"Halfway Between Nobody Knows Where and Somebody's Starting Point". A History of the West End of Motrose County, Colorado

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"HALFWAY BETWEEN NOBODY KNOWS WHERE AND SOMEBODY'S STARTING POINT": A HISTORY OF THE WEST END OF MONTROSE COUNTY, COLORADO

by

John A. Hardcastle

A thesis submitted in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

in

History
ABSTRACT

"Halfway Between Nobody Knows Where and Somebody’s Starting Point": A History of the West End of Montrose County, Colorado

by

John A. Hardcastle, Master of Arts
Utah State University, 1998

Major Professor: Dr. F. Ross Peterson
Department: History

The thesis contains interesting and relevant information concerning the impact of the mining and milling industry on communities located within a geographically, socially, politically, and economically defined area in southwestern Colorado. This area supplied a tremendous amount of radium, vanadium, and uranium in successive eras. The author focuses primarily on Uravan, and examines the town’s role in the uranium procurement program during World War II. The study of Uravan also provides information on the social structure of a company-owned community. Also examined are the ways in which government policies affected these small communities, and the impacts of the mining and milling industry upon the environment and human health.

(424 pages)
ACKNOWLEDGMENTS

I thank the Grand Junction Office of the Bureau of Land Management for the financial support of this project. Michael Piontkowski helped me get started and Wade Johnson enthusiastically encouraged me. I also thank the Museum of Western Colorado for financial support.

The staff of Umetco Minerals Corporation has been extremely helpful. I appreciate the consideration of Jack Frost, Milt Derrick, Jay Davis, and John Hamrick. Bob Beverly and Vern Bishop contributed a lot to the project.

Bill Chenoweth has helped tremendously. Betty Zatterstrom of the Rimrock Historical Society Museum showed me great generosity. The friendly staff at the Mesa County Public Library made the research easier. Duart Martin and Virginia Rogers assisted with the research, and I am grateful for their encouragement. Carolyn Been introduced me to many West End residents, and I value her support and that of Mary Helen deKoevend. I appreciate the memories and the time that Estalee Silver shared with me.

And thanks to the many former and current West End residents who agreed to talk with me. Although I have chosen to keep most of them anonymous, I will remember them for their friendliness, helpfulness, and considerable contribution to this thesis.

John A. Hardcastle
"No man fit to be called a historian ever finished his work without feeling the inadequacy of his own powers, or of any conceivable human means, to reproduce the little fragment of history which he has chosen."¹

This thought comes to mind upon the completion of the present work, a history of the West End of Montrose County, Colorado. It is by no means complete or thorough, simply a reproduction of a little fragment of the West End's fascinating history. The history of even a very small place seems impossible to tell; one searches through the records and finds all manner of subtle or pronounced influences that are worthy of examination, but which must be excluded for the sake of brevity and in favor of the theme one has chosen. But the attempt to portray a place, to make it come alive, and to describe what it was really like and how the people reacted to events and made their decisions--that effort may produce the feeling of "inadequacy" described in the previous paragraph.

I have attempted to explain how the presence of certain metals in West End mineral deposits has shaped the development of the area. I have attempted to demonstrate the ways in which West End history has been shaped by people, companies, and government agencies whose sole

¹William Roscoe Thayer, "History--Quick or Dead?" Atlantic Monthly 122 (November 1918): 642.
interest in the West End lay in the region’s mineral deposits. And I have tried to interpret the ways in which the West End responded to the events and decisions that impacted its development.

During the course of my research I conducted forty-seven interviews with varying degrees of formality. However, sixty-four people actually sat for interviews; in many cases a husband and wife both shared their time and experiences with me. In such cases each gave his and her responses to my questions. I asked each a different set of questions. They sometimes corrected one another and they often elaborated upon the other’s statements. Thus, I received two interviews in one sitting, and I have chosen to cite them in the footnotes as separate interviews. My interpretations have also been informed by numerous informal conversations with various individuals.

With certain exceptions, most of those I interviewed I kept anonymous, simply for the sake of privacy. When the source of my information is obvious, or when the interviewee gave information of a specific, technical nature, I have cited him by name in the footnotes.

I have relied heavily on newspaper articles. While such information can sometimes be misleading, incomplete, or inaccurate, it is also insightful; and in this case, it was often the only source of information on certain topics. The newspaper articles are not listed in the bibliography; thus,
in the footnotes I use the complete citation for newspaper articles each time they appear in the footnotes.

The West End's only newspaper has been published continuously since 1953. It began as the Nucla Forum, was changed to the Forum in 1954, and again to the San Miguel Basin Forum in 1971. The reader will notice this change of names in the footnotes.

I have also used documents found in the storage building of Umetco Minerals Corporation of Grand Junction, Colorado. Umetco Minerals is the latest name for a subsidiary of Union Carbide Corporation; its former names were the United States Vanadium Corporation, and Union Carbide Nuclear Company. Umetco's records contain documents from each of these three companies. I have faithfully cited these documents by file, drawer, and room number; however, Umetco Minerals is in the process of reorganizing its old records, so the designations I used in the footnotes may no longer be accurate. I have not included in the bibliography company documents cited in the footnotes.

While this is a history of the West End of Montrose County, I have given special emphasis to the development and community structure of Uravan. I considered certain aspects of Uravan's history--its function during World War II, its unusual status as a company town, and the presence in Uravan of the West End's most influential company--to be worthy of closer examination within the context of the entire area.
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CHAPTER 1
"THE GREAT UNDEVELOPED WESTERN MONTROSE COUNTY" ¹

In 1981 historians of Colorado’s Western Slope dubbed the region "A Land Alone." The area’s history is distinctive enough to merit recognition as a region separate from the rest of Colorado. Indeed, it has been suggested that the Western Slope deserves to be studied as one of the major geographic entities of the United States. ²

Vastness and isolation distinguish this part of Colorado. The Western Slope is bound by the mountains of the Continental Divide on the eastern side, while remote, sparsely populated desert characterizes the far western side. During the early development of western Colorado, this unusual geography prohibited easy travel into and out of the area. Even today most of this region is isolated; communities are, for the most part, small, and the distances between them great. Winter weather often makes travel difficult, both within the Western Slope and to points beyond.


"Geography has always been the key to the history and development of the Western Slope."¹ Nature endowed this region with an array of mineral resources, wide fertile valleys, and plenty of open graze land. Into this land alone white settlers flocked during the last quarter of the nineteenth century. Miners sought primarily gold and silver, "Colorado’s original creators"; but soon other minerals would become equally prized.⁴ Simultaneous with the miners came farmers, ranchers, and town builders. During the 1870s and 1880s, numerous towns, not to mention mining camps, arose on the Western Slope.

Climate extremes further characterize western Colorado. The high mountain regions receive tremendous amounts of snowfall; the winter temperatures are low and the summers are short. Meanwhile, the canyon lands and high plateaus near the Utah border are known for hot summers and an arid climate. Across the Western slope the terrain is rugged, not easily accessible, and often unyielding. "The forbidding mountain ranges, bitter cold, inhospitable canyons and plateaus, and the paradox of heavy snow and little water have forced people to conform to the lay of the land and nature."⁵

¹Vandenbusche and Smith, A Land Alone, 2.
⁴Lavender, foreword to A Land Alone, vii.
⁵Vandenbusche and Smith, A Land Alone, 2.
To the extent possible, people also conformed the land to their needs. For example, the valleys proved fertile; farmers found that they could grow all manner of vegetables, grains, and many types of fruit trees. But the arid climate--much of the Western Slope receives less than ten inches of rain per year--made irrigation a necessity. The irrigation systems proved complicated and costly, and the rivers simply do not supply as much water as people once supposed.6

Miners also needed water for their operations, and like the farmers, they went to great lengths to get it. A more serious problem for the miner, however, resulted from the boom and bust nature of the industry. The mining fortunes of western Colorado have always depended on outside markets. Moreover, the industry relied upon outside capital to finance its operations. David Lavender, a native of the area, noted the irony: "Thus though the Western Slope speaks proudly of 'its' riches, it actually finds itself in economic thralldom to Denver and points beyond. The result is a prickly defensiveness among many Slopers and, often, a deep ambivalence about which way to jump next."7

The people of this region have forged an identity, part mythical and part real, as "Western Slopers." This identity

6 Ibid., 147-153, 184-192.

7 Ibid., 183-184; Lavender, foreword to A Land Alone, vii.
was shaped by the land itself, which is beautiful and full of promise, yet rugged and demanding. As they grew up with the country, as it were, Western Slopers became part of it. Part of the identity is a certain defensive political posture, an "us versus them" mentality that resulted from the region's isolation, small population, and its wealth of natural resources, not the least valuable of which is water. The Western Slope has traditionally felt underrepresented in state politics; the area lacked the political influence to advance its own interests, for example, and felt powerless when the eastern slope population centers appropriated western Colorado's water. The exploitation of the Western Slope's mineral resources has traditionally generated some resentment, as well. Quite often the money used to finance mining operations came from banks and capitalists from the eastern part of Colorado. The people of the Western Slope "watched as profits of their labor went right into Denver banks and Denver-based mining companies." Meanwhile, within the Western Slope members of various interest groups find themselves at odds with one another. Farmers and ranchers, environmentalists, and developers all have fought to preserve, promote, or exploit that which seems most valuable to them.⁸ These struggles are the legacy of the Western Slope.

