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September 9, 2009

Andrew Bain, Remedial Projects Manager
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street
San Francisco, CA 94105

Re: Comments on *Engineering Evaluation/Cost Analysis, Northeast Church Rock (NECR) Mine Site, Gallup, New Mexico, May 30, 2009*

Dear Mr. Bain,

Southwest Research and Information Center (SRIC) herein submits comments on USEPA's Engineering Evaluation/Cost Analysis (EE/CA) for the Northeast Church Rock Mine, located on Navajo tribal trust land principally in Section 35, Township 17 North, Range 16 West, McKinley County, New Mexico. These comments supplement oral remarks I made at the public hearings on July 7, 2009 at Pinedale Chapter and on August 25, 2009 at Churchrock Chapter.

Historical Context

At the outset, I want to recognize the assistance that EPA Region 9 provided to Churchrock Chapter, SRIC and the community at large in conducting environmental assessments in residential areas of the Church Rock Uranium Mining District between 2002 and 2007. With EPA's provision of in-kind services for surface gamma radiation surveys, water quality assessments, and indoor radon monitoring, complemented by testing of soils and runoff for uranium and other contaminants by collaborators from Stanford and Tufts universities, the Church Rock Uranium Monitoring Project (CRUMP) was able to document the presence of radiological and chemical contaminants above background levels near abandoned uranium mining and milling sites — including and especially in Red Water Pond Road community adjacent to the Northeast Church Rock Mine. With additional support and collaboration of the Navajo Nation Environmental Protection Agency (NNEPA) and the Tribal Air Monitoring Support (TAMS) Center at the EPA laboratory in Las Vegas, Nevada, we traced increasing gamma radiation levels from Pipeline Arroyo through the Mine Water Arroyo to the face of the

mine waste dump on the northern edge of the NECR site. We observed gamma rates in soils at the bottom of the Mine Water Arroyo up to 10 times local background (which we measured, and confirmed through statistical analysis, as 11 to 13 microRoentgens per hour [uR/hr]). In 2005 and 2006, our Stanford and Tufts colleagues measured increasing uranium levels in soils at up to three feet below land surface and topping 100 milligrams per kilogram-dry weight (mg/kg) near the base of the NECR mine waste dump. Later, we established that the range of uranium in soils not impacted by anthropogenic sources was 0.3 to 2.7 mg/kg (or ppm, parts per million) with an average of less than 1 ppm. We calculated a significant difference between uranium-soil levels in non-impacted areas versus uranium-soil levels near the NECR site. In other words, we established for the first time that a large part of the Red Water Pond Road community was contaminated by mining waste, and that uranium-soil levels may pose a public health risk.

Sadly, we also found that children had unknowingly played in the contaminated sands of the Mine Water Arroyo; that some residents had unknowingly and recently built new homes in the contaminated areas; that the cement floor of a traditional hogan was probably made with mine wastes; and that virtually of all the local residents who had lived in Red Water Pond Road since before the arrival of uranium mining in 1968 had no idea that their community was so widely impacted. I vividly remember the day in October 2003 when the late Arlene Luther, who had worked at NNEPA since its creation in the early 1980s, looked over the area and said to a few of us standing nearby, “we have got to do something about this, and now.” The following year, she asked the Navajo Land Administration Department to investigate and verify the land status of the NECR mine site. The answer came back: tribal trust land since 1933. These events culminated in the Navajo Nation requesting USEPA to assume regulatory authority over the site in 2005.

Further soil testing conducted by consultants for United Nuclear Corporation (UNC) and General Electric Company (GE) under EPA enforcement orders in 2006 and 2007 confirmed the CRUMP findings, and clearly showed that the extent of the problem in the Red Water Pond Road area was much greater than we had previously described. EPA undertook an emergency soil removal action in Spring 2007, excavating nearly 6,000 cubic yards of radium-contaminated soils from around five residences. This first removal action necessitated moving the families occupying the five households to temporary lodging in Gallup for periods of one to two weeks.

