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## A Toxic Legacy: Stories of Jackpile Mine

CONNIE A. JACOBS

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Leslie Marmon Silko's *Ceremony* is, among other things, a story of one people's relationship to a particular geography and the resulting alienation when this sacred relationship is breached. Laguna critic Paula Gunn Allen reminds readers of what must always lie at the heart of any reading of *Ceremony*: "We are the land, and the land is mother to us all. The land is not really a place, separate from ourselves, where we act out the drama of our isolate destinies; the witchery makes us believe that false idea."<sup>1</sup> Witchery is the name for the force that separates people from the land, as well as friends, families, and traditions. Silko physically locates the climax of the novel—a witches' ceremony—at Cañoncito, southeast of the Jackpile Uranium Mine, and so metaphorically correlates this site with witchery.<sup>2</sup> The novel is ultimately Tayo's story of how he must restore harmony between the land and his people.

The story in *Ceremony* is arresting because it is based on fact and because the horrors at Jackpile have become an enduring toxic legacy for the Laguna people, a modern version of witchcraft.<sup>3</sup> In this article, I want to reflect on the climax of the book—the torture and mutilation of Harley by Emo, Pinky, and LeRoy—and how Silko situates this horror at the Jackpile Mine. This scene could only have taken place at the mine, the place of ultimate desecration of Laguna land. It represents a site where, as Terry Tempest Williams reflects, a contract between human beings and the land was broken.<sup>4</sup>

After listening to the stories of Jackpile Mine told by Laguna people, I want to pass on their stories for teachers to use when teaching *Ceremony* and to reflect on the message for all of us as we try to comprehend the enormity of what occurred at the mine. In a 1985 interview with Laura Coltelli, Silko comments on the importance of listening to stories for what they mean now, and for the future.<sup>5</sup> Silko was only twenty-three when she began writing the book, but part of the power of *Ceremony* comes from her knowing the community's stories, as she lived in close proximity to Jackpile Mine. Other writers comment more fully on nuclear energy development as seen in Native

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literature.<sup>6</sup> This study collects stories from Laguna residents and aligns them with parallel events in Silko's novel.<sup>7</sup>

### STORIES FROM URANIUM MINING SURVIVORS

The story begins with the land. Manuel Pino, an Acoma tribal member, is a sociology professor at Scottsdale Community College and a member of the Laguna Acoma Coalition for a Safe Environment.<sup>8</sup> He and other coalition members have traveled around the world to conferences to tell the story of the mine and the Laguna Acoma people.<sup>9</sup> Pino recounts how Laguna became intertwined with the story of the beginning of the nuclear age due, in part, to location. The development of uranium and its use as fuel for the atomic bomb began "right in the heart of Indian country in New Mexico."<sup>10</sup> Los Alamos, where the first atomic bomb was developed, is within forty miles of several northern Pueblos: Nambé, Pojoaque, Santa Clara, San Ildefonso, San Juan, and Tesuque. In *Ceremony*, Silko describes Laguna's proximity: "Trinity Site, where they exploded the first atomic bomb, was only three hundred miles to the southeast, at White Sands."<sup>11</sup> With the prevailing west-to-east wind pattern, any site east of Los Alamos was vulnerable to airborne toxins released from the lab. Ultimately the most crucial piece of the story is the location of the Grants Mineral Belt, the largest deposit of uranium reserves known to exist in the United States. In thirty-plus years approximately 24 million tons of ore from this deposit were mined at Jackpile. Pino asks, "How many times over will 24 million tons of uranium ore, when processed into nuclear warheads, blow up the world?"<sup>12</sup> Most of the ore was sold to the Department of Defense for the production of nuclear weapons during the Cold War.