Slope, and its history is the interaction between the people and the land.

Within this vast region, one small part serves as a microcosm--the West End of Montrose County. The West End, too, has earned its own identity, although the fact may not be widely known. One begins each word with a capital letter, and by adding the suffix "er," one forms the name by which residents of the area are known, West Enders. The West End is home to unusual geographic formations, as well as several artificial monuments to human endeavor.

The land lured the white settlers to this far western part of Colorado, and they, like Western Slopers in general, conformed to the land. Miners, ranchers, farmers, and town builders faced the same challenges that confronted others in western Colorado. They had to find ways to make a living in a dry, isolated, environment. The West Enders, those who stayed and made the history of the place, demonstrated a resourcefulness and hardiness that earned them a special identity.

The West End is geographically separated from the east end, and from the county seat, Montrose, by the Uncompahgre Plateau. This plateau, with elevations of up to ten thousand feet, traverses the oddly shaped county roughly in a diagonal direction, from northwest to southeast. It neatly bisects the county.
On the eastern side of this divide lies the broad, level Uncompahgre Valley, drained by the Uncompahgre River. The valley encompasses approximately 175,000 acres of arable land, and the city of Montrose, at 5,800 feet elevation, sits in the middle of this valley. The community was founded in 1882, at approximately the same time that settlers began hopefully tilling the soil. Montrose benefitted from the Denver and Rio Grande Railroad, which built a depot in town, and by its proximity to other communities, including the mining town of Ouray. It served as a market and "distribution point for nearby farms, ranches, and orchards."9

Originally, sagebrush and native grasses grew in the alkaline soil of the Uncompahgre Valley. Almost desert-like, the valley receives approximately ten inches of rain per year. Nevertheless, homesteaders poured into the valley and dug irrigation ditches from the nearby Gunnison and Uncompahgre Rivers. The valley, which stretches north into Delta County, achieved a certain renown for fruit and vegetable crops, but many growers struggled for lack of water.10

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10Vandenbusche and Smith, A Land Alone, 147-148.
The answer to this problem came in the form of the remarkable "Gunnison River Diversion." Approximately five hundred workers built a 6.2-mile tunnel from the Black Canyon of the Gunnison River to the Uncompahgre Valley, through the mesa that separates the two. The United States Reclamation Service undertook the project at a cost of $10.5 million. The construction lasted from 1905 to 1909, and has proved one of the more successful irrigation projects on the Western Slope.\textsuperscript{11}

The West End of Montrose County, in contrast with the east end, is characterized by sagebrush and cedar-covered mesas, deep canyons, and unusual sandstone formations. Elevations range from five thousand to six thousand feet. This area, west of the Uncompahgre Plateau, is drained by the Dolores and San Miguel Rivers. The Dolores and San Miguel Rivers join in western Montrose County, after which point the river is named Dolores. The West End’s most unusual and dominant geologic feature is the Paradox Valley, so named because the Dolores River flows across the valley, in a transverse manner, rather than lengthwise along the middle of the valley floor. The following description captures not only the peculiar beauty of the Paradox Valley, but also gives one a good impression of much of the West End landscape.

\textsuperscript{11}Ibid., 185-187; O’Rourke, \textit{Frontier in Transition}, 144. O’Rourke reported that the Gunnison Tunnel, as it is known, cost $6.7 million.
The valley is about 25 miles long, extending in a northwest-southeast direction, and varying in width from two to five miles. On all sides, except the southwest, abrupt and often sheer walls of naked rock rise to a height of from fifteen hundred to two thousand feet from the valley floor. These walls, fantastically eroded in banded red and gray sandstone, present strange and unearthly aspects in the changing lights. The Dolores River enters the valley through a narrow canyon in its south wall and after meandering across the valley floor makes its exit through an equally narrow canyon to the north.12

One finds similar scenery along the San Miguel and Dolores Rivers, which have cut into the sandstone. Brilliantly colored mesas and cliffs overlook these rivers and the roadway that leads north to Grand Junction.

Just east of the San Miguel River the land rises several hundred feet in elevation, the gentle beginning of the Uncompahgre Plateau. Several creeks flow from the higher elevations of the plateau toward the San Miguel. Along this margin of the Uncompahgre Plateau lie a series of "parks," broad expanses of grass and sage covered land.

The first white settlers of the West End came to the Paradox Valley in the late 1870s and early 1880s to raise cattle, and by 1879 the settlement of Paradox had been established. During the succeeding decades a number of homesteaders came to the valley, intent on raising crops or livestock on the exceedingly arid land. "With mystic and

determined hope," one observer wrote, these families "yearly wait for the completion of the irrigation project that is to convert this desert into a paradise."\(^{13}\)

During the late nineteenth century the West End attracted a number of ranchers and cattle companies. One of these, the San Miguel Cattle Company, operated its Club Ranch in the San Miguel Canyon, approximately one mile from the future site of Uravan. The ranch headquarters, "splendidly located in a country all its own," encompassed 110 acres, and ranchers had access to summer grazing land on the Uncompahgre Plateau. By 1906 the property had passed into individual ownership, and cattle on the ranch numbered 3,500.\(^{14}\)

In the early 1880s homesteaders arrived at the San Miguel River; they would call their settlement Naturita, supposedly the Spanish diminutive form of the word "nature." (The name is pronounced as "natta-rita.") By 1894 Naturita boasted of a school, and by 1905 enough families lived in the surrounding area to send twenty-five children to the

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school. Naturita became a "stopping-off place for freight wagons" that ran between the Paradox Valley and Placerville, the closest rail head.\(^{15}\)

The town of Nucla owes its existence to a group of hardy communalists. Nine men and one woman formed the Colorado Cooperative Company in 1893 in Denver. The group sold stock at one hundred dollars per share, and it limited members to one share each. The company moved to the West End the following year. The colonists lived in Pinon and other camps near Naturita for several years while they constructed a wooden flume and ditch to bring water seventeen miles from the San Miguel River to Tabeguache Park, a mesa five hundred feet above Naturita. Included in this remarkable and successful effort was a wooden trestle built over Cottonwood Creek. The trestle measured 108 feet high and 840 feet long, reportedly the biggest such structure in the world at that time.\(^{16}\)

By the turn of the century Pinon had fifty buildings; the 1900 census listed its population at 150, making it the biggest settlement in the West End. The company published a newspaper, the Altrurian, that promoted its communal mission

\(^{15}\)Rockwell, Uncompahgre Country, 147-150.

\(^{16}\)Ibid., 166-174; O’Rourke, Frontier in Transition, 87. For an interesting account of Nucla’s beginnings, see Ellen Z. Peterson, The Spell of the Tabeguache (Denver: Sage Books, 1957). Tabeguache is pronounced tab-e-wash.
and attracted new members from around Colorado and from other states, as well.\textsuperscript{17}

The colonists completed the water diversion in 1904, and began moving their town, to be named Nucla, to Tabeguache Park the next year. The town took its name from the field of atomic science, but not, as many have assumed, because of the radioactive elements found in West End mineral deposits. Nucla’s founders envisioned the colony as the center (nucleus) of an expanding socialist utopia. The colony maintained its founding principles for many years, although the lure of private property and capitalistic ventures tempered the socialistic spirit. Despite the gradual privatization of the colony, Nucla stands as the "only true agricultural colony to survive on the Western Slope."\textsuperscript{18}

West Enders witnessed their first mining boom in 1899. A company from Michigan opened the Cashin copper mine on the southwest side of Paradox Valley, on La Sal Creek. The company also operated a smelter nearby. To supply coke to the smelter, ovens for that purpose were erected near some


coal deposits at the southeast end of Paradox Valley, about four miles west of Naturita. The mine produced copper from 1899 to 1908, although on several occasions after 1908 various interests tried to reopen it. A camp, called Cashin, sprang up in the vicinity of the mine, and four miles west of there the town of Bedrock was built, in response to the increased activity in the area.¹⁹

The mining operation stimulated the West End economy. Local farmers and ranchers sold produce and other staples to the mining companies; the mining company hired freighters to haul their ore; ranchers sold grain to the freighters; freighters, in turn, brought in supplies from points beyond the West End. According to one source the town of Bedrock ballooned to five hundred residents, but this is probably quite an overestimation. Naturita benefitted economically from its location on the freight route between the Paradox Valley and the shipping point for the ore at Placerville.²⁰

Gold prospectors also visited the West End. The San Miguel River had "for untold centuries" washed grains of gold out of the San Juan mountains. This gold may be found in the river bed and in the adjacent gravel benches. From

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¹⁹Rockwell, Uncompahgre Country, 133-135.

²⁰Ibid., 135, 149. According to the 1900 census, Cashin had a population of fifty, and Bedrock, thirty-five. In 1910, the census listed neither; instead, the census consolidated all of Paradox Valley into the precinct of Paradox, which had 235 residents in 1910. Schulze, A Century of the Colorado Census, 86, 203.
the beginning of West End settlement people have tried to reclaim that gold, never with very much success. One such attempt, described by David Lavender as "a staggering piece of hopefulness," left spectacular evidence of the irresistible lure of gold and the lengths that people will go to obtain it.  