On October 23, 2007, the U.S. House Committee on Oversight and Government Reform, then chaired by Representative Henry Waxman of California, held hearings on the Navajo Uranium Legacy. The Northeast Church Rock Mine was prominently discussed as the No. 1 priority abandoned uranium mine on the Navajo Nation. One of the witnesses, Red Water Pond Road resident Edith Hood, described how she could see the “mountains” of uranium mine wastes piled 50 to 60 feet high at the NECR site and at the former Kerr-McGee Church Rock I Mine on the north side of the community from her front yard. “The uranium contamination and mining waste at my home continues to disrupt *hózhó*,” she said, explaining that the Navajo concept of *hózhó* “means balance, beauty and harmony between man and nature. When this balance is disturbed, our way of life, our health, and our well being all suffer.” She made an impassioned plea for federal help to “clean up the mess that the mining companies and the U.S. government have burdened us with. We need to restore *hózhó* so that we can live in balance and harmony with each other and nature as Navajo people, as *Diné*.”

Analysis of the Alternatives for Remediation of the NECR Mine Site

Arlene Luther's admonition to make the community safe again and Edith Hood's plea for restoration of her homeland have resonated with many of us over the past few years, and they can serve as guideposts for EPA, too. While provisions of CERCLA¹ may guide EPA's remedial actions at the Northeast Church Rock Mine, EPA must also take into consideration the fact that the NECR site is the first of at least 520 AUMs needing reclamation on the Navajo Nation, and therefore it is imperative that this one be done right the first time, with the full acceptance of the affected community and the Navajo Nation. If an inadequate clean-up plan is adopted for this site now, it is unlikely that EPA will have a second chance to get it right. The community's and Nation's interests will suffer again, adding yet another bad chapter to the Uranium Legacy story and another injustice to a community that has lived with uranium mining that it never asked for or approved for the past 40 years.

In my view, the EE/CA cannot be judged as an adequate plan for cleanup of the Northeast Church Rock Mine or as a plan for protecting the health of the local residents during and after remedial actions. I have several reasons for this conclusion.

First, as you indicated in response to questions at the public meetings and hearings earlier this year, detailed engineering designs for the five remediation alternatives are deferred until *after* the EPA decides which plan to adopt. With respect to EPA's **Preferred Alternative 5A**, disposal of mine wastes on the UNC tailings pile, this means that EPA will not be able to determine if placing 1.3 million tons of mine wastes on top of the UNC tailings pile will effectively isolate the mine wastes or will not have unintended consequences for stability of the tailings themselves. (That the waste volume may be *under estimated* is discussed below.) Other than a single plan-view drawing of the *possible* location of the NECR wastes near the former central cell of the tailings impoundment (EE/CA, Figure 3.5), the EE/CA contains no detailed technical analyses of the location of the mine-waste disposal area on the existing tailings, no analysis of surface topography that might affect the integrity of the mine-waste bottom liner, no analysis of the effects of loading of the mine wastes on the tailings, and no analysis of potential impacts to the groundwater under and down-gradient of the tailings — the very reason that the UNC tailings disposal facility was added to the National Priorities List as a Superfund site by EPA Region 6 in 1983.² Neither does the EE/CA address whether the disposal of pieces of mill equipment in the tailings has left voids beneath the cap that could lead to differential settling of mine wastes over time. This matter was raised by a former UNC employee, Mr. Scotty Begay, in oral testimony at the August 25 hearing. Mr. Begay participated in mill decommissioning activities in the 1990s and has direct knowledge of disposal practices at both the tailings facility and the NECR site.

Second, with respect again to **Preferred Alternative 5A**, EPA staff revealed at the Pinedale hearing that the U.S. Nuclear Regulatory Commission staff (NRC) had indicated that placing the mine waste on top of the tailings would *enhance and improve* tailings cover stability. I find no technical basis for NRC's purported comment in the EE/CA. However, assuming for the sake of argument that NRC has a technical basis for this view, it begs the question of whether something

¹ Comprehensive Environmental Response Compensation and Liability Act, 42 U.S.C. 9601 et seq.