Laguna Pueblo's involvement with uranium mining begins in 1950. Ferris Romero tells how Paddy Martinez, a Navajo man from the Grants area, first discovered uranium in 1950 and shortly thereafter, a Laguna sheepherder named Joy Sinyella found a very high quality of uranium ore.<sup>13</sup> Since Laguna Pueblo was located on a rich deposit of uranium in the Grants Mineral Belt, the tribe soon leased 7,000 acres to the Anaconda Copper Mine,<sup>14</sup> which "operated a uranium stripping operation on Laguna land from 1952–1981."<sup>15</sup> Miners initially worked underground, but once Anaconda realized the immensity of the deposits, they began stripping away the earth to get the ore. This operation grew until it became the largest open pit uranium mine in the world: approximately two miles wide, several miles long, and several hundred feet deep.<sup>16</sup>

The unemployment rate for the Pueblo at that time, after World War II veterans like Tayo returned, was around 70 percent. Pino recounts how before the mining operation began, many of the people were engaged only in agriculture and raising livestock. Part of the agreement Anaconda made with the Laguna tribal council was that most of the jobs would go to tribal members. Pino relates, "Over the course of thirty years, the Anaconda Company Jackpile mine was a source of employment to many Laguna tribal members. The tribal council had initially negotiated for individual jobs with Laguna preference.

Peak employment reached 800, and about 80% of these employees were Laguna members.”<sup>17</sup>

There are six major villages at Laguna Pueblo, which is located about forty-five miles west of Albuquerque on Interstate 40, and Paguete is one of the most traditional. The mine is located approximately 2,000 feet from the village, and this is where the story of the Jackpile Mine becomes most intertwined with the fate of the Laguna people. Pino helps us understand the witchery of the mining operation: in those early years of production, uranium development at Jackpile was a hands-on, pick-and-shovel operation. Indian miners were not informed of the dangers of radiation exposure, nor were they given health screenings for exposure to high-level contaminants.<sup>18</sup>

One witness to this history is Dorothy Purley, who lived in Paguete. A chance to work at the mine provided her, as a single mother, with much needed employment, and for seven years she trucked ore to the milling site. She states, “We were never advised of any safety techniques or given any safety equipment. I never realized that there was any danger and was never advised about any of the harmful effects of radiation.”<sup>19</sup> She recalls sitting on top of the ore eating lunch, and remembers that Anaconda would usually conduct its blasting around the noon and evening meals. This was a time “when our village women would dry their fruits and vegetables during the harvest season. A fine layer of [radioactive] dust would cover our food, but we simply rinsed it off, not knowing it was toxic.”<sup>20</sup> She witnessed babies being born deformed and with mental retardation, allergies, asthma, and bronchitis. She also remembers a litter of kittens with no tails.<sup>21</sup> She tells how every time it rained, there was a strange smell from the mine.

Purley’s experience is representative of the many health problems that occurred from working in and living near the mines. Her brother, who worked at Anaconda for thirty years, died and left four children. Her mother died of undiagnosed stomach cancer. Her son-in-law, who never worked at the mine, has a rare form of skin cancer as a result of his older brother carrying in dust and contamination on his clothing. Another factor was living near the railroad where the ore was shipped. Purley miscarried three times and eventually contracted lymphoma cancer, which ended her life in 1999. She says that she knew of approximately fifty people in Paguete who died from mining-related diseases, as well as twenty others who had lived downwind from the mine.<sup>22</sup> Her later years were spent as an “outspoken activist against the health, environmental and cultural costs of uranium mining and milling. Twice she traveled to Japan to establish her link to the devastation of the nuclear blasts at Hiroshima and Nagasaki.”<sup>23</sup> She is one of the 1999 recipients of the Nuclear-Free Resistance Award.