In 1889 the Montrose Placer Mining Company began working some claims on the Dolores River, four miles below its confluence with the San Miguel. A group of St. Louis businessmen financed the operations of this company. The operators believed that if they could obtain enough water for hydraulic placer mining, the claims would yield a fortune. The idea they struck upon, and carried out, was to build a flume to carry water from the San Miguel River, twelve miles above the claims they wished to mine. For eight miles of this distance, the flume had to be attached to the walls of the canyon that rises above the San Miguel and Dolores Rivers. There, supports for the flume may still be seen. The wooden ditch measured four feet deep and six feet wide. Workers fastened it to the canyon walls "100 to 150 feet above the river and from 250 to 500 feet below the summit of the gorge." The flume ran above the San Miguel River for a mile and a half, and above the Dolores River for

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21 Lavender, One Man's West, 274-275.
six and one-half miles.\textsuperscript{22} (To visualize this, one must remember that the San Miguel River joins the Dolores.)

The cost of this operation came to approximately $100,000, and the construction took two years. By all accounts the flume successfully delivered the proper amount of water. The unforeseen problem that ruined this fantastic scheme was that the gold grains were too fine to be recovered. Soon after its completion the company abandoned the flume.\textsuperscript{23}

Neither gold nor copper would bring the West End prosperity. Montrose County produced gold worth $47,155 between the years 1886 and 1923. The county produced $93,899 worth of copper during the same years. Both figures constituted minute fractions of the total worth of those minerals produced by the entire state.\textsuperscript{24} Indeed, the West End's fortunes lay in an element the properties of which scientists began to realize only at the turn of the century.

Carnotite occurs throughout the sedimentary formations of southwestern Colorado and southeastern Utah. It is the most important of several uranium-bearing minerals located on this part of the Colorado Plateau. Geologists have found

\textsuperscript{22}Rockwell, \textit{Uncompahgre Country}, 160-162.


carnotite deposits around the globe; it may be said, however, that the mineral was "discovered," or received its "type location," from a sample that originated in western Montrose County.25

Imbedded in the sandstone walls of the Paradox Valley are some of richest deposits of carnotite on the Colorado Plateau. Although the valley would become the center of mining activity, many other locations in southwestern Colorado hold extensive deposits. It became evident to geologists that the carnotite deposits, when mapped, formed a pattern. Within this belt-shaped pattern the deposits were more likely to be found than in other areas. This is now known as the "Uravan Mineral Belt," defined as "a narrow, elongate area in which the carnotite deposits generally have closer spacing, larger size, and higher grade than those in the adjoining areas and the region as a whole."26

The unnamed (at that time) mineral had intrigued prospectors since 1881, when the first sample of carnotite


was assayed. Several attempts to identify the mineral were unsuccessful. Although assayers found traces of gold and silver in carnotite, those metals did not exist in quantities sufficient enough to encourage miners to dig the ore. Because of the mineral's yellow color, and lacking a proper name for the mineral, miners called it "chrome-copper."^27

Not until 1898 did mineralogists determine that carnotite contains the radioactive element uranium. In that year Charles Poulot, a French chemist and ore buyer, received a sample of carnotite ore from western Montrose County. He determined that the ore contained uranium, but he forwarded the sample to associates in France for further analysis. They named the mineral after Adolphe Carnot, "a prominent French mineral analyst of the time."^28

Two men laid claim to the distinction of procuring the sample of carnotite ore that led to the naming of the mineral. Gordon Kimball wrote that he mined the ore from his claim on Roc Creek in 1898. He then sent the sample to Poulot, who forwarded it to France. T. M. McKee reported that he obtained a sample of the ore from the same mine on Roc Creek sometime before 1898. According to this story,


McKee met Poulot in Paradox Valley, where the latter was working for a "Michigan syndicate" (the operators of the Cashin mine). McKee went on to say that he was "dumbfounded and very much disappointed, because it had not been named in honor of Colorado or Montrose County." McKee would have had the mineral named "Montroseite."  

The identification of carnotite, and the realization that it contained uranium and vanadium, prompted small-scale mining of the mineral. There already existed a small market for uranium. Manufacturers of glass and ceramics used the element to tint or color their products, and it was also used as a pigment in dyes and inks. Steel companies experimented with uranium and vanadium, and found that both elements improved the strength of steel. And scientists required a certain amount of uranium for various experimental purposes. Although the element uranium had been known since 1789, the phenomenon of radioactivity was not discovered until 1896, so it was still a new field of research for scientists. But this small-scale mining lasted only a few years. Treating carnotite ore to remove uranium

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and vanadium proved difficult, and buyers for those elements found less expensive, more readily available sources.\textsuperscript{30}

Also in 1898 Marie and Pierre Curie discovered the element radium. Radium is a decay product of uranium. Therefore, all minerals that contain uranium also contain radium; the ratio between the two elements will always be the same, because uranium decays at a fixed rate. The Curies’ discovery sparked considerable scientific interest, and as the radioactive properties of radium began to be studied, "new medical and commercial applications began to spring forth."\textsuperscript{31}

The medical community took the most active role in research, centered primarily around the treatment of cancer with radium. The history of the medical community’s use of radium is fascinating. Physicians, and others, treated an astonishing array of human ailments with radium. While some of these treatments were misguided, at best, the use of radium in the treatment of cancer was legitimate and successful, to a degree. "The basic principles and


\textsuperscript{31}Chenoweth, "Historical Review," 5; Landa, "Buried Treasure," 30.
practices developed during the early period form the foundation of current radiation therapy."\textsuperscript{32}

Despite the realization that carnotite contained radium, no great demand materialized. European scientists and physicians engaged far more heavily in radium research than did Americans, and the Europeans had available to them other sources of radium. Several attempts were made to isolate the radium from carnotite ore during the period 1900 to 1909, but none proved successful.\textsuperscript{33}

Beginning in 1909 the outlook for the carnotite mining industry improved. In that year the General Vanadium Company, the Baltimore subsidiary of an English firm, acquired claims in Paradox Valley, mining carnotite ore for its vanadium content. The company shipped its ores to Liverpool, England, for treatment. Between 1910 and 1914 this and other companies attempted to profit from the vanadium content of carnotite; but isolating the element proved "troublesome," and those in the market for vanadium found cheaper outlets.\textsuperscript{34}

\textsuperscript{32}Landa, "Buried Treasure," 30-47, quotation on 30.


\textsuperscript{34}Thomas F. V. Curran, "Carnotite--I," \textit{Engineering and Mining Journal} 96 (20 December 1913), 1165; Frank L. Hess, "Vanadium, Titanium, Molybdenum, Uranium, and Tantalum," in \textit{Mineral Resources of the United States, Calendar Year 1910, part 1, Metals} (Washington, DC: Government Printing Office, 1911), 759-760; Frank L. Hess, "Radium, Uranium, and
Although mining carnotite for its vanadium content did not hold much promise at this time, the demand for radium began to increase significantly after 1910. European buyers had begun to purchase the ore—for both its vanadium and its radium content—in quantities greater than before. At about the same time Americans became much more interested in, and aware of, the potential benefits of radium.

In 1910 the United States Bureau of Mines was created. The federal agency became interested in the carnotite deposits on the Colorado Plateau; officials believed that this region contained "almost all of the world’s supply of radium." Bureau of Mines officials were concerned, however, that because of inefficient mining methods much of the ore was being wasted. In addition, Europeans had begun to purchase much of the ore. The Bureau of Mines hoped to boost the American rare metals industry by encouraging the production of radium in America for use in America. The Bureau of Mines considered it "almost a patriotic duty to develop an industry that will retain the radium in America."

