

**STATE OF NEW MEXICO
WATER QUALITY CONTROL COMMISSION**



**IN THE MATTER OF THE PETITION
FOR ALTERNATE ABATEMENT STANDARDS
FOR THE FORMER ST. ANTHONY MINE,
CIBOLA COUNTY, NEW MEXICO**

WQCC 16-05 (A)

UNITED NUCLEAR CORPORATION,

Petitioner.

STATEMENT OF INTENT TO PRESENT TECHNICAL EVIDENCE

Multicultural Alliance for a Safe Environment provides statement of intent to present technical evidence in the Matter of the Petition for Alternate Abatement Standards (“AAS Petition”) for the former St. Anthony mine, Cibola County, New Mexico (WQCC 16-05). As provided in the “Scheduling Order Pursuant to 20.1.3.17(B) and 20.1.3.16(B)(2) NMAC”, this statement of intent to present technical evidence is filed with Commission Administrator pursuant to 20.1.3.17(E).

Pursuant to 20.1.3.17(E) this Notice of Intent includes:

- (a) the name of the person filing the statement;
Multicultural Alliance for a Safe Environment (MASE) – Susan Gordon,
Coordinator
- (b) indication of whether the person filing the statement supports or opposes the
petition at issue;
Oppose in part, support in part
- (c) the name of each witness;
William Paul Robinson
- (d) an estimate of the length of the direct testimony of each witness;
1-1/2 hours
- (e) a list of exhibits, if any, to be offered into evidence at the hearing;

**Exhibit A – STATEMENT OF TECHNICAL EVIDENCE OF WILLIAM
PAUL ROBINSON**

and

Exhibit B – RESUME OF WILLIAM PAUL ROBINSON

Electronic files of these two exhibits have been provide to the Commission Administrator

(f) a summary or outline of the anticipated direct testimony of each witness.

Questions and concerns related to the Proposed Alternate Abatement Standards (AAS) proposed by United Nuclear Corporation (UNC) for the St. Anthony Mine relate to:

- 1) how adoption of AAS will affect the long-term quality and effectiveness of the pit and waste rock reclamation plans for the site required by New Mexico law and
- 2) the accuracy of parameters used in the models supporting the AAS and whether the AAS are appropriate or necessary if revisions to address those concerns may show that the water at the St. Anthony mine may be so reduced in volume that it would not reach a point of potential future use and therefore the AAS is not necessary or appropriate.

Specific concerns regarding the parameters in the AAS Petition models include:

- a) Likely overestimation of run-on from catchment area to pit water volume;
- b) Overestimation of future area and volume of Large Pit lake;
- c) Failure to include “kinetic, sorption or other physical and chemical mechanisms” in the groundwater model or in the conceptual design for the pit backfill.;
- d) Uranium attachment to tamarisk roots, and other biological and microbiological constraints on contaminant migration are not considered.
- e) establishment of proposed AAS uranium standard based on assumptions and calculations about uranium mineral not found at the St. Anthony mine.

Revision of AAS Petition models to reflect:

- 1) low or negligible estimated run-on contribution to pit lake volume after installation of a “water balance” type cover designed to prevent such contribution and
- 2) evaporation of all surface water in the pit as projected by 2004-2014 pit lake water elevation trends,

may eliminate the need for or appropriateness of the proposed AAS.

This STATEMENT OF INTENT TO PRESENT TECHNICAL EVIDENCE and EXHIBITS A and B have been provide to the New Mexico Water Quality Control Commission Administrator, Pam Castaneda in electronic format at pam.castaneda@state.nm.us.

CERTIFICATE OF SERVICE

I hereby certify that Electronic Copies of The STATEMENT and EXHIBITS A and B have also been provide to:

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EXHIBIT A

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**STATEMENT OF TECHNICAL EVIDENCE OF
WILLIAM PAUL ROBINSON**

**Questions and Concerns Related to the Proposed Alternate Abatement
Standards (AAS) proposed by United Nuclear Corporation (UNC) for the St.
Anthony Mine**

prepared and submitted on behalf of
Multicultural Alliance for a Safe Environment (MASE)
by
William Paul Robinson
Research Director,
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P.O. Box 4524
Albuquerque, NM 87106

Summary

Questions and concerns related to the Proposed Alternate Abatement Standards (AAS) proposed by United Nuclear Corporation (UNC) for the St. Anthony Mine relate to:

- 1) how adoption of AAS will affect the long-term quality and effectiveness of the pit and waste rock reclamation plans for the site required by New Mexico law and
- 2) the accuracy of parameters used in the models supporting the AAS and whether the AAS are appropriate or necessary if revisions to address those concerns may show that the water at the St. Anthony mine may be so reduced in volume that it would not reach a point of potential future use and therefore the AAS is not necessary or appropriate.

Specific concerns regarding the parameters in the AAS Petition models include:

- a) Likely overestimation of run-on from catchment area to pit water volume;

EXHIBIT A

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Summary

Questions and concerns related to the Proposed Alternate Abatement Standards (AAS) proposed by United Nuclear Corporation (UNC) for the St. Anthony Mine relate to:

- 1) how adoption of AAS will affect the long-term quality and effectiveness of the pit and waste rock reclamation plans for the site required by New Mexico law and
- 2) the accuracy of parameters used in the models supporting the AAS and whether the AAS are appropriate or necessary if revisions to address those concerns may show that the water at the St. Anthony mine may be so reduced in volume that it would not reach a point of potential future use and therefore the AAS is not necessary or appropriate.

Specific concerns regarding the parameters in the AAS Petition models include:

- a) Likely overestimation of run-on from catchment area to pit water volume;

- b) Overestimation of future area and volume of Large Pit lake;
- c) Failure to include “kinetic, sorption or other physical and chemical mechanisms” in the groundwater model or in the conceptual design for the pit backfill.;
- d) Uranium attachment to tamarisk roots, and other biological and microbiological constraints on contaminant migration are not considered.
- e) establishment of proposed AAS uranium standard based on assumptions and calculations about uranium mineral not found at the St. Anthony mine.

Revision of AAS Petition models to reflect:

- 1) low or negligible estimated run-on contribution to pit lake volume after installation of a “water balance” type cover designed to prevent such contribution and
- 2) evaporation of all surface water in the pit as projected by 2004-2014 pit lake water elevation trends,

may eliminate the need for or appropriateness of the proposed AAS.

What is Proposed?

United Nuclear Corporation (UNC) has petitioned the New Mexico Water Quality Control Commission (WQCC) to approve Alternate Abatement Standards (AAS) for key contaminants in groundwater at the St. Anthony mine site on the Cebolleta Land Grant . UNC seeks adoption of the AAS prior to preparation, submittal, review and approval of a mine closure plan that that is proposed to include “partial backfill and geochemical stabilization of pit water and sediments,” a closure concept reported, in the AAS Petition, to have been agreed to by a multi-stakeholder Multiple Accounts Analysis (MAA) process conducted by UNC. See Figure 1 Below.

The proposed AAS, shown below, would vastly exceed existing WQCC standards.

Table 1. Proposed Alternative Abatement Standards

COPC	Proposed AAS
Uranium	12.4 mg/L
²²⁶Ra + ²²⁸Ra	2913 pCi/L
Fluoride	10.7 mg/L
Sulfate	77,000 mg/L
Total Dissolved Solids	113,000 mg/L
Boron	5.05 mg/L
Chloride	908 mg/L

Notes:

mg/L = milligrams per liter

pCi/L = picoCuries per liter

The AAS petition, a 1964-page document available on the WQQ webpage at <https://www.env.nm.gov/water-quality-control-commission/5087/> addresses the three regulatory criteria for AAS, which must be demonstrated before AAS can be approved. The three criteria required demonstration that, in summary,:

- 1) compliance with existing standards is not achievable,
- 2) proposed standards are achievable and cost benefit justified; and
- 3) proposed standards will not cause a present or future risk to public health or undue damage to property.

UNC asserts that groundwater releases from the St. Anthony mine, where groundwater occurs in the Jackpile Sandstone and surface water occurs as a pit lake in the Large Pit, are controlled by evaporation - 'lost' to evaporation - and no groundwater moves from the pits. They assert that if the pit is covered, the surface water in the Large Pit lake would no longer evaporate and would flow downgradient in the Jackpile Sandstone to water a point of potential discharge to surface water in Meyer Draw, east of the Large Pit within the mine lease area. See Figures 5 and 6 below.

The UNC AAS Petition says,

"Backfilling of open mine pits is the presumptive regulatory approach as put forth in 19.10.5.507B NMAC and the preferred abatement option for the St Anthony Mine. However, to accomplish backfilling there would be an accompanying loss of the evaporative containment of nearby groundwater. As groundwater gradients return to premining conditions, groundwater migrating away from the Site will come into contact with secondary mineralization in the pit walls, evapo-concentrated water in the area of the former Large Pit, and the mineralized ore body. All of these Site features will act to increase levels of constituents of potential concern (COPCs) downgradient of the Site. The proposed AASs are the geochemically-modeled maximum concentrations that could be observed

downgradient of the Site and are, therefore, achievable.

“The groundwater flow model determines the future migration of groundwater and solutes away from the Site. [See Figures 6 and 7 of this memo below] The results of the model demonstrate that the very small rate of groundwater discharge to the Meyer Draw is consumed through tamarisk transpiration and evaporation at the seepage face. As detailed in the Stage 2 Abatement Plan (Exhibit 3; INTERA, 2015), the process of evaporation at the seepage face alone effectively eliminates the potential for seepage into Meyer Draw. Flow modeling also has shown that it would potentially take hundreds of years after pit backfilling of the Large Pit for any groundwater to reach Meyer Draw.” AAS Petition at 13/1964.