² See, <http://cfpub.epa.gov/superpad/cursites/csinfo.cfm?id=0600819>.

is amiss with the stability of the existing tailings cover at the UNC tailings impoundment. The integrity of tailings covers to provide tailings isolation and stability for up to 1,000 years, and in no case less than 200 years³ (which is but a small fraction of the duration of the radiological hazards present in the tailings), has come under scrutiny recently with the findings of S.M. Stollar Corporation's performance evaluation of covers at four tailings sites managed by the U.S. Department of Energy (DOE). The Stoller report⁴ concluded that conventional low-permeability covers are exhibiting degradation only 10 to 20 years after they were installed due in large part to the intrusion of deep-rooted plants through the rock covers. Increased permeability and higher percolation rates result from plant intrusion, necessitating active maintenance — i.e., frequent removal of vegetation on covers — to sustain long-term performance. As you undoubtedly have observed from visiting the tailings site, the cap on the UNC tailings impoundment is now virtually covered with sage brush and other woody plants such that it is almost unrecognizable as a uranium waste disposal facility, and more important, may be subject to some of the same intrusion and stability problems identified in the Stoller investigation. The EE/CA does not assess the suitability of the UNC tailings pile as a disposal site for NECR wastes in light the Stoller findings, and this fact in and of itself should disqualify the tailings site for consideration as the permanent resting place for the NECR mine waste.

Third, **Alternative 5A** may not be feasible if the estimated waste volume of 871,000 cubic yards (approximately 1.26 million tons (EE/CA at 31)) is significantly underestimated and more material must be disposed across more surface area of the tailings pile. The estimated waste volume is based largely on the area believed to have radium-226 concentrations greater than 2.24 picoCuries per gram (pCi/g), and to a lesser extent, on a limited number of soil/waste samples from the "high activity" areas in and around Ponds 1, 2 and 3 at the NECR site. The EE/CA (at 13) admits that "there is insufficient data to confidently define the depth of contamination", but states further that the volume estimate is "conservative." Inputs to the volume estimate are shown in Table 3.1 of the EE/CA. Here, the estimated depth of the mine wastes in Ponds 1 and 2 is stated as 10 feet. Yet a close inspection of the plan-view and cross-section diagrams for Alternatives 3 and 4 (Figures 3.1 through 3.4, respectively) shows that the existing profiles of the ponds range from about 20 feet to more than 60 feet deep. Furthermore, MWH, UNC's and GE's technical consultant, collected soil samples from borings up to 45 feet deep in Ponds 1, 2 and 3.⁵ This information suggests that waste depths may be much greater than the 10 feet depth used to calculate the waste volume in Table 3.1.

Fourth, **Alternative 3**, consolidation and capping of wastes at the NECR Mine site, is not acceptable nor protective of human health and the environment because it does not include placement of a bottom liner to protect groundwater resources (EE/CA at 41). The EE/CA states that site conditions "suggest no groundwater influx from sidewalls and the base of Drainage Basin 2, which is the location of the proposed covered area." Yet the EE/CA admits that "[a]

³ See, U.S. Nuclear Regulatory Commission, uranium mill licensing regulations, 10 CFR Part 40 Appendix A, Criterion 6(1).

⁴ J. Waugh. Got It Covered? Performance and Renovation of Disposal Cell Covers at DOE Legacy Waste Sites. S. M. Stoller Corporation, April 21, 2009.

