

APPENDIX A
OFF-SITE WATER WELLS AND SPRINGS

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Water wells and springs in the vicinity of the Site were located through database searches and field investigations. The Colorado Division of Water Resources (DWR) Well Permit Database and Water Rights database were accessed on September 30, 2008 and June 19, 2009 to obtain well information, and the DWR Water Rights Database was accessed on June 23, 2009 to obtain spring information. Field investigations were conducted to verify the existence, location, and condition of water wells located in close proximity to the site. Well owners with wells completed in the Chinle formation and the Bureau of Land Management (BLM) were also contacted to obtain additional well information such as withdrawal rates and usage.

Water Wells

Table A-1 and Figure A-1 show the 46 water wells identified within the study area exclusive of those wells permitted and installed by Energy Fuels Resources Corporation (EFRC). The list includes 45 that have been permitted with the state, and one older, unpermitted well identified by the BLM as the Prospector Well. Although 45 wells have been permitted, some of the wells have not been installed or were installed and later abandoned. Based on their location and depth (where available), each of the wells was assigned to an aquifer in Table 1. The aquifers and the number of wells permitted in each aquifer are listed below.

- Chinle/Moenkopi formations (11);
- Valley Alluvium (10);
- Dolores River Alluvium (16); and
- Others (9).

A summary of the permitted wells for each aquifer is presented below. Additional details and informational references are provided in Table A-1.

Chinle/Moenkopi Formation Wells

The wells permitted in the Chinle and Moenkopi formations are located near the toe of Davis and Monogram mesas. The mill production wells are also completed in these formations. A summary of the 11 permitted wells in this aquifer follow:

- Domestic wells currently in use (Wells 226684, 234136, 253522, and 269575): These wells supply water to the Hurdle, Herron, Boren and Fehlmann/Davis residences, respectively;
- Domestic wells not in use (Wells 91065): Well 91065 provided water to the Herron residence (previously owned by J. Russell) for domestic and livestock consumption until 2003 when the well went dry and was replaced by Well 234136;
- Stock wells currently in use (258704): Well 258704 is located on public land managed by the BLM. The well is used for watering cattle;
- Intermittent and dry wells (86582 and 86583): Well 86582 produces water on an intermittent basis during wet years. Well 86583 is dry; and

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- Wells permitted but not installed (190027, 257495, and 279209): Discussions with the owners indicate that Wells 190027 and 257495 were not installed. Well 279209 was drilled but was not completed as a well.

Alluvial Wells

The wells permitted in the alluvium are located near the central axis of the valley and typically near surface drainages. Although some of these wells may have been intermittent producers of small volumes of water, none are currently being used.

- Inoperable wells (36544, 91066, and 102922): Well 36544, located immediately east of the mill site, was installed by the land owner who has since passed away. An inspection in May 2008 found that the casing had collapsed. The windmill at Well 91066 is broken and the well is not in use. Well 102922 was found to have a plug in the casing (possibly a stuck submersible pump) when inspected in June 2009;
- Wells abandoned or not installed (190026, 190028, 102923, 138759, 218930, and 226716): These wells do not appear to currently exist based on a combination of interviews and field inspections; and
- Prospector Well: This well, which is located on the north side of the valley, was sampled by the BLM in 1980. The water was of relatively poor quality with a specific conductivity of 3,350 micro Siemens per centimeter ($\mu\text{S}/\text{cm}$) and dissolved sulfate concentration of 2,300 milligrams per liter (mg/L). The current status of the well is unknown.

Dolores River Alluvial Wells

These wells are located along the east bank of the Dolores River and are recharged by the river. Because the river cuts through the collapsed salt anticline that forms the valley, the alluvial water is very saline. The majority of the wells along the river are extraction wells for the Bureau of Reclamation's desalinization plant.

- Extraction Wells (26278, 26729, 26281, 23654, 23655, 23656, 23658, 23659, 23660, and 26280): These wells are currently pumping at a combined rate of about 230 gpm. The water is pumped to the desalinization plant where the salt is removed. The filtered water is discharged into the river downstream of the salt anticline while the extracted brine is disposed of in a deep injection well;
- Abandoned Wells (23662, 23663, 23667, and 1997009): These wells consist of abandoned extraction wells; and
- Domestic & Stock Wells (Wells 234100 and 268908): Well 234100 is a 43-foot deep well at a residence located just north of Highway 90 along the east bank of the river. This well may be south of the anticline and less effected by salt contamination. Well 268908 is located in the center of the valley; it is unlikely that this well was completed given its proximity to the Bureau of Reclamation's extraction system where salt levels are extremely high.