Overview of Questions and Concerns developed upon Review of the AAS Petition

1) Relationship between AAS process and design and approval of reclamation plans – Following review of the AAS Petition, it remains unclear how NMED and MMD will work with the responsible party and others to assure that reclamation of the pit and waste rock at St. Anthony will include a closure plan using “pit backfill with geochemical stabilization” and waste rock reclamation that uses the best available methods for control of contaminants provide for under New Mexico law.

This concern arises as the AAS Petition does not demonstrate how the relevant state agencies insure that UNC will use the best available control technologies in the development of the St. Anthony mine closure and closeout plans, in the event if the AAS based on the highest potential levels of contaminants theoretically possible are adopted. The AAS Petition asserts that UNC’s closure and closure plans will include “pit backfill with geochemical stabilization of pit water and sediments” and consolidation and capping of waste rock however those concepts are not supported by design details or plans.

2) Adequacy and accuracy of data in AAS Petition – Four questions have been identified relating the models used to project the quality and quantity of water that migrate from the St. Anthony mine site. These questions include:

- a) the likely overestimation of run-on from precipitation from the St. Anthony mine catchment area to pit water volume;
- b) overestimation of future surface area and volume of Large Pit lake;
- c) failure to include “kinetic, sorption or other physical and chemical mechanisms in the groundwater model or in the conceptual design for the pit backfill; and
- e) establishment of proposed the AAS uranium standard based on assumptions and calculations about uranium mineral not found at the St. Anthony mine.

If the reevaluations of the AAS recommended to address the concerns related to over estimation of the contribution of catchment run-on to the St. Anthony pit water balance and the Large Pit lake area trend decreasing towards zero are conducted and show that no water from the pit is likely to reach a point of potential use in the foreseeable future then the basis for the AAS Petition may no longer exist.

In that case, pit and waste rock reclamation could proceed with the firm knowledge that:

- 1) all the surface water identified in the Large Pit would have evaporated and
- 2) future precipitation would all evaporate from the “water-balance-type” covers likely to be installed, transpire from plants on the reclaimed surfaces, or be contained by the large pore space and/or reactive material placed at the bottom of the pit at the base of the backfill material.

If the Large Pit lake evaporates completely, and future water will evaporate or evapotranspire before it reaches the buried Jackpile Sandstone, then no AAS may be appropriate or necessary.

Detailed Discussion of Questions and Concerns

- 1) Can the best available pit backfill and waste rock reclamation be achieved if the AAS are adopted before a complete application for closure or closeout reclamation plans are proposed to NMED and MMD?

The UNC AAS Petition does not provide a complete mine reclamation plan involving the proposed conceptual plan of backfill with geochemical stabilization of pit water and sediments sufficient to meet applicable MMD or NMED requirements. The Petition asserts that the AAS changes are needed prior to the development and submittal of the pit backfill with geochemical stabilization plan.

It is unclear what geochemical and physical technologies will be used in the pit backfill with geochemical stabilization if the AAS are adopted. Though the AAS petition includes research on a variety of geochemical treatments, only one of the phosphate treatments achieved uranium reduction during the test period. (“sodium tripolyphosphate,” 112/1964) No information is provided as to how the geochemical stabilization tests identified in the AAS Petition, or other methods, will be incorporated into the “geochemical stabilization” portions of the pit backfill process.

No information is presented regarding useful groundwater contamination control technologies in the design and construction of the pit backfill that rely on the properties of the rock used to cover the pit bottom. These include use of large pore space material as a pit bottom cover to limit or eliminate potential groundwater movement through pore spaces and reactive rock layers within the backfill layers in contact with the pit bottom.

Adoption of the weakened AAS before a pit backfill and geochemical stabilization plans is proposed may allow for acceptance of a backfill remedy that provides less effective containment of the ground and surface water in the pit for the foreseeable future than would be the case if the AAS are not adopted.

Insuring that pit closure, and associated waste rock reclamation, achieve the best available control of contaminants in perpetuity may be limited if the standards for performance weakened significantly, as is proposed by UNC.

- 2) The AAS proposed by UNC are set at the highest possible values based on the geochemical modeling conducted to support the petition. Concerns regarding the model include:
 - a) Likely overestimation of run-on from catchment area to pit water volume;
 - b) Overestimation of future area and volume of Large Pit lake;
 - c) Failure to include “kinetic, sorption or other physical and chemical mechanisms in the groundwater model or in the conceptual design for the pit backfill.
 - d) Uranium attachment to tamarisk roots, and other biological and microbiological constraints on contaminant migration are not considered.
 - e) AAS uranium standard based on assumptions and calculations about uranium mineral not found at the St. Anthony mine.

2a) Overestimation of Run-on from Catchment area - The AAS petition supporting documents may over estimate the amount of precipitation in the Large Pit catchment area, resulting in overestimation of the water entering the pit lake. See Figure 7 Below.

The AAS Petition says,

“Both the Large Pit and the Small Pit have been observed to capture and store run-off. Although run-off into the two pits is estimated to be a small percentage of precipitation, the catchment areas for the two pits are large enough to collect significant amounts of water. **Using a water balance calculation, Dames and Moore (1985) estimated that only 1% of precipitation would produce run-off to the Jackpile Mine pit. INTERA (2006) estimated that 15% of precipitation that falls within the pit watershed would reach the pit as run-off based on a runoff coefficient for a pasture with sandy and gravelly soils.**

Ponded water has been observed to remain for months within the Small Pit, where it can infiltrate into the exposed Jackpile sandstone or is lost to evapotranspiration.

“In summary, precipitation at the Site is far exceeded by the combination of transpiration during the growing season and evaporation throughout the year. Infiltration of precipitation into the subsurface is negligible across the Site except at a limited number of locations such as the Small Pit. Tamarisk transpiration is estimated to remove groundwater from the Jackpile sandstone at a rate of roughly 14 gpm along a reach of Meyer Draw.” (Petition at 139/1964)

The geochemical model may significantly overestimate the precipitation-derived water – “run-on” from the pit watershed reaching the pit and contributing to the volume of “groundwater to be contained.” (See Figure 7 below which is Table 5-12 at AAS Petition 142 and 143/1964) INTERA assumes 15% of precipitation based estimate from an analog considerations reaches pit rather than 1% of precipitation producing runoff from Jackpile data. The assumption by INTERA results in run-on into pit from catchment area being the largest source of inflow in the Water Balance for the Large Pit, (Figure 7).

Assumption of a lower, more appropriate, run-on rate – such as 1% - would significantly reduce or eliminate the largest contributor to the Large Pit water balance. the volume of surface and groundwater at the pit pond therefore reduce the area affected by migration after backfill to Meyer Draw. Assumption that 15% of precipitation run-on reaches the Large Pit lake after closure assumes that no water balance cover is installed, and that is not a reasonable assumption. The geochemical model should be revised to reflect a more appropriate estimate of run-on from the catchment area.

If 1% of precipitation results in run-on into the pit from the catchment area, rather than 15% as modeled, there may be no needed for AAS as there would be no water migration from the pit after backfill is completed.

2b) Overestimation of pit water volume and area

Overestimation of the volume of the volume of water in the pit lake at the Sta. Anthony mine is likely to result in overestimation of the extent of migration of those waters after pit backfill. Comparison of modeling parameters for the Large Pit lake and aerial imagery in the AAS Petition shows extensive shrinking of the lake during the past decade. See Figures 2, 3 and 4 below.

Modeling parameters for the Large Pit lake identified in the Stage 1 Abatement Plan portion of the AAS Petition include the area of the Large Pit lake as 488,827 sq. feet (Table 3-2, p. 670/1964), and average pit lake depth of 5 feet and pit lake volume of 2,444,135 cubic feet, based analyses of 2006 aerial imagery (Table 3-4, 672/1964).

In the Stage 2 Abatement Plan portion of the AAS Petition at p. 143/1964, the modeling parameters for the Large Pit lake have shrunk significantly to an area of 174,000 sq. feet and a volume of 875,000 cubic feet, for 2012 (Table 5-3, 142-3/1964). See Figure 4 below (which is Table 5.5, AAS Petition 221/1964).)

The Large Pit lake area has shrunk to 35% of its size between 2006 and 2012, with the volume of the pit lake falling to 35% of the volume between 2006 and 2012.

The five-foot average depth of the Large Pit lake was identified in the Stage 1 Abatement Plan from 2006 data, (Table 3-4, 672/1964) can be compared to the five-

six foot drop in Pit Lake water levels between 2004 and 2014, shown in Figure 4 below.

The change in the value of the modeling parameters of the Large Pit lake water balance between 2006 and 2014 show that it is shrinking rapidly in both area and volume. Were the Large Pit lake shrinkage trend, and the contribution of run-on from the pit catchment reduced to a more typical value, the volume of water available for migration from the Large Pit lake following backfill would be significantly reduced.

If significantly less water would be available for migration from the Pit and the projected migration of what ever water is left after the Large Pit lake is fully evaporated, the need for the AAS as precondition for approval of the backfill plan may not be necessary or appropriate.

2c) Failure to include reaction kinetics, sorption processes, mass transfer and geochemical process overestimates the mobility of the contaminants in the Large Pit lake.

