STANDARD FORM 2015-1 (06/2015)

SUBMISSION OF WATER DEVELOPMENT PROJECTS

	FOR AGENCY USE ONLY
Through the development of scientific studies defining the aquifer within the Cedar Basin it has been documented that additional water resources will be necessary to sustain the growth and further development of the area. Without water the future economic development will be impacted by the availability and cost of existing water supplies to accommodate only the growth capable within our current water budget. This form is being circulated to document additional water supply sources that could be utilized to further alleviate the water deficit in the aquifer, as well as provide water for the future residents of the valley. This form will be evaluated for completeness of content. Please ensure that the proposed project is fully defined and information to substantiate the claim is submitted for a complete evaluation.	Application Number Date Filed

Name and address of applicant *(include zip code)*	Name, title, and address of authorized agent if different from item 1 *(include zip code)*	Telephone (area code) Applicant Authorized Agent
Gary F. Player 1671 W 546 S Cedar City, Utah 84720 gfplayer@kennylakeventures.us	H. Roice Nelson, Jr. 2155 W 700 S #31 Cedar City, Utah 84720 rnelson@walden3d.com	

A. Provide names, addresses, phone numbers and email addresses of those who filled out this form.

Gary F. Player
1671 W 546 S
Cedar City, Utah 84720
gfplayer@kennylakeventures.us

H. Roice Nelson, Jr.
2155 W 700 S, No. 31
Cedar City, Utah 84720
rnelson@walden3d.com

B. Project Description (Details are Vital)

1. Scope of Work and Project Description
2. Type of System or Facility
3. Quantity of Water Anticipated
4. Scientific Analysis of Water Resource
5. Uses (irrigation, culinary, industrial etc.)
6. Years Resource is Available
7. Constructability
8. Additional information to describe resource and availability (utilize additional sheets as necessary)

Quichapa Creek Well Re-Entry

B.1. This project is an opportunity to develop ground water from the fractured quartz monzonite bedrock aquifer within the western portion of the Cedar Valley basin as defined by the Utah Division of Water Rights (UDWR). The availability of large quantities of water would be proven initially with the deepening of one 702 feet deep, suspended water well near the convergence of the left and right-hand canyon branches of Quichapa Creek. That Cedar City well was drilled on SITLA lands. The well should be re-entered and deepened to approximately 1,200 feet below ground level, with projected sustainable productivity of up to 2,000 gallons per minute. Produced water could initially be pumped into an existing Cedar City culinary water pipeline now carrying waters from two Quichapa Creek springs. Produced water could also be injected into one or more existing Quichipa Lake wells, and allowed to percolate into the Cedar Valley alluvial basin. A recent well west of Ash Creek, south of New Harmony, has produced 4,000 gallons per minute (18 acre feet per day) from the fractured quartz monzonite aquifer.

B.2. This well would be one of an eventual larger set of wells utilized to reduce over drafting of the Cedar Valley Basin alluvial aquifer system. Water could be utilized for industrial, agricultural, and culinary purposes. The well location is near to existing power lines, pipelines, and roads so that only minimal new development would be necessary to test the concept.

B.3. A well capable of 2,000 gallons per minute would produce 4.456 cubic feet per second, or 8.836 acre-feet per day. Therefore, one well pumped for 365 days each year would provide more than 3,200 acre-feet. The ARCo well drilled in Iron Springs Gap disclosed about 4,000 feet of intrusive quartz monzonite, while at least 3,000 feet are revealed at the outcrops (surface exposures) in the Pine Valley Mountains. Recharge estimates for the fractured bedrock aquifers prepared by Player in 2010 range from 12,800 to 16,000 acre-feet per year, showing that continuous production of 12,000 acre-feet per year would not draw down the bedrock aquifer: THE AREA UNDERLAIN BY THE FRACTURED QUARTZ MONZONITE AQUIFER WEST OF CEDAR VALLEY IS APPROXIMATELY 200 SQUARE MILES. THE FOLLOWING ESTIMATE OF RECHARGE IS BASED ON 15 INCHES OF PRECIPITATION PER YEAR AND 10% INFILTRATION:

Precipitation = 1.25 feet per year
Infiltration at 10% = .125 feet per year
Area = 200*640 = 128,000 acres
Annual infiltration = .125*128, 000 = 16,000 acre-feet per year

Alternatively, recharge would not be less than 12,800 acre-feet with one foot (12 inches) of precipitation and 0.1 foot of infiltration per year.