Alveno Waconda, another miner from Paguete, told the following story in 1992 at the World Uranium Hearings in Salzburg:

The uranium ore was always around us. . . . We had lunch sitting in loader buckets to get out of the hot sun. No one warned us that the buckets were contaminated from the ore. . . . Although we had leadmen and foreman come to our areas to check on us, we always knew

they were coming because of the mine lamps headed towards our area. As soon as they would leave we would go back to our dangerous ways. Why did we do all those dangerous things? Money is the answer. The more ore work we produced the more we got paid, whether it was safe or not. . . . When the mine terminated, we were given physical examinations. But I do not know where those records are. No one has given us miners any other physicals to check on the effects of radiation or sillicosis. I, and members of the tribe, do not know what the long-term effects are from working in the mines. I feel strongly that we need to educate our people about the effects and destruction of our land, lives, and culture.<sup>24</sup>

Today, Waconda is an active member of the Laguna Acoma Coalition for a Safe Environment. Fellow coalition member Philip Sittnick describes Waconda as a tireless crusader “for environmental sanity and rightful justice for uranium miners, and the people of Paguante and Laguna Pueblo. [He] is an example for us all.”<sup>25</sup> Sittnick, an Anglo, developed a curriculum guide for the Laguna Middle School to educate Laguna children about the mining operation.<sup>26</sup> Sittnick emphasizes that the mine is a complicated issue because the tribe did benefit from the operation. However, the aftermath of mining continues to be hazardous. Sittnick discusses tailings, the radioactive leftover material from the milling, and the “23,700,000 tons . . . left there,” as well as the contaminated water used in the milling process that is eventually pumped into ponds.<sup>27</sup>

Pino gives additional information on the role of water quality as a result of mining. He describes how the reclamation effort was only partially successful because a great deal of uranium from the mines had already leached into the soil and water. He notes that two tributaries that flow directly through the mine into the Rio San Jose and eventually into the Rio Grande River have been found to have radioactive contaminants, discovered in the Elephant Butte Reservoir 150 miles away. They could have only come from the Jackpile Mine. This, he says, “is one of the best kept secrets of the United States.”<sup>28</sup>

Mildred Chino is another educator who teaches at the Laguna Elementary School. She has developed a month-long unit entitled “Water, the Greatest Storyteller . . . If We Could Only Listen” for students in hopes of keeping the story of the Paguate River alive. She is a lifelong member of Paguate Village and another member of the Laguna Acoma Coalition for a Safe Environment. Chino provides this important background information: “The source of the Paguate River is Mount Taylor, or the San Mateo Mountain Range. This river flows east through land that is still environmentally undisturbed, and it flows below Laguna Pueblo’s Paguate Village. After passing Paguate Village, the river flows through the Paguate Jackpile Mine, a reclaimed open-pit mine.”<sup>29</sup> This is the general route Tayo followed in *Ceremony*.

In my correspondence with Chino, this is the story she wanted me to pass on so that people will know what has happened to her village of Paguate:

I will begin with the fact that the entire playground of my generation is no longer available. I am fifty-seven years old. I see that land with wire fencing around it, and I remember all the play areas we had within the fenced area. My friends and I spent many hours playing on the land. We picked wild edible plants. We walked in the rivers and gulleys playing imaginative games. Gone are the beautiful valleys, which at the time provided farming spaces to the villagers as a means of subsistence. Fruit trees and cornfields are but a memory to my generation. The majestic plateaus, the sandstone rock formations of unending blends of off-white, beiges, tans, and reds are now mingled with the grays and black of the disrupted Earth. It's a shame that my five grandchildren will never walk in those same places. Mesas and unique rock formations are found, as settings, in stories and myths as told for many generations in Paguata. Some of those formations were blasted into eternity. How can a person who has grown up with these stories begin to understand the destruction, not only to the land, but to the stories that have sustained us over the centuries?<sup>30</sup>

There are many lasting negative effects of the Jackpile Mine.<sup>31</sup> In addition to the high rate of diseases, especially cancer, there is the instability and sterility of the land.<sup>32</sup> When Anaconda was operating the underground mine, they created huge holes in the earth that they supported with timbers and mesh wire. There is always the danger that these structures will collapse. Pino relates that there has been some cracking in the foundation of homes at Paguata because of the blasting at the Jackpile Mine.<sup>33</sup> Chino echoes this concern, as she also tells of the damage to homes due to the constant blasting at the mine:

Our mud homes are situated on top of a rock formation. When there were explosives blasting to loosen the ore, twice per day for close to twenty-five years, the entire formation vibrated, including the houses. Year after year, the houses endured the vibrations, until the cracks in the walls began deteriorating the entire structure. In recent years, some of the houses have had to be vacated or demolished. Some of these homes had been lived in for close to a century. What about the memories of living in one of those homes and witnessing the destruction of it? Believe me, that is the destruction of a way of life!<sup>34</sup>

The real-life survivors of Jackpile Mine live with a toxic legacy of uranium's aftermath.

#### STORIES RELATED TO *CEREMONY'S* WITCHERY

The binges of Tayo and the other veterans in *Ceremony* parallel the reservation environment created by uranium mining.<sup>35</sup> Pino, as a sociologist, has many stories to tell about the social impacts of the uranium mining—not only the loss of language and tribal traditions but also the corrosive effects of the new

wealth. As wages went up, so, too, did the incidence of drug and alcohol abuse. Pino observed an increase in the crime rate on the reservation and in border towns like Grants, New Mexico.

The horrific story Pino tells of the Paguate axe murders in 1978 is particularly disturbing. Two tribal members who worked at the mines got high on LSD and killed, dismembered, and then scattered the body parts of a fellow tribal member. This kind of violence was unheard of before the opening of the mine.<sup>36</sup> This disruption of the traditional social patterns is what Silko echoes in her climactic scene at the Jackpile Mine when a drunken Emo acts out the witchery of the desecration of the land, of relationships, and of traditions. Tayo describes the mutilation of Harley:

Squatting close to the ground, [Tayo] followed the long shadow cast by the continuous mounds of mining debris. He knew what they were doing; Harley had failed them, and all that had been intended for Tayo had now turned on Harley. There was no way the destroyers could lose: either way they had a victim and a corpse. He was close enough to hear them. "We told you to watch him. We told you to stay there."

"We told you. We told you, and now you know what you got for yourself."

Pinkie held his leg, and Leroy cut the whorl from the bottom of his big toe. Harley screamed hoarsely; the sound trailed off to a groan."  
(252)

Unfortunately, the torture in the novel had a real-life precedent.

In addition to the rise in crime, Ferris Romero observed a disruption in social patterns. People were passing up opportunities to get an education because they could make from \$40,000 to \$50,000 a year working in the mines. He notes that after the mines closed down, "Many people suffered remorse . . . because they were ill prepared to alter life styles and they lacked an education."<sup>37</sup>

Other ongoing problems remain: nothing grows in the reclaimed area except some sagebrush. None of the native plants have come back.<sup>38</sup> There is also the ongoing problem of contamination from the radioactive remains and water contamination. Silko describes this wasteland in the novel:

These were the hills northwest of Cañoncito. He sat down on a big gray rock by a cholla. Grayish green salt bushes had taken over the areas between the crisscross of big arroyos. South, in the distance, he could see one big cottonwood tree, the only bright green in that valley. It was growing on the edge of the deepest arroyo, its web of roots exposed, held upright only by a single connecting root. (242)

The mine is to the South, the direction where only one tree survives. According to Sittnick, "The process of radioactive decay lasts for thousands, even hundreds of thousands of years."<sup>39</sup>

The groundwater is also contaminated. Silko alludes to this in her description of an abandoned mine, the site of the murder scene: "But later in the summer the mine flooded again, and this time no pumps or compressors were sent. They had enough of what they needed, and the mine was closed, but the barbed-wire fences and the guards remained until August 1945" (244). The secrecy and security after the mine was closed suggests the contamination of land and water.