The AAS Petition says,

“Equilibrium between groundwater and minerals in the host rock is a simplifying assumption. Other geochemical processes that may influence uranium solubility include reaction kinetics, sorption processes, and irreversible mass transfer. At present, there are very limited experimental data on the kinetics of uranium mineral precipitation, dissolution, sorption, and mass transfer rates. Therefore, these processes were not considered in detail. As these processes would likely decrease the concentration of uranium as it travels away from the orebody, the values provided are conservative estimates.” 116/1964

The failure to consider a fuller scope of geochemical mechanisms results a likelihood of over estimate of the migration of water and contaminants from the Large Pit to a point of potential use or discharge. A revision of the model updating the scope of geochemical factors considered would provide a more thorough assessment of potential migration.

A wider scope of geochemical mechanisms including but not limited to reaction kinetics, sorption processes, and irreversible mass transfer should be incorporated into the modeling of groundwater and contaminant migration at the St. Anthony mine before a final decision on the need for or level of AAS is determined.

2d) Uranium attachment to tamarisk roots, and other biological and microbiological constraints on contaminant migration are not considered.

The AAS Petition incorporates the evapotranspiration capacity of tamarisks in its hydrologic modeling. The Petition incorporates the evapotranspiration of tamarisks in its water balance model. The incorporation of the evapotranspiration by

tamarisks existing along Meyer Draw into the models results in finding that any groundwater that might reach the alluvium of Meyer Draw is likely to evapotranspire from the tamarisk field currently existing and therefore not be water than would be available for use.

Recent research shows tamarisk uptake of uranium from soils as demonstrated by significantly higher uranium concentration in tamarisk roots than the uranium concentration in alluvial soils along the Rio Paguete. See, for example, DeVore, C. L., "Chemical interactions and mobility of uranium near abandoned mine wastes at Rio Paguete, Laguna, New Mexico, 2015, UNM Thesis at http://digitalrepository.unm.edu/cgi/viewcontent.cgi?article=1016&context=wr_sp

The AAS Petition does not include consideration of biological and microbiological controls on contaminant migration that retard the migration of contaminants and may over estimate the migration of contaminants by failing to include appropriate biological and microbiological processes demonstrated in the area of the St. Anthony Mine.

The accumulation of uranium by tamarisk roots is mechanism that is likely to reduce the potential for release of contaminants that should be incorporated into the modeling of groundwater and contaminant migration at the St. Anthony mine before a final decision on the need for or level of AAS is determined.

2e) The proposed uranium AAS is set as a function of a model of the solubility of uranophane, a secondary uranium mineral, however uranophane was not identified as one of the secondary uranium minerals at the St. Anthony mine in a petrographic study included in the AAS Petition. Setting the AAS as a function of uranium compounds found at the site is likely to more appropriately reflect site characteristics and may provide a basis for a change in the uranium AAS, if AAS are determined to be appropriate and necessary.

A brief review of references to uranophane in the New Mexico uranium literature show that the uranophane occurrences in Grant Mineral Belt are associated with Todilto limestone-based uranium deposits rather than Jackpile Sandstone-uranium deposits. See, for example, Berglof and McLemore, "Economic geology of the Todilto Formation," 2003, pp. 179-189 in: Geology of the Zuni Plateau, New Mexico Geological Society 54th Annual Fall Field Conference Guidebook, at https://nmgs.nmt.edu/publications/guidebooks/downloads/54/54_p0179_p0189.pdf

Revised parameters incorporating the thermodynamics of secondary uranium minerals identified at the St. Anthony site should be incorporated in to the modeling of groundwater and contaminant migration at the St. Anthony mine before a final decision on the need for or level of AAS is determined.

Figure 1 – Illustration of “Pit backfill with geochemical stabilization of water and sediment” - AAS Petition 186/1964