B.4. The likelihood of a sustainable bedrock aquifer resource in the Harmony Hills west of Cedar Valley was shown by Player in geohydrologic reports prepared for the Cedar City Water Utility. Scientific studies included estimation of bedrock thickness, and review of published and unpublished chemical analyses of spring waters issuing from the bedrock aquifers. Summaries of those studies are attached to the cover letter accompanying this Submission. One water sample was obtained from the Quichapa Creek No. 1 well, drilled in 2012. Water from the quartz monzonite aquifer (encountered below 500 feet) was mixed with water from a thin sandstone layer in the Quichapa Volcanics at about 225 feet below ground level. Total dissolved solids (TDS) in the mixed sample were 205 mG/L (milligrams per liter of water). Water from the Quichapa Creek Left-hand Canyon spring was sampled on the same day. That water had a lower TDS of 165 mG/L. It is interesting to note that water from the test well was found to be significantly younger (approximately 510 years before present) than water issuing from the surface spring in Quichapa Left-hand Canyon (approximately 1,660 years before present). The age difference suggests that recharge water occurring in the fractured quartz monzonite aquifer is younger than water that is the source of the springs in the shallower but less permeable Quichapa Volcanic

rocks.

B.5. Water pumped into a pipeline along Quichapa Creek would be usable by for culinary water of irrigation in the western portion of Cedar Valley. Alternatively, the "new" water could be used to recharge the Cedar Valley aquifer system through drawn down Quichapa Lake wells.

B.6. The bedrock aquifer resource is sustainable due to annual infiltration from precipitation (see above). In the unlikely event of long term drought, the production of 3,200 acre-feet per year could be sustained for more than 3,600 years without any recharge into the fractured quartz monzonite bedrock aquifer system (at least 3,000 feet thick, with 3 percent fracture porosity) beneath the westernmost portion of the Cedar Valley Basin. That aquifer is estimated to contain more than 11,500,000 acre-feet of water in place.

B.7. This well could be deepened and completed by local drilling contractors. Power lines and a road are in place for easy access to the drill site.

B.8. Summaries of bedrock aquifer studies completed in 2010 are attached to the cover letter. More detailed reports can be provided when requested.

C. Attach a map covering the area of development and location of proposed project.

1. Identify Property Ownership
2. Identify Potential Conflicts
3. Provide Details of the Area and Necessary Changes to the Area

C. A map showing the location of the Quichapa Creek No. 1 well and the well log of deeper portion are attached.

C.1. The Quichapa Creek well was drilled on SITLA lands.

C.2. Agreements with nearby surface owners at Quichapa Creek is likely. Power lines and water lines already cross the Bumble Bee Road right of way.

C.3. Roads and pipelines are already constructed. The well head (casing) is in place.

D. Identify any Federal, State or Local Government Issues

1. Federal
   a. Army Corp of Engineers
   b. Bureau of Land Management
   c. Fish and Wildlife
   d. Forest Service
   e. Other

   Federal issues, such as wetlands, are minimal on state property. The entire proposed area is outside of designated Sage Grouse Habitat.

2. State
   a. Department of Environmental Quality
   b. Division of Water Rights
   c. Other

   State issues are few. Cedar Basin water rights will be transferred by the Utah Division of Water Rights into the Quichapa well prior to beginning full scale production. The sources of those water rights would be farmers, ranchers, Cedar City Municipal Water Utility, and Southern Utah University. It is at least possible that the well would discover "new water" that could be appropriated to the District. Permits to reenter the well must be obtained from the Utah Division of Water Rights.

3. Local
   a. County
   b. Municipal
   c. Other

   There are no local issues.

E. Provide cost estimates of project

Costs to reenter the well will be on the order of $150,000 to complete and equip with pumps and a short pipeline (less than 100 feet).

F. Describe additional evaluated alternatives, if any

Separate Submissions of Water Development Projects from Player and Nelson include the following: (2) Construction of a Cretaceous aquifer test well at the Sheepherders Cabin Road, about one mile west of Woods Ranch; and (3) Reentry of the ARCo Three Peaks No. 1 Exploratory Oil Well.

G. Describe any environmental effects the proposed project would have on wildlife and/or plant species

Injection of water into Quichapa Lake wells would aid in the recharge of Cedar Valley Basin aquifer(s)

H. Provide cultural resource evaluations of proposed area

No cultural or archeological resources are present at the site. The site was inspected and cleared prior to commencement of drilling in 2012. For your information, Player served as an environmental inspector during construction of the Kern River Pipeline, and supervised SUU archeologist Barbara Frank as she prepared clearances across a 100-mile segment of the line from Milford to eastern Nevada.