Pino tells of the St. Anthony Mine on New Mexico state land, abandoned twelve years ago and not reclaimed. This mine is two miles from Jackpile Mine, and during the monsoons of June, July, and September, water flows from St. Anthony mine through Jackpile. Students from the Middle School who have monitored different areas of the mine with Geiger counters report a high level of radioactivity. Educators feel it is probably too dangerous to the children for them to continue this study.<sup>40</sup> The witchcraft of polluted land is no metaphor to Silko, but a reality she experienced in Laguna.

Silko's connection of witchery to the Jackpile Mine appears in the poetic embedded texts of the novel. The destroyers sought to use rocks from the earth to create the ultimate weapon of destruction. Interpolated within Betonie's long talks with Tayo, in the middle part of the novel, Silko most directly connects witchcraft and uranium ore:

Up here  
In these hills  
they will find the rocks,  
rocks with veins of green and yellow and black.  
They will lay the final pattern with these rocks  
they will lay it across the world  
And explode everything. (137)

In the final scene, Silko returns to this motif: "But they had taken these beautiful rocks from deep within earth and they had laid them in a monstrous design, realizing a destruction only *they* could have dreamed" (*Ceremony* 246). The atomic bomb at Hiroshima destroyed the city and more than 140,000 lives. The bomb dropped on Nagasaki two days later resulted in 40,000 deaths/people missing and 40,000 people injured. Sittnick reminds us, "the United States has the reputation for being the only country in the world that has ever used an atomic bomb on another country."<sup>41</sup> The magnitude of destruction exceeds anything known before in history. The fictional Tayo was able to turn the force of destruction, or evil, against itself only because he had the healing power of Ku'oosh's, Betonie's, Ts'eh's and his own ceremonies.

## CONCLUSION

The stories are not all tragic for Laguna and Acoma. Although much of the aftermath of the mining proved to be disastrous to the land and to the people, there have also been stories of the tribes' resilience in dealing with the effects of thirty years of mining. The Laguna Acoma Coalition for a Safe



Environment tirelessly campaigns to educate people about the hazards of mining uranium. Educators like Mildred Chino and Philip Sittnick help shape a consciousness about mining for future generations at Laguna. As a result of their activism and work by other people around the world, mines that have affected Native people worldwide are monitored. Bruce E. Johansen has compiled a listing of sites, "Indigenous Peoples and Environmental Issues: An Encyclopedia."<sup>42</sup>

One success in the aftermath of uranium mining was the creation in 1982 of a tribal construction company. The tribal members "employed the best possible planners, engineers, and construction managers and formed the Laguna Construction Company. The newly formed company, headed by Jim Olsen, employed former miners who were excellent heavy equipment operators and reclaimed the Jackpile pit."<sup>43</sup> They now work on other reclamation projects such as dismantling military nuclear areas and cleaning up radioactive contaminants. The Environmental Protection Agency will monitor the reclamation site for thirty years and currently has found acceptable levels of radiation.<sup>44</sup> At the end of the EPA monitoring, the tribes' Natural Resource Department will check levels of radiation in the soil, air, water, and plants.<sup>45</sup> In addition, Sittnick tells how the tribe invested its revenues from the mine wisely and then used the earnings to modernize the pueblo, to build the Tribal Building and Middle School, and to begin a tribal scholarship fund. In 1999, more than 1,000 Native Americans gathered at Laguna Pueblo to celebrate the tenth year of the Indigenous Environmental Network.<sup>46</sup> This organization came into being as tribes sought to work with each other to battle the multinational mining companies and the United States government over environmental disasters perpetrated on tribal lands.

The entire novel *Ceremony* builds to the final scene in which uranium mining is associated with traditional witchcraft. Tayo fights a valorous personal battle against overwhelming forces and perseveres, just as many heroes in the Laguna and Acoma communities persevere against global forces of destruction. This is ultimately the lesson to be learned from Silko's novel and from the stories of Laguna and Acoma people. The balance between good and evil is always a delicate one. Therefore, people of goodwill must work to maintain this harmonious balance between land and people, especially when consequences are so long lasting.