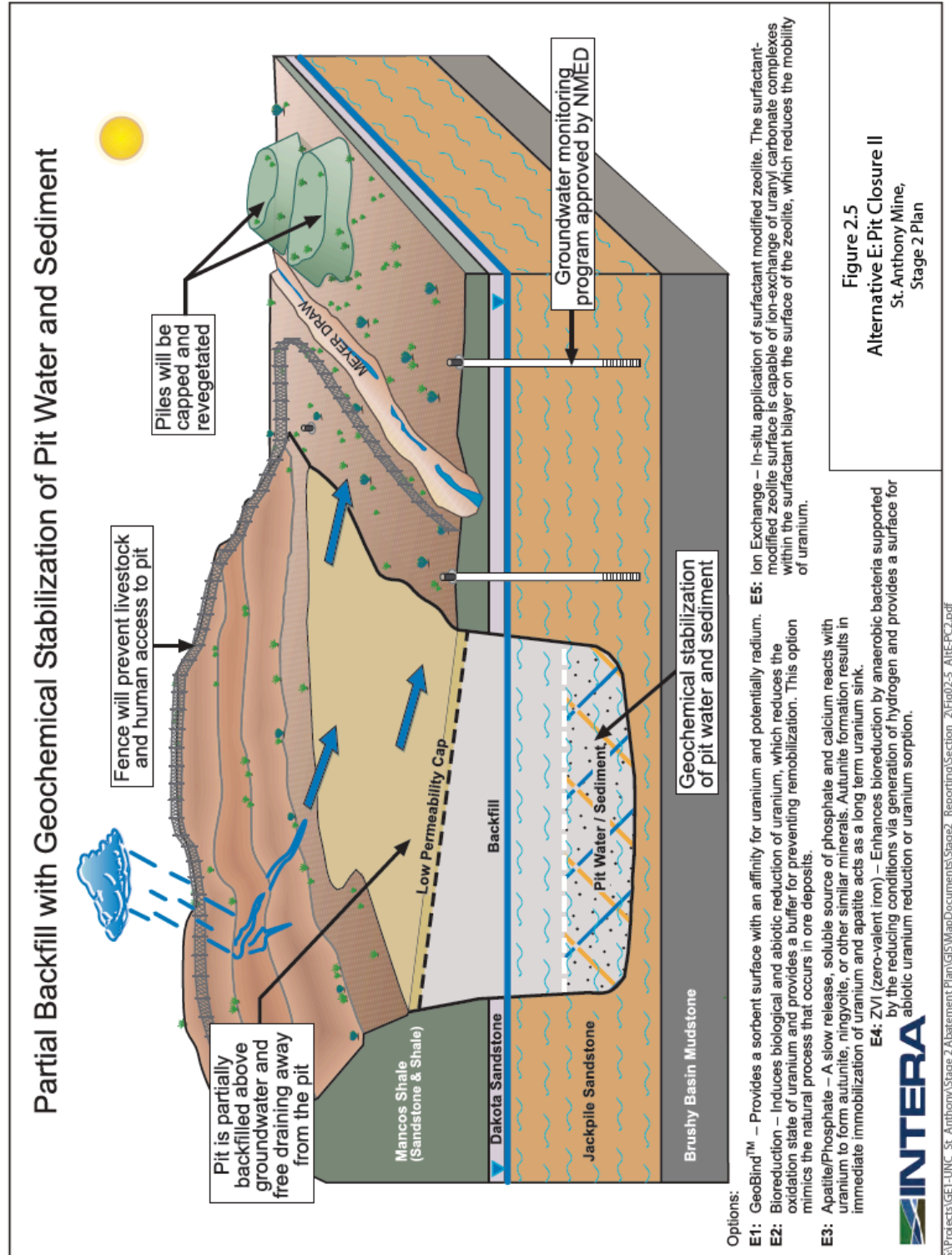


Figure 2 – Aerial View of St. Anthony Large Pit - 2011

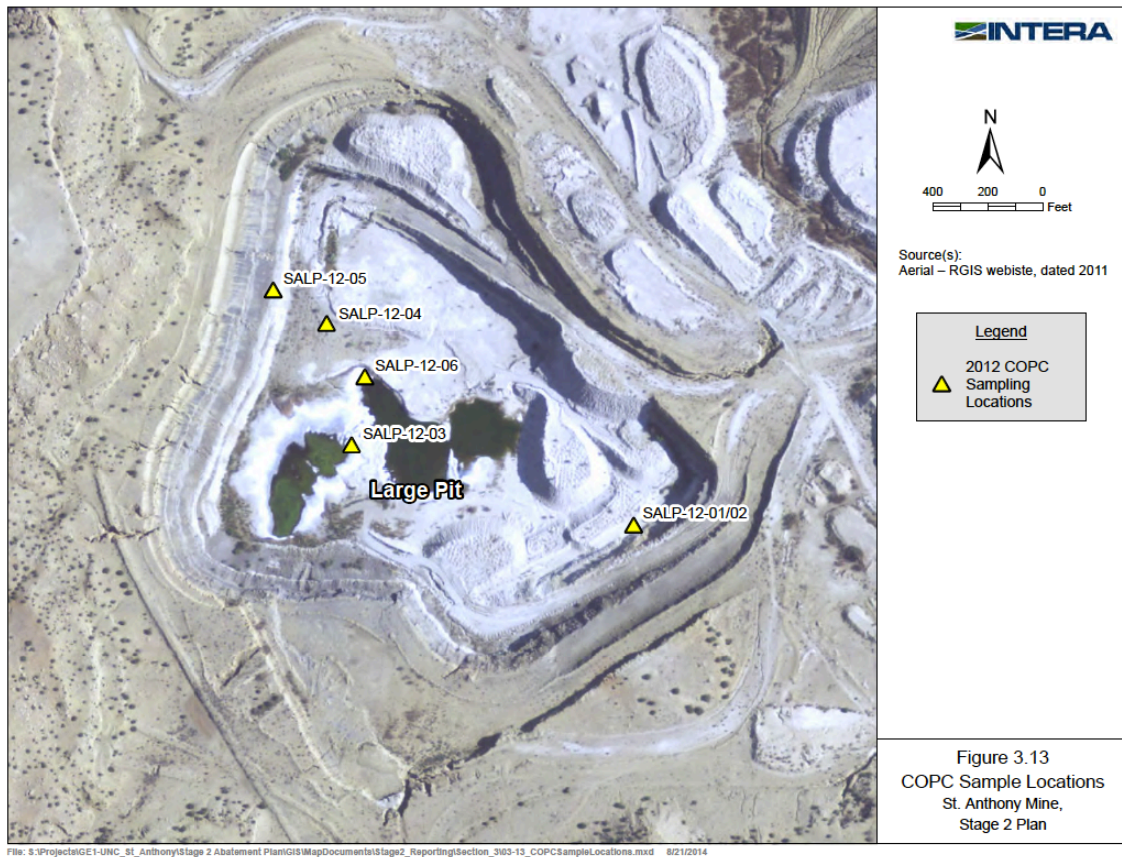


Figure 3 – Aerial view of St. Anthony Large Pit - 2006

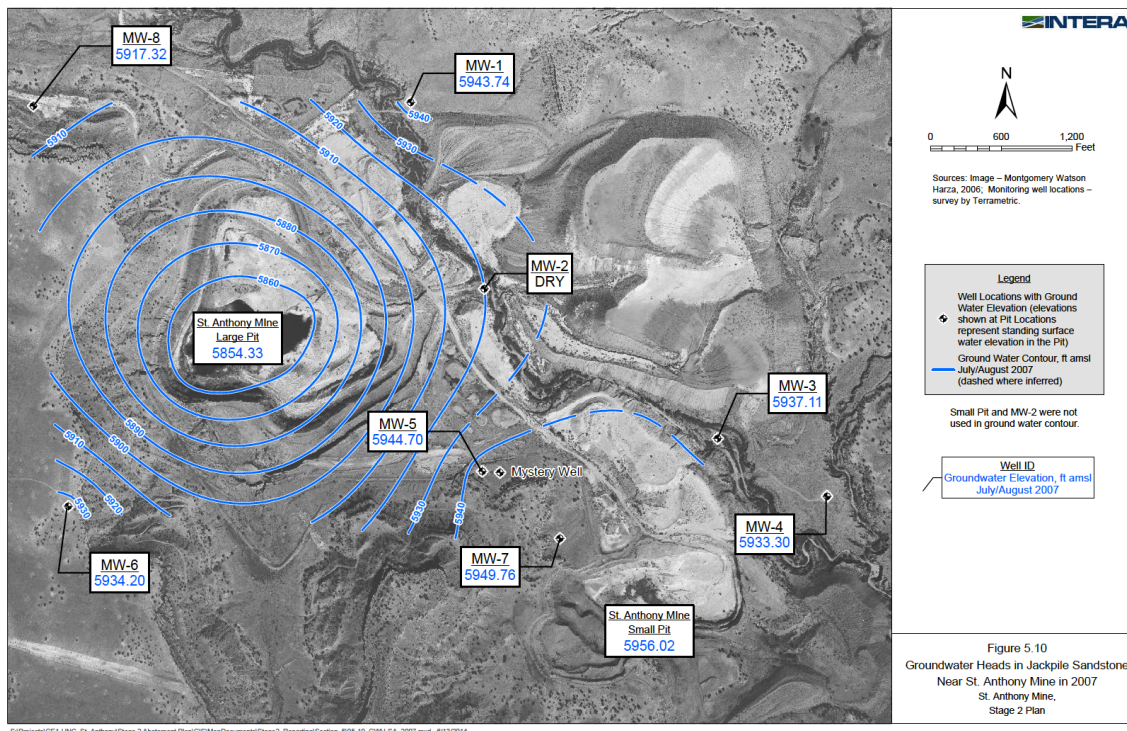


Figure 4 – Pit Water Levels 2004-2014 – AAS Petition 226/1964

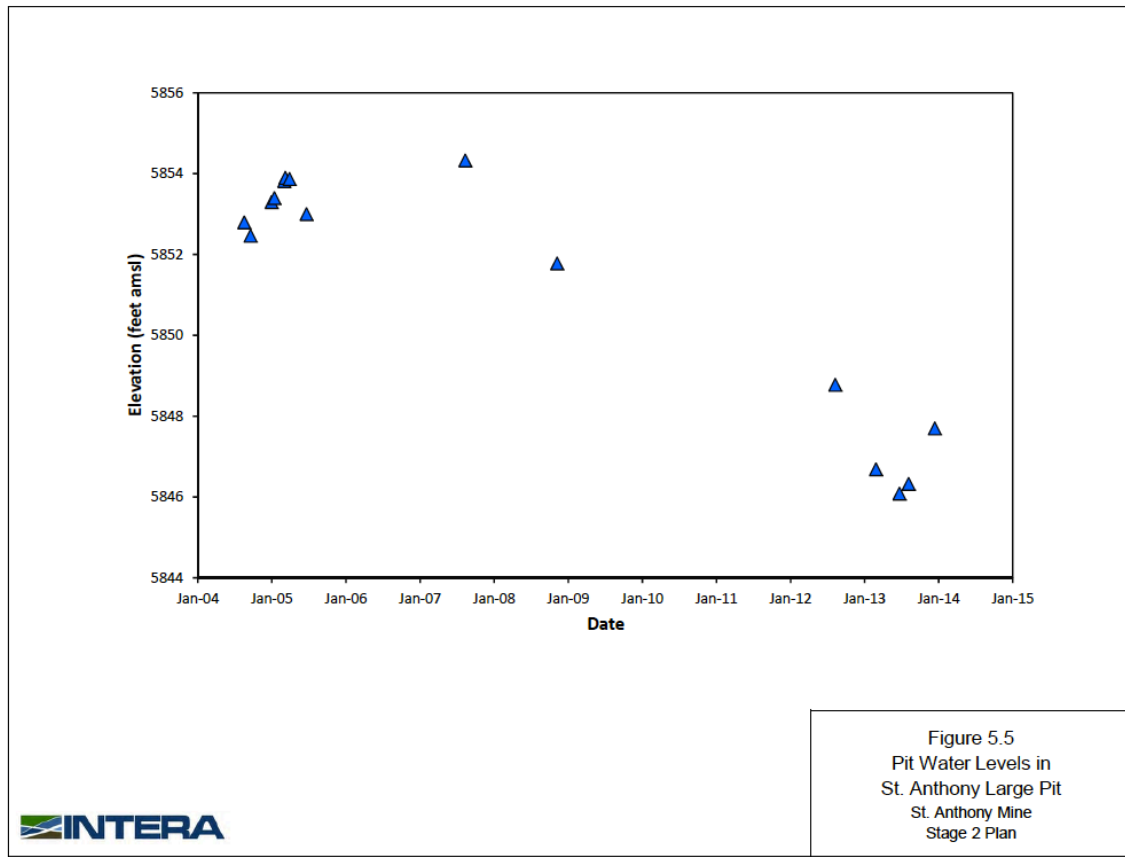


Figure 5 – Projected area of groundwater migration derived from AAS Petition modeling – small view

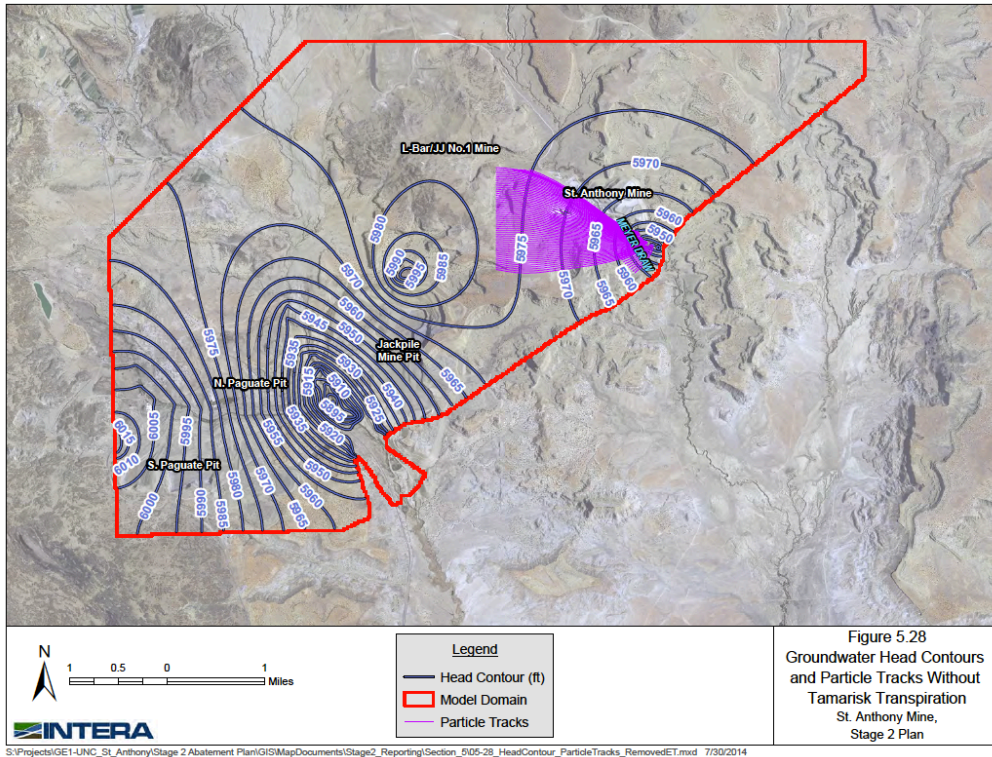


Figure 6 – Area of project groundwater migration projected by AAS Petition modeling – large view