Toward this end Bureau of Mines officials worked to arouse public interest and to find a sponsor. The bureau hoped to

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find someone or some institution willing to finance the mining of carnotite ore, and the extraction of radium.36

The reason the Bureau of Mines felt so strongly about the protection of America's radium resources had to do in large measure with the price of the element. In the years of radium production in the United States, the cost fluctuated between $40,000 and $160,000 per gram; most often, the cost is cited as $120,000 per gram. This amount reflected the scarcity of the element and the high cost of production. With carnotite ore producers needed at least two hundred to three hundred tons of high grade ore (uranium content of two percent or better) to produce one gram of radium. The treatment process required tremendous amounts of chemicals, the quantities of which ranged up to four times the weight of the ore that was treated. Companies that isolated radium hired teams of chemists and metallurgists, to develop and improve extraction methods. In addition, the high cost of finding, mining, and transporting ore from the remote regions of the Colorado Plateau to the extraction plants affected the cost of the finished product. Radium represented, literally, "the most expensive substance known to man."37


The Bureau of Mines found its sponsors in two men intensely interested in the potential of radium therapy. Howard A. Kelly, one of the few American physicians who had used radium, foresaw great possibilities. James Douglas was a philanthropic mining engineer who regularly contributed to a cancer treatment center in New York. Kelly and Douglas each supplied $75,000 for the establishment of the National Radium Institute. The Bureau of Mines agreed to provide the facilities and technical staff needed to produce the radium. In return for their investment, Kelly and Douglas would receive radium, which they would donate to the hospitals with which each associated.38

The National Radium Institute leased mining claims and established a camp at Long Park, on the southeast rim of the Paradox Valley, in 1913. By the following year it had erected an experimental extraction plant in Denver. The extraction process proved successful, and in 1915 the Institute built a second plant to increase production. The National Radium Institute met its three year goal by 1916; it had produced 8.5 grams of radium, more than anticipated. James Douglas donated his share of radium to the New York hospital that later became known as the Memorial Sloan-Kettering Cancer Center. Kelly's share went to the hospital at The Johns Hopkins University. In achieving its mission,

38Landa, "Buried Treasure," 54.
the National Radium Institute "represented an early and very successful example of public-private sector cooperation."\(^{39}\)

During the radium boom in western Colorado several companies attempted to profit by mining and processing carnotite ore. Companies such as the Standard Chemical Company, the Radium Company of Colorado, and the Radium Luminous Material Corporation controlled most of the productive carnotite deposits. The high cost of mining carnotite ore discouraged many independent miners. Often, the companies leased or bought claims that independent miners found unprofitable. Nevertheless, some prospectors found a way to make a living on their own. Carnotite buyers purchased ore from those miners who managed to operate alongside the big, well-financed companies, and those companies themselves also bought ore.\(^{40}\) The greatest part of this mining activity occurred in southwestern Colorado, with most of it centered in the West End.

Joseph M. Flannery, from Pittsburgh, gave the carnotite industry its greatest boost, and in the process made Montrose County the center of the industry. Flannery had gained experience in the mining industry when he formed the American Vanadium Company, which sold vanadium extracted

\(^{39}\) Ibid., 53-56.

from ores mined in Peru. In 1909 tragedy struck his family; Flannery's sister died of cancer. Flannery felt that radium treatments may have cured his sister, but the treatments were not widely available in the United States. Looking into the matter, Flannery believed that a great demand for radium in the United States would soon develop. He also anticipated an overseas market; by 1910 Europeans sought new sources of radium. Flannery sold his mining interests in Peru and formed the Standard Chemical Company, with the intention of mining and processing carnotite ore for the radium content.41

The Standard Chemical Company would become, by far, the largest radium producer in the United States; the company produced seventy-five percent of the ore shipped out of western Colorado. By 1921, which year marks the end of the radium boom, the company had produced seventy-four grams of radium, nearly half of all radium isolated in the United States. To sell his product Flannery created the Radium Chemical Company, designed to investigate the therapeutic uses of the element and to stimulate the interest of American physicians. The Radium Chemical Company published the journal Radium, designed to disseminate information about the clinical applications of radium. Flannery even

hired a group of physicians to experiment with radium on laboratory animals.\textsuperscript{42}

Due partly to the efforts of the Standard Chemical Company and the National Radium Institute, the medical use of radium in cancer treatments became accepted and widespread in the United States. Simultaneously, the use of radioactive medicines for other maladies proliferated. By 1913 the public's interest in radium "had been whipped almost to fever pitch." There arose a concern that America was not producing enough radium.\textsuperscript{43}

The concern over the precious resource, radium, grew to such a degree that President Woodrow Wilson's Secretary of the Interior, Franklin K. Lane, proposed massive involvement by the federal government in the production of radium. The idea was to ensure "an adequate supply of reasonably priced radium for the American medical community." However, Lane's suggestions struck fear in the hearts of capitalists like Joseph Flannery. He and others argued that private enterprise could accomplish the goal. Early in 1914 both houses of Congress held hearings on a bill, suggested by Lane, that would have directed the federal government to buy all radium ores, and to isolate the radium "at government-operated radium concentration and extraction plants." Under an earlier version of the bill the government would have

\textsuperscript{42}Landa, "Buried Treasure," 22.

\textsuperscript{43}Shumway, "History of the Uranium Industry," 22.
withdrawn land on the Colorado Plateau for the purpose of allocating, or otherwise regulating, the supply of radium. Both bills failed to pass.\textsuperscript{44}

"The Standard," as Joseph Flannery's company became known in the West End, arrived there in 1910. The company established its headquarters at the old coke ovens, at the southeast end of Paradox Valley, four miles west of Naturita. The headquarters consisted of houses, offices, an ore buying station, a commissary, and a laboratory; it was fully modern, complete with telephone connections. The company immediately began staking, leasing, and purchasing claims. According to Flannery, his company arrived at a time when West End claim holders had abandoned hope. He recalled the situation:

We had a place out there in this isolated territory where everybody would come in for a meal. It was a sort of halfway house between nobody knows where and somebody's starting point. They would come in and say, "Will you buy our claims? I am broke, and I want to get out of this country." He would say, "Do you want to buy a burro?" The burros would starve if we did not buy them, and the man would have to stay there if he didn't get the money. . . . We would pay him his cash right there, and he got his money and drove off and was satisfied.\textsuperscript{45}

\textsuperscript{44}Landa, "Buried Treasure," 63. For details on the political debate that raged during this time, see Shumway, "History of the Uranium Industry," 11-61.

\textsuperscript{45}U. S. Congress, House, Committee on Mines and Mining, Radium: Hearings on H. J. Resolution 185 and 186, 63rd Congress, 2nd session, 19-28 January 1914, p. 61. Likely, Flannery's "halfway house" was a boarding house at the company's headquarters at the Coke Ovens.
The Standard acquired some of the richest carnotite deposits in both southeastern Utah and southwestern Colorado. The company immediately began "mining and development work," and by 1911 it employed perhaps eighty people. In that year the company began shipping ore from the West End to its experimental plant in Canonsburg, Pennsylvania. By 1913 Standard's chemists had developed the necessary extraction methods, and began full-scale production of radium. In subsequent years Standard Chemical continually expanded its holdings in southwestern Colorado and southeastern Utah. For example, in 1916 the company purchased the claims held by the General Vanadium Company, which had mined ore for its vanadium content from 1910 to about 1914.46

Naturally, the residents of Montrose County took notice of developments in the radium industry. Newspapers in Montrose and Nucla carried stories about the wonders of radium, and described the latest discoveries of carnotite deposits. County boosters saw possibilities of great wealth, and they looked forward to a time when Montrose County would be the center of a great mining industry. Many of these boosters came from the city of Montrose, where they contemplated ways to bring some of the riches of the West

End to Montrose. Meanwhile, some in the West End began to consider what little Montrose had done for them. Some West Enders did not necessarily look to the county seat for help in exploiting the area’s resources.

Mineral resources were not the only commodity from the West End. Simultaneous with great developments in the carnotite industry came progress in agriculture and ranching. Homesteaders gradually settled the fertile "parks," the lands on the lower margins of the Uncompahgre Plateau. By 1911 Second Park had enough residents to necessitate the building of a schoolhouse. A Nucla correspondent believed that if the Nucla Chamber of Commerce would promote the West End, "it will be a very short time until the land in this valley will be all settled up." Such promotion succeeded. Among the homesteaders attracted to western Montrose County were a group of 150 Hungarian immigrants who came to settle in the Paradox Valley.

Of the soil in the West End, a reporter wrote that "when truth excels fancies and wild imaginings we hesitate to write the record." The record indicated "marvelous" yields of potatoes, three cuttings of alfalfa per season,

47 "West End News," Montrose Daily Press, 29 January 1912, p. 3; "Naturita Valley Notes," Montrose Daily Press, 4 October 1911, p. 2. The news from the West End appeared frequently but irregularly in the Montrose Daily Press. Often the correspondent remained unnamed, as in these two examples.

and fifty to sixty bushels of corn per acre, among other crops. The correspondent believed that "fortunes will be made on onions, tomatoes, cauliflowers and cabbage"; and in the West End orchards needed no "spraying or smudging." Growers had recently planted several orchards that, they hoped, would make the West End into a commercial fruit center. In 1912 the crops were so abundant in the West End that a local challenged the farmers in Montrose: "Beat that in the Uncompahgre Valley if you can." Ranching, too, appeared to have a bright future in western Montrose County. In 1913 the owner of the Club Ranch shipped an entire trainload--twenty-eight cars--of cattle to Denver.49

West End homesteaders succeeded only with the irrigation demanded by the arid climate. In 1911 the Hartman brothers of Montrose completed "the largest transaction of land ever" in that county; they bought four thousand acres in the Paradox Valley and planned a massive irrigation system that included a proposed reservoir, canals, and ditches. To accomplish their goal the brothers formed the Paradox Valley Irrigation Land and Development

Company, capitalized at $200,000. Several other, smaller companies formed to irrigate West End farms.

The second decade of the twentieth century brought hope to the hardy pioneers of the West End. After years of labor to make the land produce, it seemed as if the time for prosperity had come. Summing up the potential wealth of western Montrose County, the Nucla Chamber of Commerce proclaimed:

The future of this section is indeed bright. We are developing one of the richest sections of the state. We know it, and we want many more to know it, for upon the thousands of acres of our fertile lands there should be thousands of happy homes.