⁵ MWH. Final Removal Site Evaluation Report, Northeast Church Rock Mine Site. Prepared for United Nuclear Corporation, October 1, 2007.

detailed groundwater characterization has not been performed at the NECR mine facility to date” (EE/CA at 10), and provides virtually no information on groundwater conditions or quality at the site. This concern was raised by the Navajo Nation in its comments to the National Remedy Review Board in February 2009.⁶ The fact that no groundwater data exist does not justify a reclamation option that does not use state-of-the-art waste management techniques to protect human health *and the environment*. Capping alone would not be an acceptable waste management method for any other waste stream. The wastes at the NECR Mine Site are *radioactive* by their radium content and *toxic* by their uranium and arsenic concentrations alone. Their permanent disposition should be concomitant with these hazards and consistent with EPA’s determination that current site conditions and the potential for future releases from the site pose an imminent and substantial endangerment as defined in the National Contingency Plan.⁷

Fifth, while **Alternative 4**, construction of an above-ground, capped repository with a bottom liner at the NECR site, represents an improvement over Alternative 3 as a conceptual design, it also fails as a long-term remedy because the wastes would remain on the Section 35 mine site in perpetuity. As noted in the EE/CA (at 43), disposal of mine wastes at the site is not acceptable to the Navajo Nation or to the local community because it would commit another tract of tribal trust land to permanent disposition of radioactive wastes. The community’s position in this regard was made clear in its August 11, 2006, resolution⁸, which was signed by more than 100 people and transmitted to you by letter dated September 12, 2006:

USEPA should require that all mining wastes and contaminated materials and soils present at the UNC NECRM be physically removed from the site such that the land, which is held in trust by the U.S. for the use of the Navajo people, is returned to its natural, pre-mining condition such that reclamation allows for future redevelopment for human occupancy.

As a technical matter, disposal of mine wastes at the site by encapsulation or any other means always runs the risk of mechanical and-or structural failure. The mine site is at an elevation more than 100 feet higher than the community to the north, and drainage from the site flows to the north toward the Pipeline Arroyo. Furthermore, the conceptual design of the Alternative 4 above-ground repository (Figure 3.4) shows a northern (i.e., down-gradient) slope of approximately 1:1, which is roughly the slope of the existing, unreclaimed waste dump on the north side of the property at the Navajo Reservation boundary line. A significant part of the current and ongoing Interim Removal Action is down-grading the northern waste dump to a

⁶ Navajo Nation Department of Justice, Office of the Attorney General. Technical Comments of the Navajo Nation for the National Remedy Review Board Concerning the Proper Remedy for the Northeast Church Rock Site, February 2009.

⁷ See, EE/CA at 15; see, also, 40 CFR § 300.415(b)(2).

⁸ Resolution of Residents of Red Water Pond Road and Pipeline Canyon Road Concerning Proposed Assessment and Cleanup of the United Nuclear Corp. Northeast Church Rock Mine, Navajo Nation, McKinley County, New Mexico, August 11, 2006.

slope of about 2.5:1 to reduce erosion potential and provide interim stability until final reclamation is conducted.⁹

Alternative 2, total removal of all mine wastes from the NECR mine site to a disposal facility located outside of the Navajo Nation, has been identified by community members as their preferred alternative and by the Navajo Nation as its preferred alternative. Alternative 2 satisfies the community's August 2006 resolution and the Navajo Nation's policy of no additional permanent disposal of radioactive wastes on tribal trust lands or in Navajo Country. Adopting Alternative 2 is imperative to protect the public health of the local communities and the Navajo Nation as a whole, an issue that I will discuss below. But from a technical standpoint, the EE/CA's analysis of Alternative 2 is so deficient that it suggests the EPA staff did not treat it with the serious rigor it deserves. Additional analysis of Alternative 2 is needed, and EPA should engage the community, the Navajo Nation and interested parties in think-outside-the-box discussions to address the following questions:

- What are the risks of accidents involving waste trucks traveling State Route 566 to Old Route 66 at Churchrock Village and then to Interstate 40, or to the Burlington Northern rail line at Churchrock Village?
- Are alternative methods available to transport the mine wastes off of the NECR site without using SR 566? Alternatives might include construction of a rail spur from the Burlington Northern line to the NECR site, or construction of a dedicated haul road, perhaps using the bottom of the Puerco River as a *temporary* pathway.
- Can mechanical methods, like covered gravel or coal conveyors, be used to move mine waste off the site to a staging area that is near a transportation route, but away from residential areas?
- Are sites for permanent disposal of mine wastes available in the region that are closer, and therefore less expensive, than transport to a licensed treatment and disposal facility some 1,400 miles away? Did EPA consider any such alternative sites?
- Is selection and development of a disposal facility dedicated to uranium mine wastes from sites on the Navajo Nation and in other areas of the Grants Mineral Belt feasible?

These are, of course, not all of the questions one could raise. And certainly a broad public discussion would have to be held to consider public health, environmental, cultural and economic impacts of a regional disposal facility. But this is exactly the type of discussion that is needed if we are to help the Navajo Nation and other communities of northwestern New Mexico burdened by the Uranium Legacy develop a long-term, publicly acceptable solution to the abandoned uranium mine problem.

⁹ Request for a Time-Critical Removal Action at the Northeast Church Rock Step-Out Area, McKinley County, New Mexico, Navajo Nation Indian Reservation. Action Memorandum from Andrew Bain, Remedial Project Manager, to Elizabeth Adams, Assistant Director, Superfund Division, U.S. Environmental Protection Agency (San Francisco, CA); July 23, 2009; attached as Appendix B to AOC (CERCLA Docket No. 2009-11).

Public Health Analysis

In a separate comment filed for the record of this case, Dr. Johnnye Lewis, director of the University of New Mexico's Community Environmental Health Program and my colleague in the DiNEH Project Kidney Health Study¹⁰, outlined the results of our research in 20 chapters of the Eastern Navajo Agency examining whether exposure to uranium contributes to the high prevalence of kidney disease in the region. As reported by Dr. Lewis, we now have strong scientific evidence that living in proximity to abandoned uranium mines — especially mines of large surface areas like the NECR Mine — significantly increases the risk of kidney disease and the related diseases of diabetes and hypertension. The AUM proximity factor is also significant in the context of more commonly recognized risk factors, including family history of disease, obesity, age and level of education. Risk maps developed by our statistical modeler, Mr. Glenn Stark, a statistics Ph.D. candidate at UNM, show that the likelihood of disease in the NECR area is nearly doubled based on the proximity factor.

Some of the residents of Red Water Pond Road have been living with uranium mines for 40 years. Others worked in the local mines as young women and men. Several lived in areas so contaminated by radioactive materials that EPA removed six to 12 inches of soils from around their homes just two years ago. Just this past week we learned that some of the families watered livestock and a large cornfield located at the west end of the community with mine water pumped to a stock pond from Kerr-McGee's settling ponds for at least a 10-year period in the 1970s and early 1980s. In light of these chronic exposures and the DiNEH research findings, it is reasonable to conclude that it is not safe for the people to be living near the AUMs that, as Edith Hood noted two years ago at the Waxman Hearings, dominate the landscape in the Red Water Pond Road area. Accordingly, prudent public health policy dictates that —

- (1) Red Water Pond Road residents should not live in the community during both interim removal actions and the reclamation phase of the NECR Mine cleanup, and
- (2) All uranium mine wastes should be removed from the community. Eventually, this may have to include wastes at the Church Rock I Mine.