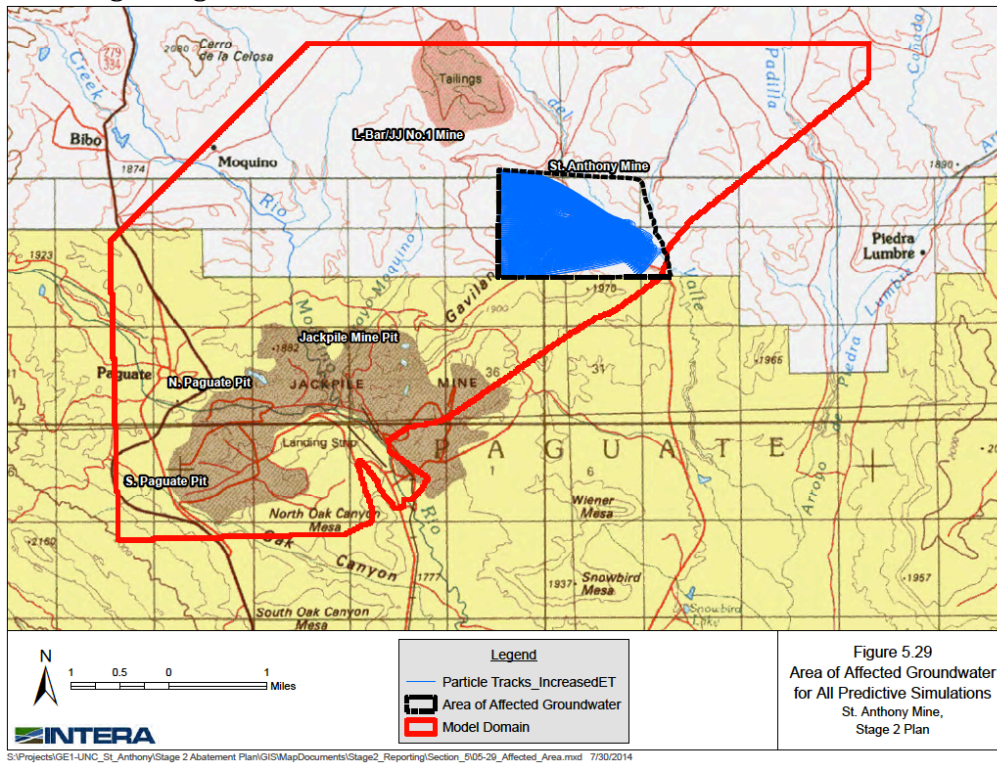


Figure 7 – Water Balance for Large Pit – AAS Petition 142-143

Table 5.2. Water Balance for Large Pit

Parameter	Value	Units	Value	Units
Precipitation	4.93E-1	ft/yr		
Area of Large Pit water 2012	1.74E5	ft ²		
Volume of Large Pit water 2012	8.75E5	ft ³		
Parameter	Value	Units	Value	Units
Volume of Large Pit water 2013	1.18E5	ft ³		
Evaporation	4.57E1	ft/yr		
Pan Coefficient	7.5E-1			
Runoff Coefficient	1.5E-1			
Watershed Area	1.05E7	ft ²		
Pit wall area	1.23E6			
Pit wall - Large Pit water area	1.06E6			
Watershed - Pit wall area	9.28E6			
Precip on Large Pit water	8.58E4	ft ³ /yr	1.2	gpm
Run-on from pit walls	7.81E4		1.1	
Run-on from catchment area	6.86E5		9.9	
Evaporation	5.97E5		8.6	
Annual storage change	7.57E5		10.8	
Groundwater inflow	5.04E5		7.3	

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RESUME OF WILLIAM PAUL ROBINSON

Resume of
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June 2017

EDUCATION

Master of Community and Regional Planning, University of New Mexico, 1992, "with distinction." Professional Project - "Planning for Reclamation of Uranium Waste Sites in Germany." Course work included analysis of natural and modified water systems, including irrigation diversions, watershed analysis, urban flood reduction, environmental impact assessment methods, and geology.

Graduate Study in Environmental Engineering, Johns Hopkins University, Baltimore, MD, 1974-5. Course work included water pollution chemistry and water resource engineering.

Bachelor of Arts, Technology and Human Affairs Program, Washington University, St. Louis, MO, 1971-4. Course work included classes from anthropology, geology, engineering, and ecology programs.

EMPLOYMENT

RESEARCH DIRECTOR - Southwest Research and Information Center, PO Box, 4524, Albuquerque, NM 87106-4524, USA. Coordinate and prepare environmental policy and technology research reports and technical analyses of mineral, water, waste management, and other natural resource development projects for non-profit scientific and educational organization and contract clients. With Southwest Research continuously July 1976 - present.

ADJUNCT PROFESSOR – 2004 - In the Fall 2004 Semester, was appointed at University of New Mexico to teach a senior seminar, "Sacred Sites and Environmental Protection," in the Native American Studies Program.

ADJUNCT PROFESSOR - 1980 – 1997 - Appointed at University of New Mexico, Albuquerque, NM to teach undergraduate and graduate courses including: "Natural Resource Planning Methods," "Introduction to Environmental Problems," "Environmental Evaluation of Water Resource Projects" and co-teach other courses in the Community and Regional Planning Program and Water Resource Management Program.

ENVIRONMENTAL POLICY AND TECHNOLOGY ASSESSMENT CONSULTANT - Since 1980, government, corporate, tribal and non-governmental organization clients have included:

Western Governors' Association, Office of Navajo and Hopi Indian Relocation (Flagstaff AZ), Acoma Pueblo (NM), Moquino Mutual Domestic Water Users Association (NM), Alliance for Transportation Research Institute at University of New Mexico, Atomic Industrial Forum, National Council of State Legislators, Zuni Legal Services, DNA (Navajo) Legal Services, Albuquerque District Attorney's Office (NM), Energy Minerals Law Center, Durango (CO), Centex American Gypsum Company (NM), United Transportation Union, Local 1181 - Gallup (NM), New Mexico Environmental Law Center, Mining Impact Coalition of Wisconsin, Colonias Development Council (NM), Pueblo of Laguna (NM), International Physicians for Prevention of Nuclear War-German Chapter, Asociación Interamericana para la Defensa del Medio Ambiente (AIDA), Colorado Center for Environmental Management, Lower Saxony (Germany) Environment Ministry, Nordhaus Law Firm, La Gente del Rio Pecos (NM), Okanagon Highlands Alliance (WA), Great Lakes Natural Resources Center (MI), Innu Nation (Labrador, Canada), Northwatch (Ontario, Canada), Center for Science in Public Participation (MT), Water Information Network (NM), Amigos Bravos (NM), Kensington Coalition (AK), City of Yakutat (AK), Baikalwatch/Earth Island Institute (CA), Pacific Environment (CA), United Steelworkers of America Local 890 (Silver City, NM), Americans for Indian Opportunity, Northern New Mexico Legal Services, Natural Resources Defense Council, Twinings (NM) Water and Sanitation District, National Wildlife Federation, Minnesota Interim Legislative Committee on Uranium Exploration, Wisconsin Center for Alternative Mining Development Policy, Montana Environmental Information Center, Save the Jemez, South Dakota FARM, Black Hills Alliance (SD), Piedmont Environmental Council (VA Huerfano Valley Citizen's Alliance (CO), Five Sandoval Pueblos, Inc. (NM), Steadman and Hector Attorneys-at-Law, Monticello

(subdivision, NM) Residents Committee, Residents of Tucumcari NM, Environmental Defense Fund (CO), Western Nebraska Resource Council, Santa Ana Pueblo (NM), Los Herederos del Pueblo de San Mateo (NM), Board of the Cebolleta Land Grant (NM), Mathis and Reiselt, Attorneys-at-Law, Concerned Citizens of Questa (NM), Wells Park Neighborhood Association (Albuquerque, NM), Southwest Organizing Project (NM), Citizen Action Coalition (Sandia Park, NM), Bluewater Valley Downstream Alliance (Milan, NM), E², Inc., Charlottesville, VA, Roanoke River Basin Council, Danville, Virginia, Mary's Igloo Traditional Council, Teller, AK; Teller Traditional Council, Teller, AK; The Center for Water Advocacy, Homer, AK; Multi-Cultural Alliance for a Safe Environment (MASE), NM.