Other Aquifers (9)

These wells are typically located on the side or top of the surrounding mesas. Many of these wells appear to be incorrectly located or monitoring wells.

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- Active Monitoring Wells (Wells 48086 and 48088): These wells are dry monitoring wells completed in the Entrada Formation and located at the Nuvemco underground mine immediately south of the mill site;
- Abandoned Wells (Wells 8547, 25277, and 32483): Well 8547 is an abandoned monitoring well for an underground mine located south of the mill site. Well 25277 may have been installed to supply water to the change room for the open pit mine east of the mill site. The mine operator, Cotter Corporation, could not locate this well and it is presumed abandoned. Well 32483 is the reclaimed Nill Mine (a.k.a., Dalton Well). Groundwater flowed into this mine, which is located in the Salt Wash member of the Morrison formation, from overlying formations. Water was pumped from the mine via pipeline for livestock use; however, the mine was sealed during reclamation and the pipeline was abandoned; and
- Incorrectly Located Wells (Wells 21384, 29990, 29991 and 115739): The coordinates for these four wells place them on BLM managed land; however, the BLM has no record of them. Wells 29990 and 29991 were filed by the Department of Energy (DOE). The DOE indicated that they were probably monitoring wells installed in Section 35 near the Durita Site, which is located in T46N R16W rather than T46N R17W, which is what was listed for the wells in the DWR database. Similar types of errors may have occurred for the other two wells.

Springs

The three springs identified within the study area are shown in Table A-2 and Figure A-1: Stone Spring, Merrill Spring, and Oublier Spring. Field investigations were conducted in June 2009 to determine if these springs are flowing or dry and if the springs originate from the Chinle formation. Based on information obtained from a site visit by EFRC personnel in June 2009, Merrill Spring and Stone Spring, located approximately 5 miles northwest of the Site, originate from the Chinle formation. However, Merrill Spring was not flowing at the time of the site visit in June, which is typically a season in which springs and seeps exhibit higher flows. Stone Spring provides water to two households on the Boren property through a polyvinyl chloride (PVC) pipe. Flow data collected in the field resulted in an estimated sustainable flow rate from Stone Spring of 10 gallons per minute.

The Oublier Spring, located approximately 4 miles southeast of the Site, was determined to flow from near the base of the Salt Wash Member of the Morrison formation, which is stratigraphically higher than the Chinle formation.

**TABLE A-1
OFF-SITE WATER WELLS**

Permit #	Owner (of record)	Well Depth (ft)	Well Yield (gpm)	Depth to Water (ft)	Aquifer ⁽¹⁾	Status	Permitted Use
258704	Bureau of Land Management	280	15	168	Chinle/Moenkopi	Operational	Stock
269575	Fehlmann Lin D. & Davis, Robert M.	302	8	158	Chinle/Moenkopi	Operational	Domestic & Stock
226684	Hurdle, Sylvia S.	320	14	134	Chinle/Moenkopi	Operational	Domestic
253522	Boren, Verl	100	20	28 ⁽²⁾	Chinle/Moenkopi	Operational	Domestic
234136	Herron, William & Katherine Gray	255	10	157	Chinle/Moenkopi	Operational	Domestic
91065	Russell, John D.	143	10	103	Chinle/Moenkopi	Dry in 2003 ⁽⁸⁾ No Longer in Use	Domestic & Stock
86582	Blackburn Ranches	160 ⁽³⁾	15	Varies	Chinle/Moenkopi	Intermittent Use Only ⁽³⁾	Stock
86583	Blackburn Ranchettes	160 ⁽³⁾	--	Dry ⁽³⁾	Chinle/Moenkopi	Dry ⁽³⁾	Stock
257495	Cooper, Dan Clayton	--	--	--	Chinle/Moenkopi	Not Installed	Domestic
190027	Bishop, Robert	--	--	--	Chinle/Moenkopi	Not Installed ⁽⁴⁾	Domestic
279209	McGuire, William L.	--	--	--	Chinle/Moenkopi	Drilled, but not completed as a well ⁽⁴⁾	Domestic & Stock
102922	San Miguel Ranches	--	--	--	Alluvium	Damaged ⁽⁵⁾	Stock
102923	San Miguel Ranches	--	--	--	Alluvium	Not Located/ Not Installed ⁽⁶⁾	Stock
36544	Huston, Eugene E.	213	--	--	Alluvium	Damaged ⁽⁷⁾	Domestic/ Industrial ⁽⁷⁾
91066	Russell, J.D.	--	--	--	Alluvium	Windmill Broken, Not in Use ⁽⁸⁾	Domestic & Stock
138759	Herron, W.E.	--	--	--	Alluvium	Dry/ Abandoned ⁽⁸⁾	Domestic
190026	Bishop, Robert	--	--	--	Alluvium	Not Installed ⁽⁴⁾	Domestic
190028	Urbanek, John C. & Anne M.	--	--	--	Alluvium	Probably Not Installed ⁽⁴⁾	Domestic
218930	Cooper, Dan & Mike DeJohn	--	15	--	Alluvium	Not Installed	Stock
226716	Herron, Willam E. & Katherine Gray	--	--	--	Alluvium	Dry/ Abandoned ⁽⁸⁾	Domestic
Unknown ⁽⁹⁾ (Prospector Well)	Bureau of Land Management	--	--	--	Alluvium	Unknown	Unknown ⁽⁹⁾
26278	U.S. Dept. Interior	77	90	12	Dolores River Alluvium	Operational	Other (Extraction Well)