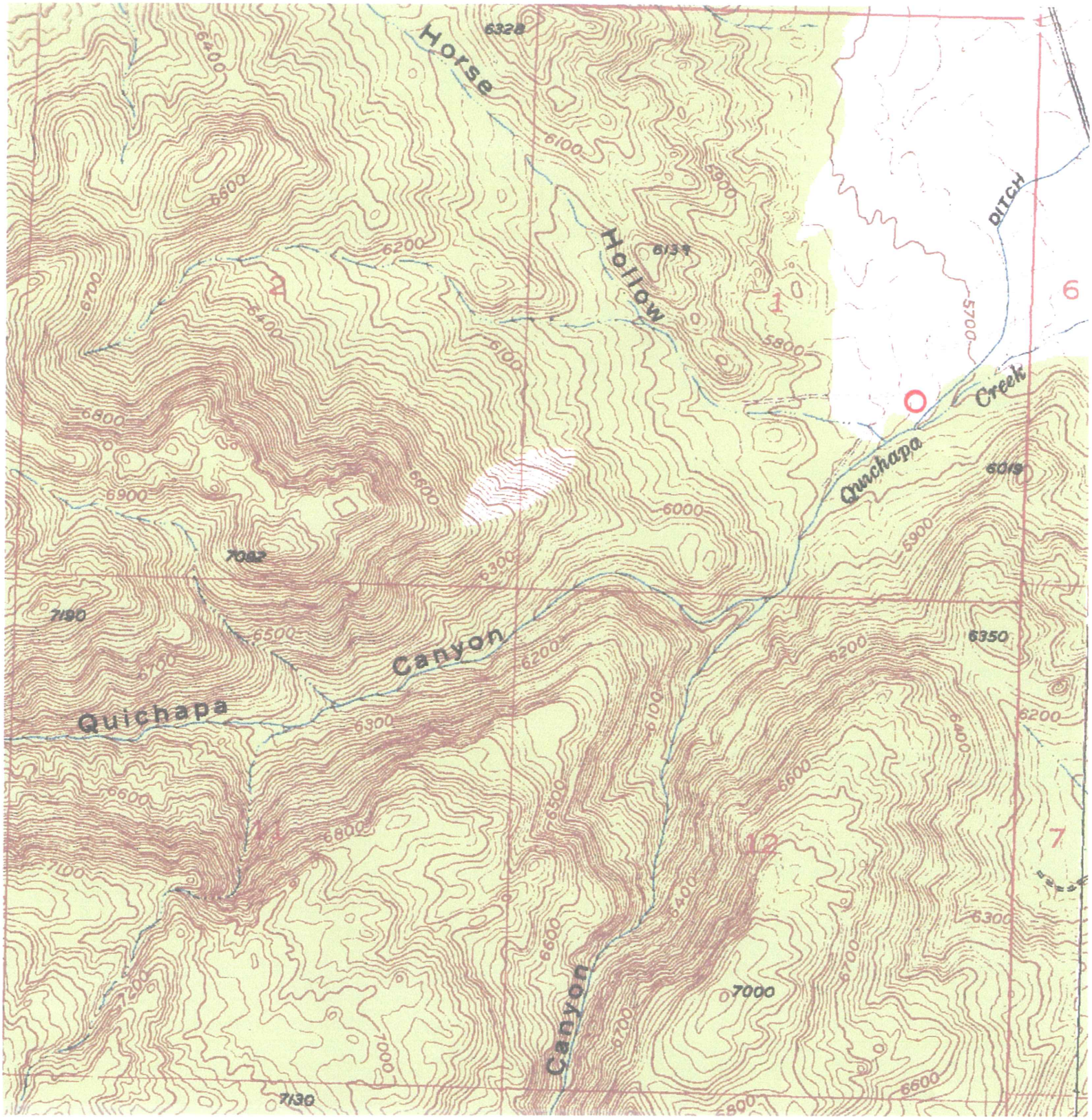
I. Provide any additional information deemed necessary in the evaluation of this project to provide future sustainable water resources to the Cedar Basin

Player reviewed the fractured quartz monzonite bedrock aquifer system for Cedar City in 2010. All of his work will be available for review with the permission of City Engineer's office. For example, additional data includes meteorological studies, summaries of geology, water analyses, aquifer rock properties (matrix porosity and fracture systems), old well records, etc. Summaries of the aquifer study are attached to the cover letter that accompanies this Submission.

Respectfully Submitted,

Gary Farnsworth Player
Utah Professional Geologist No. 5280804-2250
Idaho Professional Geologist No. 1050
Certified Petroleum Geologist No. 3097

H. Roice Nelson, Jr.
Texas Professional Geoscientist No. 5120
Louisiana Professional Geoscientist No. 879



LOCATION MAP:
PROPOSED CEDAR CITY QUICHAPA CREEK NO. 1 WELL RE-ENTRY, Iron County ○
Basemap from Stoddard Mountain USGS 1:24,000 Topographic Map

Submitted by H. Roice Nelson, Jr. and Gary F. Player

QUICHAPA CREEK TEST WELL NUMBER 1

LOGGED BY WATSON ENGINEERING FROM SURFACE TO 450 FEET.
LOGGED BY GARY F. PLAYER BELOW 450 FEET.