INTERNATIONAL RESEARCH PROGRAM COORDINATOR – 2014 - 2016

August 2015 – August 2016

“Sharing Best Practices for Mine Water in Russia and the USA: A Peer-to-Peer Dialogue Engaging Scientists, Civil Society Organizations, and Affected Community Residents,” A project funded by the US-Russia Peer-to-Peer Dialogue, a program supported the US Department of State. Project Archive including presentations, papers and background documents at http://www.sric.org/mine_water/index.php

July 2014 – July 2015

- “Sharing Best Practices for Human Health Research in Communities Affected by Ecological Damage in Russia and the USA: A Peer-to-Peer Dialogue Engaging Scientists, Civil Society Organizations, and Affected Community Residents,” A project funded by the US-Russia Peer-to-Peer Dialogue, a program supported the US Department of State. Project Archive including presentations, papers and background documents at http://www.sric.org/russia_dialogue/index.php

INTERNATIONAL MINING AND THE ENVIRONMENT EXCHANGE PROGRAM COORDINATOR – 2007 – present

“Mining and the Environment Exchange Program” Annual program since 2007 involving civil society organization, community, company and government representatives in field programs at mines, renewable energy production sites and cultural resources in the Lake Baikal Basin in Russia and Mongolia and the US Southwest, funded by Trust for Mutual Understanding, NYC, NY

TECHNICAL ASSISTANCE CONTRACTOR – 2008 - 2015

- Technical Assistance for Brownfields (TAB) consultant, sub-contractor to EPA Region 5, 6, 7 and 8 TAB contractor - Kansas State University TAB Center, Manhattan, Kansas, www.ksutab.org - 2013 - 2015

- Technical Assistance for Superfund Communities (TASC) contractor to US EPA assisting Spokane Tribe of Indians and SHAWL Society Pond Road Community Association on the Navajo Nation and other communities affected by the Dawn Mining/Newmont Mining Midnite Uranium Mine Superfund Site – 2012

- Technical Assistance Grant (TAG) contractor to US EPA assisting Bluewater Valley Downstream Alliance affected by the Barrick Gold/Homestake Mining Company uranium mill and mill tailings site Superfund Site – 2010 – 2013

- Technical Assistance for Superfund Communities (TASC) contractor to US EPA assisting Red Water Pond Road Community Association on the Navajo Nation and other communities affected by the General Electric/United Nuclear Northeast Churchrock uranium mine removal action – 2011 – 2013

- Technical Assistance for Superfund Communities (TASC) contractor to US EPA assisting Bluewater Valley Downstream Alliance and other communities affected by Barrick Gold/Homestake Mining Company uranium mill and tailings Superfund Site – 2008 – 2009

PROJECT DIRECTOR, NAVAJO LAND SELECTION PROJECT – 1994 – 2008, Technical Support to Navajo-Hopi Land Commission and Navajo-Hopi Land Commission Office of the Navajo Nation initiative to select, acquire and development lands to benefit Navajo families and communities affected by Relocation as contractor Office of Navajo and Hopi Indian Relocation, Flagstaff, AZ

PROJECT COORDINATOR - CITIZENS' MINING INFORMATION NETWORK - 1991 – 1996 - Southwest Research and Information Center. Project provides current technical and policy-related information on mining to citizens and community organizations across the US. This Project funded by United States Environmental Protection Agency and private donors.

WATER RESOURCE SPECIALIST - NORTHERN NEW MEXICO WATER PROJECT - June 1984 - June 1990 - At Southwest Research and Information Center. Project provided technical support for community and governmental organizations in northern New Mexico. This project funded by the Ford Foundation.

SELECTED PUBLICATIONS AND PRESENTATIONS (SELECTED ORAL TESTIMONY AND PRESENTATIONS AT P .16)

- “Let’s Not Wait for Catastrophic Spills to Happen: Holistic, Long-Term, Multi-Jurisdictional Monitoring in Legacy Mining Areas,” with Dennis McQuillan N.M. Environment Department, Chris Shuey and Paul Robinson, Southwest Research and Information Center, Second Annual Conference on Environmental Conditions of the Animas and San Juan River with Emphasis on Gold King Mine and other Mine Waste Issues, New Mexico Water Resources Research Institute, Farmington, NM, June 20-27, 2017, abstract at <https://animas.nmwri.nmsu.edu/2017/presentations/oral-presentations/>

- “Ablation Mining Technology Review and Recommendations regarding Regulatory Status”, Submitted to Colorado Department of Public Health and the Environment (CDPHE) Pursuant to the CDPHE Ablation Process Stakeholder Comment Invitation on Behalf of INFORM (Information Network for Responsible Mining, Jennifer Thurston, Director and Colorado Citizens Against Toxic Waste, Inc., Coloradans Against Resource Destruction, Sheep Mountain Alliance, Tallahassee Area Community, Inc., and Uranium Watch, July 22, 2016 available at https://www.colorado.gov/pacific/sites/default/files/HM_rad-ablation-comments.pdf, p. 2 – 19.

- “Groundwater Contamination at Sandia National Laboratories (SNL) Continues At Tijeras Arroyo, Tech Area-V and Burn Sites Environmental Restoration (ER) Areas of Concern (AOCs): Increased transparency and stakeholder involvement needed to accelerate clean-up,” Presentation and Fact Sheet presented before Albuquerque Bernalillo County Water Utility Authority (ABCWUA), Water Protection Advisory Board (WPAB), June 10, 2016. Presentation available at http://www.sric.org/nuclear/docs/2016-06-01_Env_Oversight_for_SNL_GW_Sites.pdf. Fact Sheet available at http://www.sric.org/nuclear/docs/2016-06-10_Revised_Fact_Sheet.pdf

- “Remediation of the Terrero Mine and El Molino Mill, San Miguel County, New Mexico”, with Dennis McQuillan, New Mexico Environment Department and Virginia McLemore, N.M. Bureau of Geology and Mineral Resources, In “Environmental Conditions of the Animas and San Juan Watersheds with Emphasis on the Gold King Mine and other Mine Wastes,” New Mexico Water Resources Research Institute, Farmington, NM, May 17-18, 2016. Abstract at <https://animas.nmwri.nmsu.edu/2016/abstracts/oral-presentations/>

- “Oyu Tolgoi Phase 2: Plans, Issues and Risks: An Overview of Oyu Tolgoi Phase 2 Mining Plans and some of the issues and risks associated with block cave underground mining, international metal price uncertainty, project power supply, and impacts on water resources used by herders”, Prepared for CEE Bankwatch Network, Prague, Czech Republic www.bankwatch.org and OT Watch <http://www.minewatch.mn>, January 10, 2016. Full Report available at <http://bankwatch.org/sites/default/files/OyuTolgoi-Phase2.pdf> and Summary available at <http://bankwatch.org/sites/default/files/OyuTolgoi-Phase2-summary.pdf>.

- “Final Report to Trust for Mutual Understanding For 2015 International Mining and the Environment Exchange Program,” submitted January 26, 2016 to Trust for Mutual Understanding, New York, New York.

- “Statement in the Matter of Rio Grande Resources Corporation’s Application to Change the Status of its Existing Mine Permit from Standby Status to Active Status; Permit Revision 13-2 (Permit CI002RE)”, Before the State of New Mexico Mining and Milling Division, Submitted at Public Hearing in Grants, New Mexico, December 4, 2015 – Written Testimony available at: http://www.sric.org/uranium/docs/20151204_Mt_Taylor_Mine_Hearing_Statement_PR.pdf

and Exhibit 2 – Slide Presentation available at:

http://www.sric.org/uranium/docs/20151204_Mt_Taylor_Mine_Hearing_Exhibit2_PR.pdf

- “The Impact of Uranium Mining and Clean-up Activities in the Grants Mineral Belt: Seven Key Points”, An Invited Presentation to the New Mexico Interim Legislature Indian Affairs Committee Meeting, Red Valley Chapter, Navajo Nation, October 1, 2015. Available at:

<http://www.nmlegis.gov/lcs/handouts/IAC%20093015%20Item%2010%20Uranium%20Impacts.pdf>

- With Avasara, S; Artyushkova, K, et al, “Chemical composition of abandoned mine wastes in Northeastern Arizona Navajo land: Integration of Spectroscopy, microscopy and chemical extraction analyses,” *Environmental Science & Technology* July 2015; 49(14).

- “Technical Written Statement Recommending Deferral of Determination of Corrective Action Complete with Controls Status (CACCS) for the Mixed Waste Landfill at Sandia National Laboratories”, filed “Notice of Intent to Provide Technical Written Testimony and Technical Oral Testimony in the Matter of: Determination of Corrective Action Complete with Controls Status for the Mixed Waste Landfill, Sandia National Laboratories, EPA ID No. NM5890110518, No. HWB 15-18(P) before New Mexico Environment Department Secretary on June 15, 2015. Oral testimony provided and written testimony admitted to Hearing Record July 10, 2015.

- “Health Risk Research Dialogue: A US-Russia Peer-to-Peer Program to Identify Best Practices for Research Investigating Human Health Risks in Areas of Ecological Damage,” in Proceedings of “Actual Issues on Safety and Analysis of Human Health Risk from Environmental Hazards”, 6th All-Russian Scientific Conference convened by Russian Federal Scientific Center for Medical and Preventive Health Risk Technologies, Perm, Russia, May 12-15, 2015 available at: http://www.sric.org/russia_dialogue/docs/2015_May_trip/20150423_PERM_HealthDialogue_en.pdf

- “Water and Mining – Impact avoidance through mine design and planning, balancing operations needs with environmental sensitivity” prepared and presented at Conference on “The Mitigation Hierarchy: Reducing the Environmental Impacts of Large-Scale Mining and Small-Scale Mining”, Ulaanbaatar, Mongolia May 27-28, 2015 available at http://www.sric.org/enr/docs/20150527_Water_Mining_ImpactAvoidance_Mongolia.pdf

- “Best Practices for Uranium Mines and Mills: Where are they needed?” Compiled for World Uranium Symposium, April 14 – 16, 2015, Quebec City, Canada. Available at: http://www.sric.org/uranium/docs/2015-04-12_Best_Practices_uranium_WUS-2a.pdf

- “Uranium Issues in the Western US: Legacy, Current Production, Health Research and Resource Estimates” Compiled for World Uranium Symposium, April 14 – 16, 2015, Quebec City, Canada. Available at: http://www.sric.org/uranium/docs/2015-04-12_Uranium_activities_Western_US_1a.pdf

- “Final Report to Trust for Mutual Understanding For 2014 Mining and the Environment, Renewable Energy and Cultural Resources International Exchange Program,” submitted December 15, 2014 to Trust for Mutual Understanding, New York, New York.