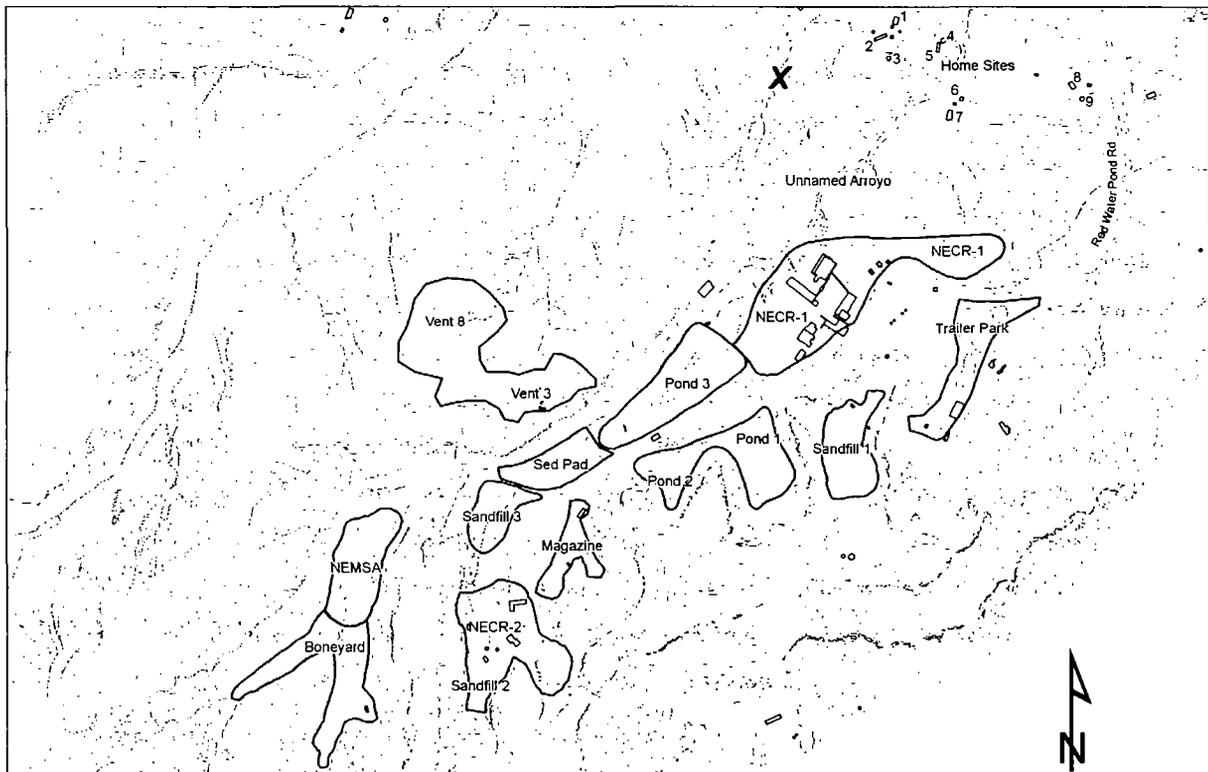
Another reason to exercise caution is that the clean-up action level of 2.24 pCi/g radium-226 carries a lifetime cancer risk of 1 in 20,000 for residential scenarios (EE/CA at 13), a risk level that is at the lower end of the risk range that USEPA usually regulates for human carcinogens (i.e., 1 in 10,000 to 1 in 1,000,000). While the 2.24 pCi/g action level compares favorably with USEPA's off-site clean-up standard for radium in soils at uranium mill tailings facilities (i.e., 5 pCi/g in the first 15 centimeters of soils and 15 pCi/g in the second 15 cm; see 40 CFR 192.02 and 192.04), the action level is still more than two times greater than local background of 1 pCi/g. Furthermore, radium is a Class A human carcinogen that is associated with bone, liver and breast cancers.¹¹ Some post-reclamation uses of the mine site may have to be limited or restricted by residual radium levels in soils.

¹⁰ The Diné Network for Environmental Health (DiNEH) Project's Navajo Uranium Assessment and Kidney Health Project is funded by the National Institute for Environmental Health Sciences.

¹¹ For more information on radium, see <http://www.atsdr.cdc.gov/tfacts144.html>.