DATE	FROM	TO	THICK	RATE FT/HOUR	WATER GPM	LITHOLOGY
05/08/12	450	460	10	30	30 GPM	QUICHAPA VOLCANICS--REDDISH BROWN ASH FLOW TUFFS. WATER ENTRY FROM ABOVE ONLY.
	460	470	10	60	30 GPM	SAME
	470	475	5	40	30 GPM	SAME
	475	485	10	20	30 GPM	CUTTINGS SIZE INCREASING TO GRANULES AND FINE PEBBLE SIZE, FRACTURED
	485	490	5	20	30+ GPM	BASALT INTERBBEDED WITH ASH FLOW TUFF. DRILL BIT BOUNCING, WATER INCREASING SLIGHTLY
	490	495	5	20	30+ GPM	AS ABOVE
	495	500	5	20	30+ GPM	**DEEPLY WEATHERED QUARTZ MONZONITE, WHITE, CLAYEY, WITH TRACES OF RED-BROWN ANDESITE** LAST FOOT OF CUTTINGS ARE FULL OF WHITE CLAY, DRILLED SLOWLY BUT SMOOTHLY. WATER INCREASING. TOP GRANITE MAY BE WEATHERED EROSION SURFACE COVERED BY BASALT EXTRUSION AT BASE OF QUICHAPA GROU STOPPED TO REAM OUT HOLE TO 8" AND GET PERMISSION TO CONTINUE TO 700 FEET.
05/11/12	501	507	6	60	50+ GPM	CIRCULATED OUT FILL. COARSE FRACTURED MATERIALS--MIX OF VOLCANICS AND QUARTZ MONZONITE. WHITE CL
	507	512	5	60		GRANITIC QUARTZ MONZONITE CUTTINGS INCREASED TO 50%.
	512	517	5	48		GRANITIC CUTTINGS TO 75%
	517	522	5	25		GRANITIC CUTTINGS TO 80%. NO INDICATIONS OF ANY ROUNDING--ANGULAR CHUNKS
	522	527	5	37	60+	SLIGHT PINK TINGE TO QUARTZ MONZONITE. QUARTZ XTALS TO 4 MM. WATER INCREASING GRADUALLY
	527	532	5	37		PLAGIOCLASE PHENOCRYSTS TO 4 MM IN PINKISH GROUND MASS
	532	537	5	33		AS ABOVE
	537	542	5	33	75+	AS ABOVE, SLIGHTLY MORE FRACTURES; 20% DARK MINERALS IN PINKISH TO WHITE QM. BIOTITE AND PYROXENES
	542	547	5	30		QM FRESH AND HARD, A FEW WHITE, MOSTLY PINKISH GRAINS OF QM, AS AT PINE VALLEY MTNS.
	547	552	5	30	80+	AS ABOVE, FRACTURED AT 549. DRILLING AIR PRESSURE UP TO 130 PSI--STARTED TODAY AT 120 PSI.
	552	557	5	37		AS ABOVE
	557	562	5	30		FRACTURES 561-562
	562	567	5	60		FRACTURES 562-567+ IN QM
	567	572	5	30		FRACTURES CONTINUING IN QM. WATER INCREASING. MICROCRYSTALLINE WHITE QUARTZ LINES FRACTURES.
	572	577	5	30	90+	FRACTURES CONTINUING IN QM. WATER INCREASING. PINKISH QM MICROCRYSTALLINE WHITE QUARTZ LINES FRA
	577	582	5	35		FRACTURES CONTINUING IN QM. WATER INCREASING. MICROCRYSTALLINE WHITE QUARTZ LINES FRACTURES.
	582	702	120	10-60	120+GPM	QUARTZ MONZONITE, AS ABOVE, VARYING FROM LIGHT GRAY TO REDDISH BROWN (WHERE WEATHERED) TO PINK LOCALLY FRACTURED. WATER BEARING.

NOTE: WELL REMAINED IN FRACTURED QUARTZ MONZONITE TO 702 FEET BELOW GROUND. MEASURED AIR PRESURE INCREASED TO OVER 200 PSI WATER PRODUCTION RATE MEASURED (ESTIMATED WITH A 5 GALLON BUCKET DIPPED INTO STREAM) AT ABOUT 120 GALLONS PER MINUTE BELOW 650 F SCANNED FIELD NOTES INTO A .PDF FILE.