- “Environmental Issues and Challenges associated with Uranium Exploration and Uranium Mill Tailings,” Invited Statement before, Quebec Uranium Inquiry Commission, Bureau D’Audiences Publique sur L’Environnement (BAPE), Quebec, City, Quebec, Canada, September 9 - 10, 2014. The written statements and presentations submitted to the Commission are available at <http://www.sric.org/enr/international.php>. Abstracts of the invited statements are available on website of BAPE Uranium Inquiry Commission at http://www.bape.gouv.qc.ca/sections/mandats/uranium-enjeux/horaire_septembre.htm and video recordings of the statement provided are available at http://www.bape.gouv.qc.ca/sections/mandats/uranium-enjeux/webdiffusion_differe%20septembre.htm.

- “Review of Côté Lake Gold Project Draft Environmental Assessment Regarding Acid Mine Drainage Potential,” July 2, 2014, Prepared on Behalf of Northwatch Canada for submittal to Canadian Environmental Assessment Agency Review of Côté Lake Project Environmental Impact Statement.

- With Avasarala, S., Atryushkova, K., et al, "Application of spectroscopy, microscopy, and chemical extraction analyses to investigate metal speciation in abandoned mine wastes," Poster presented at "Surface Analysis 2014: 36th Symposium on Applied Surface Analysis," Albuquerque, NM, US June 2014. Available at <http://www.nmavs.org/wp-content/uploads/2014/06/SA14-Book-5-31-14.pdf>

- Shuey, Chris, Bill, Sadie; Brearly, Adrian; Cerrato, J. M.; Ali, Abdul-Mehdi, "uranium in soil, Mine Waste and Spring water near Abandoned Uranium Mines, Tachee/blue Gap and Black Mesa Chapters, Navajo Nation, Arizona, MERALS Monograph No. 1, UNM METALS Center (Metal Exposure Toxicity Assessment on Tribal lands in the Southwest), University of New Mexico./Southwest Research and Information Center/indigenous Education Institute/Laguna Pueblo/Red Water Pond Road Community Association/Tachee Uranium Concerns Committee, Albuquerque, NM, March 31, 2014. available from SRIC and UNM Metals Center upon request.

- with Cerrato, J. M; Avasarala, S; et al, "Reactivity of U in Surface/Subsurface Environments: Insights from Laboratory and Field Experiments, university of New Mexico and others, Gordon Research Conference Poster, 2014

- "Oyu Tolgoi Copper-Gold-Molybdenum Mine, Omnigovi Province, Mongolia: Overview of Human and Natural Resource Impacts Based on Observations in August 2013," Presented at Alaska Forum for the Environment, Anchorage, Alaska," February 5, 2014, available from SRIC on request.

- "Final Report to Trust for Mutual Understanding For 2013 Mining and the Environment, Renewable Energy and Cultural Resources International Exchange Program," submitted December 15, 2013 to Trust for Mutual Understanding, New York, New York.

- "A Tour of Abandoned Uranium Mines in Navajo Country and Beyond," Compiled with Chris Shuey, October 2013 available at: http://www.sric.org/uranium/docs/Navajo_AUM_Maps_Photos_101013rev.pdf

- "Foreign Infiltration in the U.S. Uranium Industry?" in www.NewMexicoMercury.com, April 10, 2013, available at: http://newmexicomercury.com/blog/comments/foreign_infiltration_of_u.s._uranium_industry

- Comments and Recommendations Regarding the Proposed Canadian Nuclear Safety Commission Licence for the Strateco Resources, Inc. Matoush Advanced Exploration Project, May 16, 2012, on behalf of InnuPower and SISUR, Submitted to CNSC at Public Hearing on Application for Strateco Resources' Matoush Project Underground Exploration Project, Misstasini, Quebec, Canada. Submittal Number 12-H7.26 available at http://www.cnscc-ccsn.gc.ca/eng/the-commission/hearings/documents_browse/results.cfm?dt=5-Jun-2012,

- Social and Environmental Responsibility in Mining: International Experience and Lessons Learned Regarding Accumulated Damage from Abandoned Mines, Long-term Risks Associated with Waste Management and Renewable Energy Use," presented at Conference on Social and Environmental Responsibility in the Mineral Industry in Russia, Moscow, Russia, October 6, 2012 available at: <http://www.wwf.ru/data/programmes/mining/conference/2012/presentation/1/paulrobinson.pdf>.

- "Comments and Recommendations Regarding the "Draft Environmental Impact Statement for the La Jara Mesa Uranium Project Prepared by the Mt. Taylor Ranger District, Cibola National Forest, Cibola County, New Mexico, US Forest Service," MB-R3-03-17, March 2012," Prepared under contract to Chestnut Law Firm, General Counsel to Pueblo of Acoma, August 15, 2012

- Memorandum Addressing Opportunities for County-Level for Protection of Public Health, Safety, and Welfare from Activities Involving Generation and Disposal of Ore and Ore-processing Waste with Potential to Damage Public Health, Safety and Welfare, Property Values and Surface and Ground Water Resources," Roanoke River Basin Association, Danville, VA, July 2, 2012

- TASC Summary and Review of "Midnite Mine Superfund Site Remedial Design Work Plan - Revision 0" March 2012," Technical Assistance Services for Communities Contract No.: EP-W-07-059 TASC WA No.: TASC-4-HQ-OSRTI Technical Directive No.: 2.01 TD #2 – Midnite Mine, Prepared under contract to SKEO Solutions on behalf of Spokane Tribe of Indians, March 27, 2012

- "TASC Summary and Review of "Spokane Tribe of Indians, Airborne Radiological Surveys, Spokane, WA" March 2012," Technical Assistance Services for Communities Contract No.: EP-W-07-059 TASC WA No.: TASC-4-HQ-OSRTI Technical Directive No.: 2.01 TD #2 – Midnite Mine, Prepared under contract to SKEO Solutions on behalf of Spokane Tribe of Indians, March 27, 2012

- "Observations and Comments Regarding Environmental Performance of the Blind River Uranium Refinery, Ontario, Canada, Submittal in the matter of the Blind River Uranium Refinery License Renewal for Canadian Nuclear Safety Commission on behalf of Northwatch, North Bay, Ontario, Canada, December 18, 2011

- Comments on Voluntary Flexible Housing Options for Impacted Residents at the Northeast Churchrock Mine Site, Navajo Nation, New Mexico - Draft 4, Technical Assistance Services for Communities Contract No.: EP-W-07-059 TASC WA No.: TASC-4-HQ-OSRTI TD No.: 2.09 TD #4 NE Church Rock (NECR), US EPA, Region 6, Dallas, TX December 5, 2011

- Observations Regarding Detour Lake Project Plans: Review of Detour Lake Comprehensive Study Report, Submittal in the matter of the Canadian Environmental Assessment Agency Review of the Detour Lake Comprehensive Study Report, on behalf of Northwatch, North Bay, Ontario, November 30, 2011

- "Review of the Mt. Taylor Uranium Mine Stand-by Renewal Application filed by Rio Grande Resources Corporation Related to: Economic Viability of the Deposit, Corporate Connections to Cotter Corporation and General Atomics, and Environmental Violations by Cotter at its Canon City Mill and Schwartzwalder Mine in Colorado," prepared under contract to Multi-Cultural Alliance for a Safe Environment (MASAE) and New Mexico Environmental Law Center (NMELC), August 4, 2011

- Groundwater Contamination and Remediation Options at the Technical Area Five (TA-V) and the Tijeras Arroyo Groundwater (TAG) Environmental Remediation Sites at Sandia National Laboratories, New Mexico," Prepared for: Sandia Working Group of New Mexico SEES (Sustainable Energy and Effective Stewardship) and Citizens for Alternatives to Radioactive Dumping (CARD), Albuquerque, New Mexico, July 20, 2011 available at: <http://www.srlc.org/nuclear/docs/2011-07-20%20CARD%20Project%20Sixth%20Draft%20w%20Figs.pdf>

- "Mining and the Environment Dialogue International Exchange: Final Report", Submitted to Trust for Mutual Understanding, New York, New York, December 29, 2010

- "Observations and Recommendations Regarding the June 18, 2010 Addenda to the Draft Focused Review of Specific Remediation Issues for the Homestake Mining Company (Grants) Superfund Site, February 2010", co-authored with Chris Shuey, under contract to E², Inc. pursuant to US Environmental Protection Agency, Technical Assistance Services for Communities Contract No.: EP-W-07-059 TASC WA No.: R6-TASC-002 Technical Directive No.: R6-Homestake Mining-03, Dallas, TX, July 22, 2010

- "Investigation of the Solar Power Potential of Reclaimed Areas at the Black Mesa Coal Mine, Arizona, U.S.", A Report to Black Mesa Water Coalition and To Nizhoni Ani May 28, 2010, pursuant to contract with Western Resource Advocates, Boulder, CO, May 28, 2010

- "Comments on Air Monitoring and Radon Issues Raised in the U.S. Army Corps of Engineers' Draft Remediation System Evaluation (Supplement) for the Homestake Mining Company (Grants) Superfund Site, New Mexico", Technical Assistance Services for Communities Contract No.: EP-W-07-059 TASC WA No.: R6-TASC-002, Technical Directive No.: R6-Homestake Mining-02, May 6, 2010

- "Observations and Recommendations Regarding the Draft Focused Review of Specific Remediation Issues for the Homestake Mining Company (Grants) Superfund Site, February 2010 – Ground Water Considerations Introduction", co-authored with Chris Shuey, under contract to E², Inc. pursuant to US Environmental Protection Agency, Technical

Assistance Services for Communities Contract No.: EP-W-07-059 TASC WA No.: R6-TASC-002 Technical Directive No.: R6-Homestake Mining-02, Charlottesville, VA, May 6, 2010