## NOTES

1. Paula Gunn Allen, "Feminine Landscapes in Leslie Marmon Silko's *Ceremony*," in *The Sacred Hoop: Recovering the Feminine in American Indian Traditions* (Boston: Beacon Press, 1992), 119.

2. See Robert M. Nelson's article, "The Function of Landscape in *Ceremony*," in *Leslie Marmon Silko's Ceremony: A Casebook*, ed. Allan Chavkin (New York: Oxford University Press, 2002). In this insightful article, Nelson lays out three important planes on which the story takes place: Tayo's experiences, the story of his people that Tayo must reenact, and the geography where all of the action takes place. Nelson argues the novel is a congruence of all these planes, in which each one informs the others.

3. Philip Sittnick, "Uranium Mining and Its Impact on Laguna Pueblo," in *A Study Guide for an Interdisciplinary Unit* (Laguna Middle School, July 1998), 24. Sittnick tells how the mine got its name: one day before the mine was dug, an Anaconda boss named Jack Knaebel was told by one of his pilots that he had located a large deposit of uranium ore with the Geiger counter in his plane. Knaebel went to check on the find, but being ill, vomited behind a bush at the site. The next day when the pilot returned to this place, he told people he was "heading for Jack's pile."

4. Terry Tempest Williams, "The Clan of the One-Breasted Women," in *Refuge: An Unnatural History of Family and Place* (New York: Random House, 1999), 129.

5. Laura Coltelli, "Leslie Marmon Silko," in *Winged Words: American Indian Writers Speak* (Lincoln: University of Nebraska Press, 1990), 141.

6. See especially Shamooin Zamir's "Literature in a 'National Sacrifice Area': Leslie Silko's *Ceremony*." *New Voices in Native American Literary Criticism*, ed. Arnold Krupat (Washington: Smithsonian Institution Press, 1993), 396–415. Zamir's Marxist/postcolonial reading emphasizes the assault on the Laguna people's traditional life as a result of the mining, and she reads the witchery in the novel as "Silko's diabolic myth for historical disruptions and colonial violence" (400). The societal shifts brought on by the mining demand new stories and new ceremonies, and the article analyzes the competing Pueblo and western narratives embedded in the novel. This analysis of *Ceremony* also provides good background information on Anaconda Company and the devastation to the area and to the people that resulted from the strip-mining operation.

7. My thanks to Manuel Pino, Alveno Waconda, and Mildred Chino, who so willingly shared their stories and photos with me through emails, phone conversations, and mail. Their generosity of spirit made this article possible.

8. Members of the Laguna and Acoma tribes founded the Laguna Acoma Coalition for a Safe Environment in 1994 in order to educate and fight for rights for the tribes and for the miners affected with diseases that resulted from working at the Jackpile Mine.

9. This ongoing activist group testified at the World Uranium Hearing in Salzburg in 1992; the 1998 World Conference Against Atom and Hydrogen Bombs, Hiroshima; the Hague Appeal for Peace in 1999; the 2001 World Conference Against Racism, and the 2002 World Summit on Sustainable Development, both in South Africa; and most recently, in 2003, the Western Mining Activists Network Conference in Vancouver and the National Environmental Conference in Alaska.

10. Manuel Pino, "Testimony," World Uranium Hearings, Salzburg, 16 September 1992. Rpt. from *Poison Fire, Sacred Earth. Lectures, Conclusions, The World Uranium Hearings, Salzburg 1992*, 146–148, available at <http://www.underground-book.com/chapters/uranium/> (accessed 3 June 2004). Pino tells how the BIA helped negotiate the contract between the mine and the Pueblo, but failed to warn the miners of the potential dangers.

11. Leslie Marmon Silko, *Ceremony* (1977; New York: Penguin, 1986), 245. All subsequent quotations, cited parenthetically in the text of the paper, are from this edition.

