehensive study is completed defining a larger safe yield volume or the applicant is able to place to beneficial use the first block of approved water without any negative effects, then an additional block of water may be considered for approval under this application.

§73-3-8 (1)(a)(ii) Not Impair Existing Rights or Interfere with the More Beneficial Use of Water

Protestants expressed concern that the proposed water withdrawal under this application would likely harm existing water users including dewatering of nearby springs and impairment of nearby groundwater wells with established water rights.

The project area is remote with very few underground water wells or springs nearby. The nearest active well relied on by water users is located at the Canyonlands Field Airport which is over 7 miles southeast of the project site. The nearest springs with water rights are 3 BLM springs located approximately 1 mile to the east of the proposed well field and Burro Seep located 7 miles southeast of the project site near the airport. All of the springs are listed for use as stockwatering sources. The only other beneficial uses nearby are stockwatering rights on washes with ephemeral seasonal flows.

There are no nearby water rights on underground wells or springs that would be affected by this application. The three BLM springs 1 mile east of the site are located across the anticline which likely serves as a groundwater flow barrier. It is unlikely that a relatively small volume of water withdrawn under this application would affect wells and springs located several miles from the project site. The only nearby surface rights, not owned by the lessee of the site, are stock watering rights on dry washes that receive only ephemeral flow from precipitation events or spring runoff. It is unlikely that these rights would be affected by this application. The State Engineer has reason to believe that a small volume of water withdrawn under this application will not impair existing rights or interfere with a more beneficial use of water. There is insufficient hydrologic data to determine whether the full withdrawal of 20,000 acre-feet of water under this application would affect wells and springs located some distance from the project site.

§73-3-8 (1)(a)(iii-v) Physically and Economically Feasible; Financial Ability to Complete the Proposed Works; Filed in Good Faith, Not for Speculation or Monopoly

Some of the protests revolve around the physical and economic feasibility of the proposed project; whether the applicant has the financial ability to complete the proposed works; and on the speculative nature of the proposed project.

The applicant has drilled an exploratory boring, Crescent State #32-22, in Salt Valley which represents a considerable capital investment. Drilling of the boring has been confirmed with the Division of Oil, Gas and Mining but PPI has not submitted a boring log. The applicant, doing business as Sabine International, Inc., entered into a Mineral Lease agreement with School and Institutional Trust Lands Administration (SITLA) under Mineral Lease No. ML 51720 for over 10,000 acres in March 2010.

The applicant submitted additional financial information on February 21, 2013. The submittal stated that PPI was formed as a partnership in 2008 with initial capitalization of 12 million dollars. The initial capital was used in part to acquire over 60,000 acres of pending prospecting permits on Bureau of Land Management lands and 20,931 acres of SITLA potash leases on State lands within the Crescent Junction area. These funds were also used to obtain patents on 21 claims in the US, Canada and Russia; develop a rail design and secure a Memorandum of Understanding with Union Pacific Railroad for over seventeen miles of track to enable shipment of 8 million tons of potash; conduct substantial survey investigations; complete exploration wells; and as mentioned, complete one well to a depth of over 9,300 feet within the salt anticline. The submittal listed a number of business consultants and government agencies which PPI has worked closely with during this phase of the project. The applicant projects in the submittal the need for additional funding beyond the initial capitalization of up to \$50 million. The submittal indicates that PPI has developed a Confidential Information Memorandum to raise the additional capital, and is currently in the process of raising additional capital for the project.

The State Engineer is of the opinion that sufficient information has been submitted by the applicant to show the project is physically and economically feasible, the applicant has sufficient financial ability to pursue development of the project, and the application has been filed in good faith.

§73-3-8 (1)(b)(i) Public Welfare / Recreation / Natural Stream Environment

Some protests raised the concern that withdrawal of such a large volume of water and/or the associated solution mining techniques proposed for the project may cause land subsidence and trigger seismic events that may damage or destroy the natural arches, located nearby in Arches National Park. This in turn may harm recreation opportunities and the local tourist economy. Concerns were also raised about potential damage to important infrastructure such as nearby highways or Canyonlands Field Airport from these hazards.