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50 Rockwell, *Uncompahgre Country*, 136; "Deal Being Concluded Involving 250,000.00," *Montrose Daily Press*, 12 October 1911, p. 1; "New Paradox Valley Company Formed with Capital of $600,000," *Montrose Daily Press*, 30 July 1912, p. 1. The Hartman brothers, according to this article, planned to sell six thousand shares of stock at $100 per share. Rockwell reported that "$200,000 in outside capital was invested."


52 "Real Reasons for Residing in Western Montrose County," *Nucla (CO) Independent*, 17 April 1913, p. 8. This promotion ran in several editions of the paper. This weekly was published from 1913 until 1929, although copies of many editions have been lost.
CHAPTER 2
"NO PLACE FOR THE LOVERS
OF EASE AND LUXURY”

The West End experienced considerable growth between 1910 and 1920, ten years that encompass most of the radium boom. The three towns of Nucla, Paradox, and Naturita grew from a combined total of 832 residents in 1910 to 1,393 in 1920. By 1920 a new community appeared on the census: Fords Camp, which owed its existence to the carnotite industry, had 119 residents in 1920. Much of this growth was tied directly to the mining industry, and there is evidence of the economic impact that the radium boom had on the West End.

When the Standard Chemical Company set up operations in the West End, it created jobs for some West Enders, business opportunities for others, and injected into the small, rural economy a large sum of outside capital. The radium boom undoubtedly helped to boost the West End’s population. And it also stirred people’s imaginations. Residents of western Montrose County noted proudly that within their sandstone cliffs and mesas lay the world’s supply of radium. They imagined a prosperous future for their part of the county.

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The most obvious impact the radium boom had on the West End was the number of people the industry employed. In 1911 Standard Chemical alone employed eighty. By 1914 the total number of people employed in the West End carnotite industry had grown to 350, a figure that probably includes freighters and others who worked peripheral businesses. In 1918 the general manager of the Standard, John I. Mullen, estimated that 295 men worked for four companies operating in the West End. Of those, the Standard employed two hundred.3

The mining companies experienced no difficulties in attracting labor. As reports of the mining activities in the West End spread, the carnotite fields became "overcrowded with men seeking employment." For each job, four to five men applied; many of those applicants had arrived in the West End with no means, and found themselves "broke," and unable to "get out of the country." Standard Chemical sought to discourage hopeful job seekers.4

In addition to hiring miners, the Standard and other companies contracted the services of freighters to haul ore


to the railhead at Placerville for shipment. Some observers preferred to use the number of horses used by freighters as a way to gauge the level of mining activity. In one edition of a Montrose newspaper, readers learned that "60 four- and six-horse teams are hauling this ore." If they read further, in another article, they learned that "twenty-five six-horse teams" hauled ore out of the West End. The definitive estimate, perhaps, came from a Paradox Valley resident. He reported that "208 head of heavy freight horses" hauled ore for shipment. In addition, one hundred burros were used to pack ore from the mines to the freight stations.

The mining camps that sprang up around the West End created a certain amount of peripheral employment, as well. The larger camps usually had a boarding house, where miners lodged and ate, and near the larger groups of mines were located "country stores," where miners procured their supplies and mail. The miners created a demand for local farm products, and the freighters relied on local farms for hay to feed to their horses and burros. In addition to

5 "Notice," Nucla Independent, 10 April 1913, p. 4, and 31 July 1913, p. 8. The Standard requested sealed bids for ore hauling, and specified the exact procedures the freighters would be expected to follow.

hauling ore out of the West End, freighters brought into the country goods that had to be purchased from larger commercial centers.\textsuperscript{7}

By its own estimate Standard Chemical had spent $135,000 on its mining operations in the West End by 1914. This figure included the purchase price of the company's mines, the cost of constructing mining camps and company headquarters at the Coke Ovens, investments in road and trail building, and wages paid to employees.\textsuperscript{8} Although nothing substantial remains of the Coke Ovens today, at one time it was referred to as "a modern little city." The company also ushered in the automotive age in the West End. By 1917 trucks motored alongside freight wagons hauling ore, and as part of its daily operations, the company kept "two Ford cars traveling most of the time between the different camps and over the country." The company replaced its cars once each year, and built a garage "with a concrete floor and . . . electric lights" to house its vehicles.\textsuperscript{9}


\textsuperscript{8}U. S. Congress, \textit{Radium}, 80.

As noted, to extract one gram of radium from carnotite ore, the Standard had to ship at least two hundred tons of high grade ore to its plant in Pennsylvania. To improve the efficiency of its operations, the company built a concentrating mill "to upgrade the lower grade ore." By separating the radium-bearing ore from the waste, the mill increased the radium content of lower grade ores. This greatly reduced the amount of ore to be shipped, first by freight wagon to Placerville, then by train to Canonsburg, Pennsylvania. The company located its new mill in a canyon on the San Miguel River, fifteen miles down river from Naturita and bordering the Club Ranch. The company chose that site probably because of its proximity to important mines and because the river supplied the means to produce electricity. Standard contracted with the Westinghouse Electric Company, also of Pittsburgh, to build the reduction plant in 1914.

One year earlier, in 1913, the company had constructed a camp at this location. West Enders knew the site as

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10 The phrase is William L. Chenoweth's, communicated informally to the author.


12 "Nucla News," Montrose Daily Press, 15 July 1913, p. 2. The Nucla correspondent wrote: "The Standard Chemical company are to start a new camp near the Club ranch and will likely put in a phone at that place, which will be a new line 18 miles in length." 1912 has long been accepted as the year during which the camp's boarding house, which still
the Ford, probably because ranchers had used that spot to ford the river. Soon after construction of the mill the camp was renamed Joe Junior, in honor of Joseph Flannery's son. Some locals referred to the camp as Ford, while others adopted the company's new name for the place. In addition to the mill, the camp included a boarding house, tent houses, a "mines laboratory," commissary, and a hydroelectric plant. The mill ran "three shifts per day, 7 days per week," and the company charged one dollar a day for food and board.¹³

Companies in the West End paid employees from three to seven dollars per day, depending on the skill level of a particular job. For example, the Radium Luminous Material Corporation offered miners "$3.25 per day to start," and "advancement to men who make good." Blair Burwell, a young mining engineer with Standard Chemical, reported that "miners and muckers are paid $4.50, ore sorters $5.50, and drill runners $7 per shift, with board at $1 per day." Labor in the West End benefitted from the competition among the various companies operating there, and from the eastern capital that financed the operations. By contrast, the

stands, was built. The foregoing note is the only written reference known to the author.

carnotite miners on Calamity Mesa, in southwestern Mesa County, received only one dollar per day, although they did not have to pay board.  

For a time the Joe Junior camp was probably populated by single men, as were other camps in the area. A former resident of the Joe Junior camp recalled that "a man's pay accumulated until it began to burn a hole in his pocket." He then would leave for Telluride, on the pretext of visiting a dentist. Later, "he would return to camp, often without having his teeth fixed and generally without any money." Local law prohibited the sale of alcohol in Montrose County, but no such law existed in neighboring San Miguel County, and its county seat, Telluride.

If during the years before 1917 bachelors constituted the majority of the Joe Junior camp's population, by that year enough families had moved into the camp that the need for a school arose. At the urging of Standard Chemical's John Mullen, the county provided a teacher and opened a school at the Joe Junior camp. In 1917 six to ten students enrolled in classes held in a tent schoolhouse. The school operated for five years; after 1921 the population of the camp dropped.


Joe Junior camp dwindled to a point that obviated the need for a school.\textsuperscript{16}

Until 1915 the West End had no high school. Parents wishing to further their children's educations arranged for them to stay with families in Montrose for the entire school year. Margaret Galley, a West End pioneer, remembers about fifteen students, including herself, who journeyed to Montrose to attend school. A student could come home for Christmas if her parents had eight dollars to send her. It cost about that much to take the train from Montrose to Placerville, and the mail wagon from Placerville to Naturita, a trip that included overnight lodging in Placerville.\textsuperscript{17}

Later Margaret Galley taught school in Nucla. She rode, on horseback, seven miles from her home to school. For an extra five dollars per month, she performed janitorial work at the school. On most days, she left home before the sun rose and returned home well after darkness.\textsuperscript{18}


\textsuperscript{17}Margaret Galley, interview by author, 16 July 1993, Nucla, Colorado, tape recording, private collection.

\textsuperscript{18}Ibid.
In 1915 the county school board arranged to hold high school classes in Nucla's Congregational Church. That development certainly represented progress. After 1915 Nucla adolescents attended high school in their home town; students from other parts of the West End lodged with families in Nucla for the entire school year.¹⁹

Standard diversions for West Enders included baseball games and dances, forms of recreation that became hallmarks of West End life. The towns of the area formed baseball teams that played against one another, and various mining camps also fielded teams. The games attracted enough spectators that Naturita citizens built a grand stand designed to accommodate two hundred at the town's ball park. And dances were held on a regular basis, often as a way to raise funds for community projects. Standard Chemical showed its generosity by sponsoring a dance in the Nucla Town Hall; the company invited everyone to "come out and enjoy the hospitality of the Coke Ovens boys."²⁰

Signs of economic growth accompanied the increase in population. Nucla became a hub of traffic into and out of the region. Hotels and restaurants sprang up in the


village, and with the coming of the motor age, several entrepreneurs opened garages and began selling, and repairing, motor vehicles. Merchants offered hardware and mining supplies, while blacksmiths and liverymen advertised their services. Nucla enjoyed frequent visits from officials of the various mining companies, ore buyers, assayers, and others associated with the carnotite industry.