12. Pino, "Testimony," 3.

13. Romero worked in the uranium mining industry for seventeen years, served on the Laguna Tribal Council for fourteen years, and is a member of Pueblo of Laguna tribe.

14. Sittnick, "Uranium Mining," 24. He explains the leases: "Anaconda's original lease with the tribe was signed May 7, 1952, for 4,988 acres. The company later negotiated the lease of additional acres, 2,560 in 1963 and 320 in 1976."

15. Anaconda Company, Records, 1876–1974, available at [http://www.historycooperative.org/journals/eh/8.1/bib\\_4.html](http://www.historycooperative.org/journals/eh/8.1/bib_4.html). Scroll to Montana Historical Society/Anaconda Company/1876–1974 (accessed 3 June 2004). This source gives the following information on the company: "Anaconda Mining Company incorporated 1892; in 1895 renamed Anaconda Copper Mining Company; in 1955 reorganized at Anaconda Company; sold to Atlantic Richfield Co., 1979, and operations shut down in 1983."

16. Pino, "Testimony," 2.

17. *Ibid.*, 3.

18. Pino, telephone interview by author, 23 September 2003.

19. Dorothy Purley, in "Remembering an Inspiring Nuclear Abolitionist," American Friends Service Committee, in *Peacework Magazine* (December 1999–January 2000), 2, available at <http://www.afsc.org/pwork/1299/peacewrk.htm>, 2 (accessed 3 June 2004).

20. *Ibid.*, 1.

21. Dorothy Purley, "Uranium Mining and the Laguna People," interview by Susan Lee, July 1995, *Synthesis/Regeneration* 10 (Spring 1996): 1, available at <http://www.greens.org/s-r/10/toc.html> (accessed 7 July 2004). (You must first go to <http://www.greens.org/s-r/> and click on issue number 10.)

22. *Ibid.*, 1.

23. "Dorothy Purley & Grace Thorpe, 1999 Nuclear-Free Resistance Award Recipients": 1, available at <http://www.nuclear-free.com/english/res.htm>, 25 (accessed 7 July 2004).

24. Alveno Waconda, Testimony, World Uranium Hearings, Salzburg, 16 September 1992. Report from *Poison Fire, Sacred Earth, Testimonies. Lectures, Conclusions, The World*, 1999, 1, available at <http://www.ratical.org/radiation/WorldUraniumHearing/AlvenoWaconda.html> (accessed 7 July 2004).

25. Sittnick, "Uranium Mining," 2.

26. Alveno Waconda provided me with this curriculum, as well as the photos of the mine taken from the Laguna Acoma Coalition for a Safe Environment archives. Sittnick's Laguna Uranium Mining Curriculum contains the following units: Introduction, Nuclear Science and Uranium, The Nuclear Fuel Cycle, Uranium Mining in the 'Grants Mineral Belt,' The Jackpile/Paguete Mine, The Legacy of the Mine, and Future Outlook.

27. Sittnick, "Uranium Mining," 15. The rocks were crushed at the mine and then mixed with water to form a slurry. Sittnick explains: "The slurry is pumped into special tanks where it is mixed with certain chemicals (often sulphuric acid) that separate out the uranium ore from the rest of the rock. This process is called leaching. . . . The final steps of the milling process involve removing the water and drying the uranium precipitate, called yellowcake. The yellowcake is then packaged, usually into 55 gallon steel drums, for shipment to an enrichment plant."

28. Danielle Knight, "Native Americans Denounce Toxic Legacy," International Third World Press News Agency (IPS), 14 June 1999, 3. Rpt. online <http://www.twinside.org.sg/title/legacy-cn.htm> (accessed 13 July 2004).

29. Mildred Chino, "Water, the Greatest Storyteller . . . If We Could Only Listen," available by writing to Mildred Chino, Laguna Elementary School, P.O. Box 191, Laguna, New Mexico 87026; or by email at [mymail@anywhere.edu](mailto:mymail@anywhere.edu).