The Living Rivers protest expressed concern that the proposed water withdrawal under this application would likely dewater nearby springs. The National Park Service (NPS) expressed concern that the wells proposed as points of diversion for this application are located upgradient to the recharge area for the Arches National Park Courthouse - Seven mile spring system. The NPS believes that if these wells are developed in the same source aquifer or adjacent source aquifers, and upgradient from, springs in the spring system, that the spring flows would likely be adversely affected by increases in groundwater withdrawal. Any reduced flow as a result of

upstream development could result in impacts to water-dependent vegetation, wildlife and other resources. A number of studies were submitted by the NPS in support of their position.

Public Welfare & Recreation - Summary of Investigation

Land subsidence, including the formation of sinkholes, and induced seismicity have been documented under certain mining conditions at various sites around the globe. A review of the literature on this topic suggests that generally the induced seismic events are small and cause no damage, however, the frequency and severity of mining-induced seismicity is directly related to the rate of extraction from the mine and depth of the mine.¹² Similarly, subsidence and the formation of sinkholes depend largely on the techniques used in the mining process. Studies completed on these hazards recommend that existing seismic hazards and background seismicity need to be studied at the project onset and faults capable of damaging earthquakes be defined with appropriate buffers and exclusion zones to prevent interaction with the mining activity.¹³

Sub-Section Conclusions – Public Welfare and Recreation

The Utah Mined Land Reclamation Act of 1975 (Utah Code Ann. §40-08) directs the Utah Division of Oil, Gas and Mining (DOG M) to develop regulations that “prevent conditions detrimental to the general safety and welfare of the citizens of the state of Utah” that could occur from activities of the mining industry in the state. DOGM is the primary regulatory agency tasked with evaluating potential surface or subsurface impacts related to mining activity. Permitting and inspection/enforcement procedures ensure proper mine operation and the reclamation of affected lands. Administrative Rule R647 governs the mineral regulatory program for the State of Utah. Personal communication with staff from DOGM confirmed that the agency does evaluate mine plans for potential impacts due to induced seismicity and land subsidence.¹⁴ These hazards as related to the mining techniques proposed to be used by the applicant for this project fall under the jurisdiction of the Division of Oil, Gas and Mining.

Natural Stream Environment - Summary of Investigation

A key finding in the studies submitted by the NPS indicated that “the ground-water flow system supplying the Courthouse-Seven mile spring system is contained entirely in the Moab Member aquifer, except for Courthouse Wash Boundary Spring, which receives some recharge from alluvium in Courthouse Wash and/or the Morrison and Summerville Formations overlying the Moab Member”. The contact between the Moab Member and the underlying Slick Rock Member of the Entrada is lined with fine-grained, impermeable deposits that likely prevent percolation of ground water from the Moab Member downward into the Slick Rock Member.¹⁵

¹² Cypser, D.A., 1996, “Colorado Law and Induced Seismicity”

¹³ Cladouhos, T., et al., 2010, “Injection Induced Seismicity and Geothermal Energy”, GRC Transactions, Vol. 34.

¹⁴ Personal Communication, Peter Brinton, Environmental Scientist/Engineer, Division of Oil, Gas and Mining, October 2012.

¹⁵ Hurlow, H.A. and Bishop, C.E., 2003, Recharge areas and geologic controls for the Courthouse-Sevenmile spring system, western Arches National Park, Grand County, Utah, Special Study 108, Utah Geological Survey, p. 6.

Sub-Section Conclusions – Natural Stream Environment

The State Engineer believes there is a small volume of water available for appropriation from the aquifers at the project site that will not impact the springs within the Park boundaries or other springs located in the region. There is insufficient hydrologic data to determine whether the full withdrawal of 20,000 acre-feet of water under this application would affect wells and springs located some distance from the project site.

Other Concerns - Water Contracts from Flaming Gorge Dam

The U.S. Bureau of Reclamation (Reclamation) stated in its protest that stored water is delivered to Lake Powell each year pursuant to the Colorado River Storage Project authorization. Reclamation asserts that any right to use stored water released from Flaming Gorge Reservoir must be based on a water service contract with Reclamation.