**TABLE A-1
OFF-SITE WATER WELLS**

Permit #	Owner (of record)	Well Depth (ft)	Well Yield (gpm)	Depth to Water (ft)	Aquifer ⁽¹⁾	Status	Permitted Use
26279	U.S. Dept. Interior	67	100	9	Dolores River Alluvium	Operational	Other (Extraction Well)
26281	U.S. Dept. Interior	71	97	8	Dolores River Alluvium	Operational	Other (Extraction Well)
23654	U.S. Dept. Interior	106	133	7	Dolores River Alluvium	Operational	Other (Extraction Well)
23655	U.S. Dept. Interior	75	70	10	Dolores River Alluvium	Operational	Other (Extraction Well)
23656	U.S. Dept. Interior	56	65	8	Dolores River Alluvium	Operational	Other (Extraction Well)
23658	U.S. Dept. Interior	78	5	8	Dolores River Alluvium	Operational	Other (Extraction Well)
23659	U.S. Dept. Interior	80	27.5	8	Dolores River Alluvium	Operational	Other (Extraction Well)
23660	U.S. Dept. Interior	54	45	7	Dolores River Alluvium	Operational	Other (Extraction Well)
26280	U.S. Dept. Interior	65	65	13	Dolores River Alluvium	Operational	Other (Extraction Well)
234100	Grimes, William J.	43	4	35	Dolores River Alluvium	Unknown	Domestic
268908	Chadman, Peter A.	--	--	--	Dolores River Alluvium	Not Located/ Not Installed	Domestic & Stock
23662	U.S. Dept. Interior	72	14	7	Dolores River Alluvium	Abandoned	Other (Extraction Well)
23663	U.S. Dept. Interior	62	41	7	Dolores River Alluvium	Abandoned	Other (Extraction Well)
23667	U.S. Dept. Interior	94	5	8	Dolores River Alluvium	Abandoned	Other (Extraction Well)
1997009	VETCO Minerals Corp.	--	--	--	Dolores River Alluvium	Abandoned	Other (Extraction Well)
29990	U.S. Dept. Energy	--	--	--	Other Aquifer	Not Located ⁽¹⁰⁾	Monitoring Well
29991	U.S. Dept. Energy	--	--	--	Other Aquifer	Not Located ⁽¹⁰⁾	Monitoring Well
48086	NUVEMCO LLC c/o Linda Carter	--	--	--	Other Aquifer	Dry ⁽¹¹⁾	Monitoring Well
48088	NUVEMCO LLC c/o Linda Carter	340	--	290	Other Aquifer	Dry ⁽¹¹⁾	Monitoring Well
21384	Porter, Cherie	--	--	--	Other Aquifer	On BLM Land/ Not Located	Monitoring Well
115739	Atchinson, Gordon A.	--	--	--	Other Aquifer	On BLM Land/ Not Located	Domestic
8547	Kelley Ton	312	--	--	Other Aquifer	Abandoned	Monitoring Well