In 1914 a new bank opened in Nucla. Nucla also endured a negative, but common, aspect of growth. "For some time," the newspaper reported in 1919, "there has been a shortage of good houses in our town." While there were no carnotite mines in the direct vicinity of Nucla, a number of miners and their families called the town home. In the era before a daily commute was possible, miners stayed for long periods of time at the mining camps in which they found employment.21

If Naturita lagged somewhat behind Nucla in both population and economic growth, it too became "a busy little place." Naturita's trade greatly increased after 1916, when a county road crew carved a road along the San Miguel River.

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from Naturita to the Joe Junior camp. Until the completion of this road, freighters and travelers from the Joe Junior camp generally followed a trail that led them up Tabeguache Creek and across the parks to Nucla. With the completion of the San Miguel River road, freighters went directly to Naturita, bypassing Nucla.

As West Enders realized the economic benefits made possible by the radium boom, many dreamed of ways to capitalize further. They believed the area would inevitably become a commercial entity able to stand on its own, built on the seemingly unlimited potential of agriculture and mining. Certain of their country's future growth, some talked of dividing Montrose county, of forming a separate county from the communities in the western half. Many West Enders harbored resentment towards the county seat, which, they believed, did not invest enough in the development of the western half of the county. Proponents of county secession, however, decided to postpone the matter. The Nucla Chamber of Commerce realized that "taxes are high enough now, without dividing the county to make them more."  

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Though some in the West End felt neglected, citizens of Montrose took great interest in the mineral-rich lands to the west. After all, as early as 1913 carnotite ores accounted for an estimated thirty percent of the total value of all goods in Montrose County. Throughout the 1910s Montrose boosters encouraged support for the West End carnotite industry. One correspondent lamented the apathy he perceived on the part of his fellow citizens:

Montrose county has the bulk of the world's supply [of radium] and here we are still trying to get a reputation on onions and potatoes. If we knew what was good for us, we would exploit the radium this county has and it would make all the gold in the San Juan look like pewter platters in comparison.

Yet, however diligently the promoters persuaded, Montrose found it difficult to capitalize on the West End's fortunes. Of major concern was the fact that the Standard and other radium producers shipped their ore out of state, or even out of the country, for processing. Many hoped for a day when radium could be mined, isolated, and sold from Montrose County, thereby keeping the profits "at home."

Stated one interested citizen: "Montrose should bend every energy possible to get a mill and reduction plant. . . . It would mean the greatest era of building and prosperity to

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our city and country." Another believed that "one hundred men with $100 each or ten men with $1000 each can have a mill for extracting radium in Montrose in sixty days." At least one attempt was made to form a company that would produce radium in Montrose County, but nothing substantial resulted. Likely, the company's founders underestimated both the financial resources and the complicated processes required to isolate radium. The extraction process demanded a "specialized plant, . . . access to a skilled construction and operating work force, large quantities of fuel and water, and industrial, chemical, and scientific equipment and supplies." Only with a tremendous financial investment could such a plant have been constructed in Montrose in 1913.

As an obstacle to West End prosperity, the condition of the county's roads presented the most pressing problem. The poor state of the roads made the shipment of goods from the West End more expensive than necessary. And because there was no good road connecting the eastern half of the county with the western half, Montrose merchants felt that they were denied the lucrative trade with their western


neighbors. West Enders found it easier to travel to Telluride or Placerville to do their business. The topic of road construction and improvement dominated the county newspapers throughout the radium period.

Placerville, the nearest rail outlet for West End goods, lay approximately forty-two miles from Naturita, and nearly two thousand feet higher than Naturita. During the winter and spring months snow and rain rendered the dirt road impassable. Between Placerville and the West End lies the infamous, steep grade of Norwood hill. That section of road presents a danger to drivers of today; but to see Norwood hill in the early days, one "would hardly believe . . . that anyone could drive a four-horse team and wagon up and down it." The trip from Naturita to Placerville and back again by freight wagon took at least five days, with good conditions; this included the stops necessary to pick up and deliver freight.

The people of the West End were not satisfied in sending their goods to Placerville for shipment. The narrow, dangerous road to Placerville constantly needed upgrading; they wanted a broad, smooth road over which freight wagons could run all year. Moreover, there was growing sentiment among West Enders that they should have

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access to a larger commercial center. The cities of Grand Junction and Montrose provided the alternatives. There was no direct route to Grand Junction, approximately one hundred miles distant by today's road. The distance to Montrose from the West End was considerably shorter, about sixty road miles; but the only direct road to Montrose was hardly worthy of the name. Known as the "colony road," because it ran between the Nucla colony and Montrose, this route was more of a trail, used by ranchers to drive cattle to the railroad at Montrose. The colony road led travelers directly over the Uncompahgre Plateau; the snow on the ten-thousand-foot high plateau prevented travel over this route for much of the year. Even today this road remains closed during the winter.  

As the commercial value of resources in the West End became more apparent, Montrose boosters sought to bring attention to the need for a good county road. One frustrated observer noted that "Montrose is evidently asleep and will not wake up to the opportunity of getting the Paradox and west end business until it is too late." The president of the Montrose Chamber of Commerce admitted that the road proposal "means more to Montrose than the most of

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30 In 1913 a motorist drove from Nucla to Montrose over the colony road. He covered the fifty-five miles in six hours and forty-five minutes "without a mishap." The Ford car "climbed over rocks and stumps" on a road marked often by steep grades. "Lincoln Vestal Drives Auto over Old State Road from Nucla Here," Montrose Daily Press, 21 August 1913, p. 1.
us had the slightest idea of." Promoters pointed out that not only could Montrose become a shipping point for West End goods, but with a good road, the citizens of the West End would come more frequently to Montrose to recreate, purchase supplies, pay taxes, and otherwise spend money.\(^{31}\)

In August of 1912 the Montrose Chamber of Commerce held "one of the most important meetings" ever, to discuss the construction of a road to the Paradox Valley. Promoters had to raise a large sum of money, probably in the range of $20,000. The chamber planned to raise enough money, through subscriptions from businesses, partially to construct the road. Then, road promoters hoped, the State Road Commission would see the need for the byway and would appropriate additional money to the project. By September of 1912 the county had sent out a surveyor to map the best route. The *Montrose Daily Press* reported these events with optimism, and it seemed only a matter of time until a passable road connected Montrose and the West End.\(^{32}\)

West End promoters, however, had some different ideas on the matter. They had "clamored for a good road for


years," trying "every conceivable method" to get one. They greeted every road proposal with a great deal of enthusiasm, only to see their hopes frustrated. The State Road Commission, alleged the Nucla Independent, allotted just enough money to "repair a few ruts," using funds to repair poor roads instead of building good ones. West Enders had heard enough proposals that they could almost "hear the tooting of the automobiles" motoring into their country. City boosters not only from Montrose, but also from Grand Junction, had shown interest in a West End road, but the plans never materialized.33

In fact, West Enders probably preferred a road to Grand Junction rather than Montrose. B. W. Marsh, a spokesman for the Paradox Valley, believed it impractical to construct a road over the Uncompahgre Plateau and its ten-thousand-foot elevation. Marsh advocated a byway to Grand Junction, the highest point of which would be seven thousand feet. Moreover, the road bed on such a route would be superior to that of the Uncompahgre Plateau. Marsh wrote letters to Grand Junction businessmen, trying to convince them of the trade opportunities available to them. Because of his overtures to Grand Junction, the Montrose Daily Press accused Marsh of "playing one community against the other in

order to get the road." No doubt this observation was accurate. "If we cannot get the desired response from the citizens of Grand Junction," wrote Marsh, "we will by mere necessity be compelled to look elsewhere for an outlet."  

Although efforts to secure a good road to the outside world never flagged, during the radium boom the West End never realized its dream. The cost of such a road, likely, proved too much for the city of Montrose, and the geographical barriers discouraged all but the most hopeful. The most direct, well-maintained route from the West End to its county seat still runs through Placerville and San Miguel County.

Ultimately, Grand Junction gathered the funding to tap the "vast resources" of the Paradox Valley. The Grand Junction Chamber of Commerce aggressively pushed the road, primarily by soliciting businesses. By March of 1922 subscriptions totaled $5,000. Two months later, mining companies had donated an additional $12,000, and farmers had pledged horse power and feed. Eventually, the chamber of commerce may have raised as much as $30,000. Convict labor constituted at least a part of the construction work force.