The flows of the Green River as measured at the Green River station average over 4 million acre-feet per year while releases from Flaming Gorge Dam average only 1.4 million acre-feet per year. The majority of flows at the Green River station come from downstream tributaries to the Green not from storage released from Flaming Gorge Dam. Once water is released from Flaming Gorge Dam, provided it is not encumbered by other change applications or service contracts, it is regulated as part of the flow of the river on a priority basis.

Flaming Gorge Reservoir diverts and stores water in Utah under Utah Law pursuant to Application to Appropriate A30414, approved October 6, 1959. Utah Code Section 73-3-1 sets forth that the appropriation of public water in the state may be made only for a useful and beneficial purpose. Utah Code Section 73-3-2 provides that those proposed purposes must be set forth in an application to appropriate filed with the State Engineer. Application to Appropriate A30414 sets forth the purposes of use for the application as: Power Generation at Flaming Gorge Dam, Irrigation, Municipal, Domestic and Industrial uses in Uintah and Duchesne Counties and for incidental recreational and domestic uses in the vicinity of Flaming Gorge Reservoir and in Dinosaur National Monument. Additionally, the proposed uses enumerated in the application as it was filed and approved included purposes set forth in the Upper Basin Colorado River Compact particularly Article IX(a), which was quoted in the application. The Bureau of Reclamation did not seek instream flows under the application to appropriate and the State Engineer has not approved an application to appropriate for that purpose. Utah Code Section 73-3-30 provides specific instruction for application and approval of change applications for instream flow. No change application for that purpose has been filed on Flaming Gorge Reservoir water rights nor has any been granted.

Inasmuch as this application does not seek to appropriate water from the main stem of the Green River or any surface tributary to the Green River, and is based solely on groundwater resources in the area of Crescent Junction, the State Engineer believes water right held by Reclamation for project purposes will not be adversely impacted.

Summary of Application Conclusions

It is the opinion of the State Engineer that there is water that can be appropriated under this fixed-time application. However, this right will not be granted in perpetuity. The fixed-time nature of this application has been discussed with the applicant and the applicant is willing to accept the conditions of such an approval.

It is, therefore, **ORDERED** and Fixed-Time Application Number 92-674 (F79183) is hereby **APPROVED** subject to prior rights and the following condition:

- 1) This Fixed Time Application is partially approved to divert up to 5,000 acre-feet annually. A groundwater monitoring plan must be submitted and approved by the State Engineer before any groundwater is diverted under this application. The balance of the water applied for will remain unapproved but up to 15,000 additional acre-feet may be approved if a comprehensive study and monitoring program of groundwater recharge and discharge for the purpose of establishing the safe yield volume is completed by the applicant and if monitoring data show no adverse impacts to existing water rights, no localized interference issues, no impact to the existing regional groundwater table, no contamination issues, and no adverse effects to the natural environment including at Arches National Park. In the event that the study or monitoring finds groundwater withdrawal rates exceed the safe yield volume, the applicant will be required to reduce uses to safe yield volumes.
- 2) The following limitations and restrictions on diversion and depletion from the various aquifers are as follows: a) 500 acre-feet may be developed from water resources within the Salt Valley Anticline caprock or rock formations within the salt dome; b) 500 acre-feet may be developed from aquifers down to and including the Entrada aquifer; and c) 4,000 acre-feet may be developed from the Glen Canyon Group aquifers or underlying aquifers such as the Mississippian. Additional blocks of water may be considered for approval from the various aquifers provided the criteria in Condition 1 are met.
- 3) This application is approved subject to 73-3-8(2), Utah Code Annotated, for a fixed-time period which ends June 30, 2027. The application will permanently lapse at the end of the fixed-time period unless extended as required by statute. It may lapse sooner if the purpose of the application, potash mining at the Crescent Project, is satisfied or if Utah reaches full utilization of its Colorado River allocation and is forced to reduce use under the Law of the Colorado River.
- 4) All water diverted must be metered and reported annually to the Utah Water Use Program.