


**TIER-1 APPLICATION TO THE NEW MEXICO INTERSTATE STREAM COMMISSION
FOR NEW MEXICO UNIT OR WATER UTILIZATION ALTERNATIVE
UNDER THE ARIZONA WATER SETTLEMENTS ACT**

APPLICANT INFORMATION

DATE: April 21, 2011

<p>1. Legal Names: ¹Mark Person, ¹Fred Phillips, ¹Andrew Campbell, ²James Witcher, ³Carl Gable</p>	<p>2. Organization: ¹New Mexico Tech, Dept. Earth & Envir. Sci., Hydrology Program, ²James Witcher & Assoc., ³Los Alamos National Laboratory</p>										
<p>3. Address (street, city, county, state, and zip code):</p> <p>Dept. Earth & Environmental Sciences, MSEC 208 801 Leroy Place Socorro, NM 87801</p>	<p>4. Name, email, and phone number of contract person:</p> <p>Mark Person mperson@nmt.edu 575-835-6505 (office) 812-345-3973 (cell)</p>										
<p>5. TYPE OF APPLICATION (check one): <input type="checkbox"/> Final <input checked="" type="checkbox"/> Preliminary for review <input type="checkbox"/> Revised</p>	<p>6. TYPE OF APPLICANT (CHECK BOX):</p> <p><input type="checkbox"/> local governments or municipalities</p> <p><input type="checkbox"/> soil and water conservation districts, irrigation districts or commissions, acequias, or other political subdivision of the State of New Mexico</p> <p><input checked="" type="checkbox"/> institutions of higher education or a consortium of such institutions</p> <p><input type="checkbox"/> non-profit organizations or associations</p> <p><input checked="" type="checkbox"/> private individual/s</p> <p><input checked="" type="checkbox"/> federal agency (ies)</p> <p><input type="checkbox"/> Other (specify)</p>										
<p>7. BRIEF PROJECT DESCRIPTION: In phase I, we propose to determine the feasibility of installing a 10 MW geothermal power plant and geothermal greenhouses along the San Francisco River. We will conduct fieldwork, shallow drilling (1000 feet), aquifer test analysis, and hydrothermal modeling. During Phase II we would team with ORMAT to install the power plant.</p>											
<p>8. AREAS AFFECTED (describe by county, municipality, township, etc. as applicable): Our focus would be on the Lower Frisco Hot Springs in Catron County near the City of Glenwood and the Gila Hot springs in Grant County about 16 miles north of the City of Grant.</p>											
<p>9. TOTAL FUNDING REQUESTED (in \$1,000):</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">2012: \$460</td> <td style="width: 20%;">2013: \$650</td> <td style="width: 20%;">2012:</td> <td style="width: 20%;">2013:</td> <td style="width: 20%;">2013:</td> </tr> <tr> <td>2012:</td> <td>2013:</td> <td>2012:</td> <td>2013:</td> <td>2012:</td> </tr> </table>		2012: \$460	2013: \$650	2012:	2013:	2013:	2012:	2013:	2012:	2013:	2012:
2012: \$460	2013: \$650	2012:	2013:	2013:							
2012:	2013:	2012:	2013:	2012:							
<p>10a. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED REQUIREMENTS AND ASSURANCES IF THE PROPOSAL IS ACCEPTED.</p>											
<p>10b. TYPED OR PRINTED NAME OF AUTHORIZED REPRESENTATIVE: Mark Person</p>	<p>11. TITLE: Professor</p>										
<p>12. PHONE NUMBER: 575-835-6506</p>											
<p>13. SIGNATURE: </p>	<p>DATE: April 27, 2011</p>										

14. Evaluation criteria.

A. State whether the proposal is for the “New Mexico Unit,” a “water utilization alternative,” or both.

Water utilization by our geothermal power plant is proposed for the “New Mexico Water Unit”. Depending on the year, the excess stream flows to Arizona are about 5000 ac-ft/yr. A 10 MWe geothermal power plant consumes between about 1000-6800 acre-feet per year. The exact usage depends on the type of power plant (binary, flash, EGS).

B. Describe how the proposal will meet a “water supply demand” in the Southwest New Mexico Water Planning Region, comprised of Catron, Grant, Hidalgo and Luna Counties.

Geothermal power plants use water during construction and operation. Water is typically used for cooling purposes and is lost to evaporation. Not all fluids evaporate and the “blowdown” from the evaporative coolers must be reinjected into a deep saline formation. Because the hot springs along the San Fransico River have moderate salinity, a geothermal power plant may reduce the salt load of the river. Surface water can also be reinjected into the subsurface to maintain water pressure. A reverse osmosis water treatment system could also be constructed as part of this project to minimize the volume of reinjected fluids. This would be powered by geothermal power generation.

C. Describe how the proposal considers the Gila environment and describe how any negative impacts might be mitigated.

Geothermal energy production would help New Mexico be more energy independent. Currently, New Mexico is expected to derive 20 percent of its power generation from renewables by 2020. A geothermal power plant in either Catron or Grant counties would provide jobs and badly needed tax revenues. According to the non-profit Geo-Energy a 10 MW of geothermal power could provide 42 full time jobs and \$150 million economic output over a 30 year period. Geothermal power generation provides about a quarter of the county tax base in the rural town of Imperial County, California, producing over \$12 million in tax revenue. CalEnergy, the largest geothermal company in the California, is the single largest taxpayer in Imperial County, California. Six western states including California, Idaho, Nevada, New Mexico, Oregon, and Utah have received \$27 million for FY 2007 and FY 2008 and 31 counties in those states received an additional \$4.3 million in 2007 and \$9.1 million in 2008. Greenhouses could also be developed next to the power plant to use the spent geothermal fluids for agricultural production. According to Witcher (2002) geothermal greenhouses provide more than \$4 million, and gross receipts exceeding \$12 million in New Mexico. Greenhouse sales are among the top 10 agriculture sectors in the state. For example, the Burgett Geothermal Greenhouse near Cotton City in Southwestern NM has been the largest employer and business in Hidalgo County.

Geothermal power plants consume significant amounts of water and spent geothermal fluids are often brackish and must be reinjected. Geothermal power generation has significant capitalization costs. According to ORMAT, several test wells would need to be drilled prior to installation of a power plant in order to justify their investment.

D. Describe how the proposal considers the historic uses of and future demands for water in the Southwest New Mexico Water Planning Region and the traditions, cultures and customs affecting those uses.

There is a small tourism industry associated with the hot springs along the San Francisco River. A geothermal power plant would likely have a negative impact on hot spring activities in the immediate vicinity (4 km²) of its location. We intend to construct a three-dimensional hydrothermal model of the area to determine the effects of geothermal power production and reinjection on stream flow and hot spring discharges. The proposed drilling of a geothermal test well (12" diameter) and aquifer testing would also be important for determining the impacts of geothermal power production on salt loading and stream flow in the San Francisco.