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34 "Montrose Promoters to Survey the Paradox Wagon Road in 10 Days," Montrose Daily Press, 1 June 1912, p. 1. In this article the editor reprinted Marsh's letter to the Grand Junction business community.
By the summer of 1923, "road gangs" had completed the much anticipated highway.36

Ironically, the road came too late to benefit the West End during the radium boom. By 1923 only limited mining activity took place. Nevertheless, by investing in the road the business leaders of Grand Junction demonstrated that they were not "blind" to the future, which held "much in store for the radium fields." That future, however, lay farther down the road than most anticipated. It would be thirteen years before carnotite mining of any significance occurred in the West End. For their part West Enders by 1923 were "glad to realize the fact that they have found a community which gives the west end of the county at least more than its moral support."36

It is one of the enduring ironies of West End life that the distance from Naturita to Grand Junction is approximately sixty miles. But because of geographic obstacles, the road travels through one hundred miles of landscape.

35"Funds Needed to Continue Paradox Road," Daily Sentinel, 24 March 1922, p. 4; "San Miguel Road to be Built to Paradox Valley," Daily Sentinel, 25 May 1922, p. 4; John I. Mullen, "The G. J.-Paradox Road," Nucla Independent, 1 February 1923, p. 1. It seems possible that Standard Chemical contributed to the construction of the road. But there were also mining companies in Grand Junction interested in the road project.

The dreams of road-building went far beyond the feasible. For many years talk circulated of a Paradox Valley railroad. These rumors followed the same line, and took place at the same time, as those concerning a conventional wagon and automobile road. In 1912 Montrose boosters met and discussed ways to persuade railroad officials to build a line from Montrose to the West End. Two weeks later the people of the West End had become "greatly agitated over the prospects of a railroad."

Meanwhile, Grand Junction promoters gained the lead in the railroad rumors: they claimed that the Denver and Rio Grande Railroad favored Grand Junction over Montrose as an outlet from the Paradox Valley, and that "actual construction work may start on such a road."  

Four years later the West End still did not have its railroad, and the local citizenry, while still hopeful, had become disaffected:

In the past ten years we have had numerous railroads built into this country; two or three have been built down the [San] Miguel from Placerville. At least two have been launched from Montrose. Probably not less than one half dozen broad gauge railroads have been built from Canada to the Gulf and each road has come through our prosperous section. We have railroads to burn, in our minds. Pipe dream railroads.  


38 "Where is Our Railroad?" Nucla Independent, 13 July 1916, p. 6.
Although interest in a railroad continued for several years, the dream never materialized.

Some road-building dreams went beyond the reasonable into the realm of the fantastic. As early as 1911 those who wished to "open up the west end" discussed the possibility of constructing an electric line from Montrose to the Paradox Valley. Not to be outdone, Grand Junction boosters also entertained the notion. The newspaper articles of the day reveal nothing concerning the means by which the electric line would be built, maintained, or operated. One reporter merely assured readers that "such a line would not be expensive to construct and operate," and that "eastern financiers are willing to furnish capital." In 1916 a group of men from Grand Junction set out for the Paradox Valley to survey business opportunities. Ever optimistic, the Nucla Independent reported that "if the proposition for business looks good we will no doubt see electric cars running in this country in the next year."39

Such reports repeated. When it became obvious that no investors would come forth to finance the scheme, those

39"Will Discuss an Electric to West," Montrose Daily Press, 21 October 1911, p. 3; "Electric Line from Grand Junction to Paradox Proposed," Montrose Daily Press, 3 April 1916, p. 1; "Electric Road from Grand Junction," Nucla Independent, 6 April 1916, p. 1. The idea of electric-powered transportation took hold in the Nucla colony very early. One of the pioneer settlers envisioned "the town as a nucleus from which electric cars ran to all points" surrounding the colony. Peterson, Spell of the Tabeguache, 21.
still interested in the electric line turned to the company with the deepest pockets and biggest investment in the West End: the Standard Chemical Company. John I. Mullen, superintendent of the Standard, responded angrily to the suggestion that his company would finance an electric line. He pointed out that Standard Chemical had spent $300,000 during the previous seven years in transporting its ore from the Paradox Valley to Placerville. Therefore, the company remained "open for suggestions." But Mullen summarily dismissed the suggestion that freighting ore through the rugged country in southwestern Colorado could be accomplished by electric cars. "The electric line would require an investment that would make the proposition a laughing stock." Mullen also took to task those who assumed that the Standard stood ready to absorb the cost of an electric line. The very idea struck Mullen as "ridiculous and laughable."®

This episode characterizes the economic quandary faced by West Enders and Montrose County leaders. They relied a great deal upon the investments of the Standard Chemical Company and other outside capital. They resented their own lack of control; at the same time, however, they came to expect more from their benefactors.

Two articles from the *Nucla Independent* illustrate the paradox in which West Enders found themselves. In the first, a Montrose optician, T. V. R. Quinn, pointed out the wonderful benefits provided by Standard Chemical. It formed "the backbone of the uranium business" in the West End. It paid fair prices for ore, and bought its ore directly from the miners, or "producers." Thus, the prices were not affected by independent buyers or middlemen. Moreover, the Standard at least kept its ore and profits in the United States, instead of shipping it to Europe for processing. Best of all, "the Standard Chemical Company is putting a bridge across the San Miguel river, some 60 feet in length." If nothing else, this writer implied, citizens should be grateful for this new bridge. "The Standard is A-1 in the carnotite business."

Quinn acknowledged that the "producers" worked at the mercy of the rich men in the radium business, and that local miners did not see a fair share of the radium profits. But he laid blame on the buyers for European concerns, not on the Standard Chemical Company. At any rate, the problem would be solved once a radium extraction plant were established in Grand Junction or Denver, as anticipated. Then, "we'll keep our rock at home, and our radium too."\(^{41}\)

The writer of the second article, J. H. Burfeind, took a harsher view of the radium buyers, in which group he included Standard Chemical. Burfeind detailed a typical ore transaction, showing the prices paid to miners for their ore, and the profits supposedly realized by the radium buyers and brokers. This profit allowed the elite of the industry to "ride in automobiles, make trips to Europe, [and] have plenty of money to buy claims and ores."

Meanwhile, the West End producers drove "broken down teams"; they scarcely profited from their work because they bore the costs of "mining, [ore] sorting, wagon-hauls, railroad freight, sampling charges, etc."

Burfeind expected Standard Chemical to remedy this discrepancy by competing more aggressively with the other buyers in the field. He noted one instance in which a buyer for a European firm paid eighty dollars per ton for a certain grade of ore. The Standard offered only sixty-four dollars per ton for the same grade. "Had the Standard been thoroughly [sic] patriotic it would have bid $81.00, or even $101.00."

Some in the West End expected more from the Standard than new bridges.

But the Standard was not willing to play the role of benefactor, and the company spent its money only when absolutely necessary. In 1914 officials from the Standard

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met with the commissioners of Montrose County to discuss a proposed $9,000 road from Naturita to the Joe Junior camp, running along the San Miguel River. Standard Chemical wanted Montrose County to finance the road; because the company had invested some $45,000 in its West End operations during the month of July alone, officials felt "the county should be able to give them some assistance." But the commissioners refused, claiming the county had only $668.00 to spend per year in that district. The county would have gladly assisted, but the law forbade the expenditure. The county's refusal to fund this road seems disingenuous, considering the sentiments of county boosters, who wished to support the radium industry in every way possible. On the other hand, Standard's refusal to build the road seems almost trivial; the company stood to profit from the road, which would significantly decrease the time, expense, and difficulty of hauling ore to and from its Joe Junior mill. Montrose County officials could justifiably view the road as a business expense to be borne by Standard Chemical. Nevertheless, the company held out, and two years later, in 1916, the county found the means to construct the road.43

43 "County Can Not Help Build Road," Montrose Daily Press, 30 July 1914, p. 1; "Tragic Ending of Nick Krohn," Montrose Daily Press, 16 September 1916, p. 1. Krohn, the supervisor of the road crew, was killed in an accident near the completion of the building project. The article contains information regarding the construction of the road.
Standard Chemical and Montrose County officials also wrangled over the amount of taxes owed the county by the company. In 1926 the Standard hired a Denver law firm and sued the county for the recovery of tax revenues, claiming an excessive evaluation of company property. This was not the first such lawsuit—the company had already "won a number of suits against the county," and company officials had "no reason to doubt" a victory in this case, as well.44

The Standard Chemical Company and other radium producers invested great sums in the business of producing radium. The manager of the Radium Company of Colorado estimated that, during the radium boom, the ten companies working in the West End had invested $10 million in the industry. This corresponds with a statement made by John I. Mullen in 1923: "There has been about a million dollars (Eastern money) a year spent in the Paradox during the past eight years."45 These figures likely include the cost of refining radium, money spent outside the West End. Nevertheless, the radium companies must have spent quite a lot of money in the West End. But within the boom period


forces beyond the West End's control limited the area's prosperity.

First of all, the chronically poor road system within the region forced mining operations to halt for at least three months of the year. The wet winter weather made for "impassable roads." Of course, when the mines closed, freighting and other cottage industries had no business, either.