Further soil testing is needed in the western portion of the community in and around the stock pond and cornfield that residents say received mine water from the Kerr-McGee CR-I settling ponds in the 1970s and 80s. As summarized in SRIC's report¹² of CRUMP activities and results, the mine water was reported to have exceeded federal discharge permit limits for total uranium, radium-226 and pH in 7 reporting months between 1980 and 1983. Red Water Pond Road residents say they routinely used water from the pond for livestock watering and irrigation during the period of operation of CR-I. They have accessed these locations countless times since then, unaware of the potential exposures to a known kidney toxicant (i.e., uranium) and a documented carcinogen (i.e., radium-226). We are not aware of any previous testing of these locations. That accumulation of radium and uranium in the sediments of the livestock pond and soils of the cornfield is likely is based on both CRUMP and EPA soil testing of the Mine Water Arroyo downstream from the NECR mine-water ponds.

As I indicated at the Churchrock Chapter hearing on August 25, additional soil radiation surveys and contaminant assessments are needed west of the current Step-out Area and north of the Reservation boundary to determine if releases from the Vent Hole Area on the west side of the NECR site may have contributed to an elevated uranium-soil level at a CRUMP/Stanford sampling location indicated by the X on the map below, taken from MWH's May 22, 2007 presentation of removal site investigation sampling results. A uranium concentration of 26.825



¹² Shuey C, Ronca-Battista M. *Report of the Church Rock Uranium Monitoring Project, 2003-2007*. Albuquerque: Southwest Research and Information Center, May 2007.

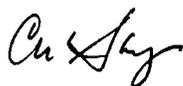
mg/kg (ppm) was detected at the location (coordinates: 35.66250N, -108.50917W), which is roughly equivalent to a radium-226 soil concentration of between 10 and 12 pCi/g, or 4 to 5 times the site-specific action level.¹³ While EPA officials have stated in the recent public meetings and hearings that soil assessments were completed in the drainage downstream of the Vent Hole area and that no additional contamination above the 2.24 pCi/g radium-226 action level was detected, I am unable to locate those data in the Administrative Record, and they do not appear to have been included in MWH's May 2007 presentation or October 2007 RSE report.

Finally, I note for the record Ms. Hood's testimony at the August 25 hearing that children who live in the Red Water Pond Road community are walking through or past the Step-out Area where the current Interim Removal Action (IRA) is being conducted. While the IRA is a separate activity covered by a separate Administrative Order on Consent executed between EPA Region 9 and UNC and GE on July 24, 2009, it is part and parcel to the phased cleanup of the mine site and the residential areas affected by the NECR Mine. As such, EPA should immediately make provisions to arrange for door-to-door transportation of these children to their schools in Gallup to prevent any further exposure of the most sensitive members of the population to the effects of ionizing radiation and heavy metal toxicants. It is my professional opinion as an environmental public health specialist that none of the residents of the community should be subjected to environmental exposures to materials released during the current three-part IRA, which also involves removal of contamination soils from the Mine Water Arroyo and from a portion of Red Water Pond Road and replacement with clean fill — a process that is expected to last into December. To protect the *entire* community's health, EPA should extend temporary housing benefits to all families of the community, regardless of the cost, for the duration of the current IRA.

And as noted above, temporary lodging outside of the community should be provided for all Red Water Pond Road families during the four to nine years that will be required for remediation of the NECR Mine site. It makes no logical or public health sense to remove contaminated materials from the residential areas and then let community members live in the area while at least 1.3 million tons of highly contaminated materials are removed from the mine site on the hill south of their homes. Both the Precautionary Principle and the principles of environmental justice mandate that such measures be taken to protect the health, safety and welfare of the Red Water Pond Road community members.

SRIC appreciates the opportunity to comment on the NECR Mine EE/CA and looks forward to continuing to work with EPA Region 9 on a comprehensive, protective and publicly acceptable cleanup of the Northeast Church Rock Mine site.

Sincerely,



Chris Shuey, MPH

¹³ This location was also shown as a yellow dot on Figure IV.4 of the SRIC CRUMP report.