**TABLE A-1
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Permit #	Owner (of record)	Well Depth (ft)	Well Yield (gpm)	Depth to Water (ft)	Aquifer ⁽¹⁾	Status	Permitted Use
25277	Brown/Root Inc.	--	--	--	Other Aquifer	Abandoned	Industrial
32483	Groom, Rudy M.Ch.	106	--	--	Other Aquifer	Abandoned	Irrigation

NOTES:

- (1) Aquifer assumed based on well location and depth
- (2) Depth to water provided from personal communication between Verl Boren and Jess Fulbright of Energy Fuels Resources Corporation (EFRC), during a site visit on 6/17/09. Depth to water from state permit database is 40 ft.
- (3) Information provided from personal communication between Dan Cooper and Dick White of EFRC, October 1, 2008.
- (4) Information provided from personal communication between the Borens and Jess Fulbright of EFRC, June 25, 2009.
- (5) Well inspected by Brent Kramer of EFRC on 6/4/09. Well casing contained a plug at a depth of 42 feet and a water level could not be obtained.
- (6) Brent Kramer of EFRC attempted to locate this well on 6/2/09 based on the distance from section lines provided in the DWR Well Permit Database. The well was not located and may have been abandoned or never installed.
- (7) Well inspected by Roman Popielak of Golder Associates on 5/14/08. The well was not functioning and the casing had collapsed. The owner has died, but reportedly planned to develop the well for domestic or industrial (sand and gravel) use.
- (8) Information provided from personal communication between Bill Herron and Jess Fulbright of EFRC, June 24, 2009.
- (9) Information provided from personal communication between Dennis Murphy with the Bureau of Land Management (BLM) and Frank Filas of EFRC, June 25, 2009. Well is referred to by the BLM as "Prospector Well" and was sampled in 1980; conductivity of 3.3 mS/cm.
- (10) According to Ed Cotter of the U.S. Dept. of Energy, these wells are likely mis-identified in the DWR database and should be in T46N, R16W, which is outside the study area (personal communication, Dick White of EFRC, June 24, 2009).
- (11) Information provided from personal communication between Tom Cavanaugh of O&G Environmental Consulting and Frank Filas of EFRC, June 23, 2009.
- (12) Except where noted, well information provided from the Colorado Division of Water Resources (DWR), Well Permit Database, accessed June 18, 2009.

**TABLE A-2
SPRINGS IN THE VICINITY OF THE SITE**

Name	Use of Water	Flow Rate* (gpm)	Water Source (Formation)	Distance from Site Boundary (miles)
Stone Spring	2 Households on Boren Property	10	Chinle	4.8
Merrill Spring	None	Dry	Chinle	4.7
Oublier Spring	None	Not Measured	Morrison	4.0

*measured June 17, 2009

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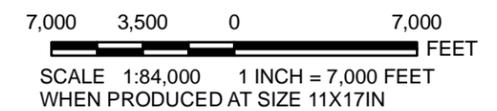
- LEGEND**
- Spring (Chinle Formation)
 - Spring (Morrison Formation)
 - Alluvial Well
 - Chinle/Moenkopi Well
 - Dolores River Alluvial Well
 - Well Completed in Other Aquifers
 - Piñon Ridge Site Boundary
 - Surface Drainage Area/Study Area
 - Township Range
 - Section

NOTES

*Other off-site wells include abandoned wells, inoperable wells, wells that were permitted but not installed, and wells completed in formations other than the Chinle and Moenkopi.

REFERENCES

Off-site Well Location: Colorado Division of Water Resources, Well Permit Database, accessed June 19, 2009.
 Stone Spring: Coordinates provided by Dennis M. Murphy, Hydrologist with the Bureau of Land Management on 6/15/2009.
 Oublier Spring and Merrill Spring: Locations plotted based on Wolcott LLC Energy Fuels: Paradox Valley Montrose County, Colorado Map.
 USGS. Various dates. Topo Quad (7.5') drawn from National Geographic TOPO! 4.0 [software] 2005:
 Projection: StatePlane, Colorado Central, NAD83, Feet.



PROJECT
**ENERGY FUELS RESOURCES CORPORATION
 PIÑON RIDGE
 MONTROSE COUNTY, COLORADO**

TITLE
OFF-SITE WELLS AND SPRINGS

	PROJECT No.	073-81694	FILE No.	11x17_OffSiteWells.mxd
	DESIGN	MCM	06/22/2009	SCALE AS SHOWN
	GIS	MCM	06/22/2009	REV 0
	CHECK	SED	06/23/2009	FIGURE A-1
REVIEW	RSP	07/01/2009		