- "Comments on Air Monitoring and Radon Issues Raised in the U.S. Army Corps of Engineers' Draft Remediation System Evaluation (Supplement) for the Homestake Mining Company (Grants) Superfund Site, New Mexico", co-authored with Chris Shuey, under contract to E², Inc. pursuant to US Environmental Protection Agency, Technical Assistance Services for Communities Contract No.: EP-W-07-059 TASC WA No.: R6-TASC-002 Technical Directive No.: R6-Homestake Mining-02, Charlottesville, VA, May 6, 2010

- "Testimony in the of the Renewal and Modification of Homestake Mining Company Discharge Permit DP-725," before the Secretary of the Environment of the State of New Mexico, GWB No.09-35(P), Santa Fe, New Mexico, December 18, 2009

- "Summary and Review of Application for Modification and Renewal of NMED Discharge Permit DP-725, Effluent Disposal Facilities for the Ground Water Remediation System at the Homestake Mining Company, Grants Reclamation Project, Milan, N.M.," co-authored with Chris Shuey, under contract to E², Inc. pursuant to US Environmental Protection Agency, Technical Assistance Services for Communities Program, Contract No.: EP-W-07-059, TASC WA No.: R6-TASC-002, Charlottesville, VA, November 18, 2009

- "Is There a Need for New Uranium Mines in the US?, in "Voices from the Earth", Southwest Research and Information Center, Volume 10, Number 1 at <http://www.sric.org/voices/2009/v10n1/Need%20for%20New%20U%20Mines.pdf>

- "An Overview of the Uranium Mining and Milling Processes, Risks and Costs, Public Interest Environmental Law Conference," University of Oregon School of Law, Eugene, Oregon, February 27, 2009 at <http://www.pielc.org/2009/materials/2009-02-27%20Uranium%20Resource%20Overview%20PIELC%20-%20Part%201.pdf>

- "Uranium Resources: Global Supply and Demand and Implications for the United States," Public Interest Environmental Law Conference, University of Oregon School of Law, Eugene, Oregon, February 27, 2009 at <http://www.pielc.org/2009/materials/2009-02-27%20Uranium%20Resource%20Overview%20PIELC%20-%20Part%202.pdf>

- "Expert Report in Matter of the International Uranium (USA) Corp. Revised 11.e.(2) Radioactive Materials License No. UT1900479, Amendment 2 (June 13, 2006), before the Utah Radiation Control Board" prepared under contract to Energy and Mineral Law Project on behalf of Energy Mineral Law Center of Durango, CO on Behalf of Glen Canyon Chapter of the Sierra Club, December 4, 2006

- "Radiation Releases at Sandia National Laboratories/New Mexico: Recently Reported Radiation Releases and Other Sources of Radiation Release," Albuquerque Center for Peace and Justice funded by grant from Monitoring and Technical Assessment Fund, Washington, DC, November 6, 2006 at: <http://www.clarku.edu/mtafund/prodlib/albuquerque/Robinson.pdf>

- "Need or Greed?: Uranium Prices and Demand", in "Voices from the Earth," Southwest Research and Information Center, Volume 7, Number 3, at http://www.sric.org/voices/2006/v7n3/need_greed.php

- "Review of Sandia National Laboratories' Mixed Waste Landfill Corrective Measure Implementation Plan and Fate and Transport Model: Comments and Recommendations February 7, 2006, Prepared on behalf of: Citizen Action New Mexico" at: http://www.radfreenm.org/old_web/pages/PublicComments/CMIP_FTM_comments.pdf

- "Expanding Citizens' Use of Environmental Rights in Magadan Oblast: Final Report," to Foundation for Russian American Economic Cooperation (FRAEC) pursuant to Agreement PG4-US-N-408, with Jennifer Castner - Pacific Environment and Olga Moskvina - Magadan Center for the Environment, Albuquerque, NM, San Francisco, CA and Magadan, Russia, January 30, 2006.

- "Midnite Uranium Mine Proposed Cleanup Plan Review: Comments and Recommendations," based on presentations at "Midnite Mine Superfund Cleanup Plans: Addressing Community Concerns Training Session and Seminar convened by Technical Outreach Services for Native Americans, Kansas State University, November 17, 2005, Wellpinit, WA, January 18, 2006.
- "A Guide to Support the Expanded Use of Citizen Environmental Rights in Magadan and Eastern Russia," with Misha Jones – Pacific Environment and Olga Moskvina – Magadan Center for the Environment, in pursuant to Foundation for Russian American Economic Cooperation, Albuquerque, NM, San Francisco, CA and Magadan, Russia, May 2005, at: <http://www.sric.org/mining/docs/FRAEC-cit-guide.pdf>, in English, Russian version also available.
- "Uranium Price Rise...Still No Need for New Mines," in "Voices from the Earth," Southwest Research and Information Center, Volume 5, Number 4, at: <http://www.sric.org/voices/2004/v5n4/uspoinprice.php>
- "Technical Testimony Before State of New Mexico Secretary of Environment, Case No. HWB 04-M in the Matter of the Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill, Sandia National Laboratories, Bernalillo County, New Mexico, EPA ID No. NM5890110518," on behalf of Citizen Action, Sandia Park, New Mexico, December 3, 2004 - Outline at: http://www.radfree.nm.org/old_web/pages/testimony_robinson.htm; Full Notice of Intent at: http://www.radfree.nm.org/old_web/pages/noticeofintent.htm
- "Mining and Mineral Development Management Policy in the Selenga River Watershed," with Galina Anosova, in proceedings of: Science for Watershed Conservation: Multidisciplinary Approaches for Natural Resource Management Conference, Convened by United States Geological Survey (USGS), Institute of General and Experimental Biology, Siberian Division -Russian Academy of Sciences, and Mongolian Academy of Sciences, September 1 - 8, 2004, Ulan-Ude, Russia and Ulanbaatar, Mongolia available at: <http://www.sric.org/mining/docs/USGS-siberia.pdf>
- "Evaluation of Application to Use the Sacaton Mine in Arizona to Meet Wisconsin Mining Moratorium Law – Wisc. Stat. §293.50 – Requirements by Nicolet Mining Company," report under contract to Mining Impact Coalition of Wisconsin, Madison, Wisconsin, May 24, 2004
- "Uranium Mill Tailings Remediation Performed by US DOE: An Overview," report under a grant from Monitoring and Technical Assessment Fund, Washington, DC, May 18, 2004 available at: http://www.clarku.edu/miafund/prodlib/southwest/uranium_mill.pdf
- "Environmental Remediation and Mine Waste Management at the Pecos, New Mexico USA Lead-Zinc Mill Tailings Site: A Case Study of a Durable Solution to an Inactive Mine Waste Pollution Problem," presented at "Environmental Remediation and Mine Waste Management: International Business and Technology Seminar," Bucharest, Romania convened by United States Agency for International Development (USAID), United States Department of Commerce (USDOC), Ministry of Economy and Commerce of Romania, Department of Mining, Romania, Institute for Studies and Power Engineering (ISPE), and Faculty of Land Reclamation and Environmental Engineering, April 21-23, 2004
- "Analysis and Recommendations Regarding the Mixed Waste Landfill Corrective Measure Study Final Report prepared by Department of Energy and Sandia National Laboratories," Prepared under contract to Citizen Action, Sandia Park, NM, March 30, 2004 available at: http://www.radfree.nm.org/old_web/pdf_docs/comments_mwl.pdf
- "Statement of Intent to Present Technical Testimony in the Matter of the Petition for Alternative Abatement Standards for L-Bar Uranium Mill, SOHIO Western Mining Company, WQCC-02-24(A), before the New Mexico Water Quality Control Commission, Santa Fe, NM, May 2003"
- "Comments on Interim Independent Technical Peer Review Panel Report of January 15, 2003 on Sandia National Laboratories' Draft Corrective Measures Study for the Mixed Waste Landfill," January 2003 submitted to Waste Education and Research Consortium, Alas Cruces, NM, January 2003
- "A Review of Financial Assurance Options for Long-Term Stewardship at the Mixed Waste Landfill, Sandia National Laboratories," prepared under contract to Citizen Action, Sandia Park NM, through a grant from the Monitoring and

Technical Assessment Fund (MTA), June, 2002, at: http://www.radfreenm.org/old_web/pages/indie-review.htm

- "Comments on "Environmental Assessment Screening Report: Possession and Management of Waste Nuclear Substances Situated at the Spanish American, Milliken, Lacnor, Nordic/Buckles, and Pronto Historical Properties in the Elliot Lake Area, Ontario: A Report of the Canadian Nuclear Safety Commission, May 2001," Prepared on behalf of Miningwatch, Ottawa, Ontario, Canada, February 14, 2002.
- "Review of the Khiagda Uranium Mine Investment Rational and OVOS/Environmental Impact Assessment: Observations and Suggestions," Prepared on behalf of Buryat Regional Center on Baikal, Ulan-Ude, Buryat Republic, Russian Federation, January 28, 2002.
- "Technical Testimony in the Matter of the Draft Final Permit for the Triassic Park Waste Disposal Facility, US EPA No. NM0001002484" before the New Mexico Environment Department, Case No. HRM 01-02(P), on behalf of Citizens United for a Rationale Environment, Roswell, New Mexico, October 11, 2001.
- "Identification of Potential Water Quality Risks to Lake Baikal's Largest Tributary, the Selenga River, from Mining and other sources: A Preliminary Investigation," Prepared under contract to Baikalwatch, Earth Island Institute, San Francisco, CA, USA, September 20, 2001.
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