30. Mildred Chino, letter to the author, 6 October 2003.

31. For more background information on the mining operations and their effects, I offer the following list of selected materials: Peter Eichstaedt and Murray Haynes, *If You Poison Us: Uranium and Native Americans* (Santa Fe: Red Crane Books, 1994); F. J. Hahne, *Early Uranium Mining in the United States*, Fourteenth International Symposium Uranium Institute (London, 1989). Rpt. online <http://www.world-nuclear.org/usumin.htm> (accessed 13 July 2004); Jackpile-Paguate Uranium Mine Reclamation Project Environmental Impact Statement, U.S. Bureau of Land Management, 1985; Winona LaDuke and Ward Churchill, "Native America: The Political Economy of Radioactive Colonialism," *Journal of Ethnic Studies* 13, 3 (1985): 107–32; Peter Nabokov, *Native American Testimony: A Chronicle of Indian-White Relations From Prophecy to the Present* (New York: Penguin, 1991); The League of Women Voters Education Fund, *The Nuclear Waste Primer: A Handbook for Citizens* (New York: N. Lyons Books, 1993); and Manuel Pino, "Testimony," 33.

32. Zamir, in "Literature in a 'National Sacrifice Area,'" and Nelson in "Landscape" compare this land to T. S. Eliot's "Wasteland."

33. Pino, "World Uranium," 3.

34. Chino, personal correspondence, 6 October 2003.

35. The time sequencing of Silko's story does not correspond with actual events. The climax of the story takes place at the abandoned Jackpile Mine. However, the mining for the uranium that was used in the bombs dropped in World War II did not come from Laguna but rather from mining done on the Navajo Reservation. Company records tell us that Anaconda did not begin production at Laguna until 1952. So why would Silko place the climactic scene at a closed mine shaft that in actuality was not yet opened? Silko gives us the answer for her time distortion in the text. "The ceremony was completed there" (246). Tayo finally understands the pattern of Betonie's ceremony at the mine, a place where the witchery unleashed in the world seeks to use "an ore rock" to divide humans from each other and to desecrate the earth (246). The abandoned mine shaft is a metaphor for what has been lost, and it is up to Tayo to reverse the course set in motion by the witchery. "He had only to complete this night, to keep the story out of the reach of the destroyers for a few more hours, and their witchery would turn, upon itself, upon them" (247). The healing ceremony fittingly ends at the ultimate source of evil, the abandoned mine shaft, not the mine shaft that had the potential to destroy, but the place where rocks were taken from the earth and "laid in a monstrous design" (246).

36. Pino, interview, 23 September 2003.

37. Ferris Romero, "Uranium Mining: Its Effects on Laguna Pueblo," in UR-2001 \$1 "Metal of Dishonor" Section IV: Indigenous Peoples Victimized by Military Radiation, available at <http://www.geology.und.edu/gerla/geocult.leuders.html> (accessed 3 June 2004).

38. Pino, interview, 23 September 2003.

39. Sittnick, "Uranium Mining," 15.

40. Pino, interview, 23 September 2003.

41. Sittnick, "Uranium Mining," 21.

42. Bruce E. Johansen, "Indigenous Peoples and Environmental Issues: An Encyclopedia," available at <http://www.ratical.org/ratville/IPEIE/index.txt> (accessed 7 July 2004). You can contact the author at [bjohansen@mail.unomaha.edu](mailto:bjohansen@mail.unomaha.edu).

43. Romero, "Uranium Mining: Its Effects," 3.

44. Ibid.

45. Sittnick, "Uranium Mining," 27-28.

46. Cate Gilles, "Native Americans gather to defend homelands," in High Country News online at [http://www.hcn.org/servlets/hcn.Article?article\\_id=5183](http://www.hcn.org/servlets/hcn.Article?article_id=5183) (accessed 17 July 2004).