Secondly, the market for radium fluctuated a great deal. The market affected independent miners the most. But after the outbreak of the First World War in the summer of 1914, the entire radium industry came almost to a halt. Germany, which had purchased nearly two million dollars worth of carnotite ore per year, diverted its resources to the war and stopped buying radium and radium ore altogether. Even the well-financed Standard Chemical Company stopped production for a time; it, too, depended on the European market for the sale of its finished product.

The bust in the radium industry lasted approximately three years, from 1914 until 1917. Unfortunately, almost no record exists regarding the impact this temporary bust had on the West End communities. (Coincidentally, few issues of

46 Burwell, "Carnotite Mining," 758.

the Nucla Independent from 1914 to 1917 remain.) The miners and prospectors attracted to the carnotite regions have been described as a "restless crew, . . . with no interest in the community." Such persons would have drifted out of the West End as easily as they arrived.\textsuperscript{48} Others who lost out on business opportunities spent more time on their farms and ranches. Some may have found other occupations, but in the West End, there were not many alternatives to agriculture and mining.

For a time all carnotite mining ceased. The last load of ore left Placerville in September of 1914. Standard Chemical shut down its operations, but probably not for very long. The company had invested heavily in the West End, and it had the resources to weather a slump. The Standard resumed production, albeit on a limited basis: in 1914 the company produced 9.6 grams of radium; in 1915, 1.7 grams; in 1916, five grams; and in 1917, seven grams.\textsuperscript{49} As noted, the talk of highways and railroads in the West End circulated vigorously in 1916; this indicates that the Standard did not cease mining for long, and that few expected the radium slump to last long.

\textsuperscript{48}Deets, "Paradox Valley," 196.

While the First World War put a hold on the use of radium in medical research, it created another market that renewed the radium boom. Several companies had been experimenting with radium in the production of luminous paint, which was applied to watch faces and instrument panels. The soft light emitted by the paint allowed one to read the instrument in the dark. By 1913 watches with luminous dials had become relatively popular in the United States. Soon thereafter the military started using the paint on compasses, watches, gunsights, and the instrument panels of ships and planes. This market greatly boosted the radium industry; in 1918 radium production in the United States peaked at 21.7 grams (Standard Chemical accounted for 13.6 grams). Of this, approximately ninety-five percent went for the production of luminous paint. 50

Despite the great demand for radium during this period, some would question the prosperity enjoyed by West Enders. According to one opinion the economic impact was minimal. The sponsors of the boom came from outside the region; therefore, the profits left the region without benefit to West Enders.

While farmers and ranchers profited indirectly from the influx of money brought on by the booms, their mode of living continued on fundamentally the same as if there had been no uranium or vanadium ore in the region. Likewise, the towns of the area received only temporary and superficial benefits from the migration of

prospectors and miners and the freighting of ore through the country.\textsuperscript{51}

Another opinion holds that the Paradox Valley, and, presumably, other parts of the West End, rode "the crest of a wave of prosperity" during the radium years; money "poured" into the local economy.\textsuperscript{52}

Certainly, some locals must have capitalized to an appreciable degree. However, when the boom subsided West Enders could point to only a few tangible, lasting benefits: a bank and a high school in Nucla, and some road improvements, but no permanent, thriving industry. The hotels and other business enterprises established in the West End could not prosper without the capital provided by the radium industry.

The recollections of a West End pioneer testify to the difficulty of making a living during boom and bust. Walter and Myrtle Cooper moved to Naturita in 1899, intending to raise cattle. Finding that endeavor "unprofitable," Walter and a partner became freighters, when the Cashin copper mine was operated. For unspecified reasons "Walter didn't stay with ore hauling very long." Presumably, that occupation proved just as risky as ranching. But the family stayed in the area, and for several years the Coopers operated Naturita's post office; later, they relinquished the post

\textsuperscript{51}Rockwell, \textit{Uncompahgre Country}, 195.

\textsuperscript{52}Deets, "Paradox Valley," 195.
master’s job and opened their house to boarders. During the radium boom they had plenty of business but "the profit didn’t amount to very much," especially when compared with the amount of work involved in running a boarding house. Through it all the Coopers maintained their farm, because the land was the one sure thing they had. As noted in this recollection, "people on these small farms often tried ways of adding to their small income." The radium boom afforded the Coopers such an opportunity, but it certainly did not make them wealthy. 53

The radium boom exercised the greatest impact, perhaps, on the collective imagination of Montrose County residents. For years news from the radium fields dominated talk in the county. Newspaper correspondents enthusiastically reported each new discovery of high grade ore, printed the latest news from the carnotite industry, and repeated the claim that the whole world looked to the West End to supply the valuable element, radium. Radium so enthralled the West End that the region took radium as part of its identity. Some referred to the region as "the radium belt," and when Nucla’s first movie house opened, its proprietor adopted the name "Radium Theatre" (and the slogan, "Meet Me At The Radium Theatre"). Other merchants tried to capitalize on

53 Locke, "Recollections of Naturita," 34-42.
the element; a Nucla creamery produced "Radium Brand Butter."\textsuperscript{54}

The county's newspapers treated readers to stories of miraculous cures accomplished by radium therapy, and to the newest applications for radium, such as "the rejuvenation of frozen fruit trees," a technique developed by a scientist in California. In Montrose consumers had available to them the latest, practical use for radium--a switchplate coated with luminescent paint made with radium. At the cost of one dollar each, one could "radiumize" his home by purchasing "everlasting guide lights for finding wall electric push buttons in the night time."\textsuperscript{55}

Since the general public did not understand the phenomenon of radioactivity--the most significant characteristic of radium--a knowledgeable Montrose man sought to inform the less enlightened. In a remarkable, sometimes eschatological treatise, the author announced that "radium is the nearest approach to God of any known metallic


[sic] substance." He warned that chemists "are getting closer to Causation every day. But, Obey the Sign: Thus Far, and No Farther Shalt Thou Go! 'God Lives Next Door.'" Used unwisely, he suggested, radium could "set the world afire."

After this startling introduction, the author retreated slightly, allowing that "God is Good": never would God have given to humans the element radium if it were not intended for some good, and if the dangers of radium were not "printed in bold-faced type on the label." In fact, scientists were beginning to realize that radium "is Life-giving." Not only had science developed radium cures, but those who merely lived near radium deposits reaped healthful benefits:

The doctor practising [sic] in the western mountainous portions of the United States, from Colorado to northern Alaska, has to depend mostly on births, old age, accidents and sick visitors from the east for a revenue. And it is being noticed that this part of Colorado is phenomenally healthy. Radium, like many other subtle activities, may be the silent factor lighting each spark of vital force in life.  

With such an endorsement West Enders could not help but take pride in their radium fields.

The most enduring evidence of the West End's fascination with radium survives to the present day in a bit of folklore. Quite early people began to believe that Marie

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Curie performed her experimental work with radium from Colorado carnotite. As recorded in a mining journal in 1911, "agents of Doctor and Madame Curie operated" a mine and a "small factory" in the West End. Forty years later, one could read that near Naturita "the famous Madame Curie had a working mill and several mines supplying ore to the plant." More likely, however, the scientists' slim budget prevented them from hiring agents and building factories. In all but a few cases, the Curies received their samples from a pitchblende mine and mill in Austria. 57

Equally persistent, and interrelated, is the notion that Curie, the most famous name associated with radium, toured the West End or some other part of the Colorado Plateau. These rumors may have been fueled, in part, by her actual visit to the United States in 1921. In that year Curie received as a gift from the "women of America" one gram of radium, "the most celebrated gram of radium produced" by the Standard Chemical Company. The itinerary for her visit reportedly included a stop in Colorado, to observe carnotite mining operations. According to the same accounts, she later decided to bypass Colorado. 58


Over the years various observers recorded Marie Curie's supposed sojourn in the West End. If all of the stories were true, she would have traversed the Colorado Plateau from Moab, Utah, to the Paradox Valley and on to Naturita. A researcher in the 1950s established 1908 as the year of the earliest Curie sighting. One account holds that Curie came to southwestern Colorado in 1899 and named the mineral carnotite. A West End resident claimed to have met Curie when she visited the superintendent of the Standard Chemical Company; she reportedly left with three sacks of radioactive ore. But the final word on the subject belongs to David Lavender: "Mme. Curie, incidentally, never visited the Colorado Plateau, though some promoters will show you the very chair she sat in."59

The year Marie Curie visited the United States, 1921, also marked the decline of America’s radium industry. In that year a Belgian company received from the Belgian Congo the first shipments of pitchblende, a mineral with very high concentrations of uranium and radium. The Belgian company had developed the necessary process to extract radium from the pitchblende; and because the ore contained so much radium, the company needed only ten tons to produce three or four grams of radium each month. The American radium

59Bruyn, Uranium Country, 62-64; Richard E. Westwood, "Howard W. Balsley, Dean of Uranium Miners and Civic Leader of Moab," Utah Historical Quarterly 59 (Fall 1991): 399-400; "Meet 'Clear Water Lou,'" Forum (Nucla, CO), 13 February 1964, p. 8; Lavender, One Man's West, 304n.
companies realized immediately that they could not compete with the Belgian company. Instead, Standard Chemical and other companies cooperated by providing technical assistance and by helping the Belgians market their radium.\(^{60}\)

By the second half of 1922 the American companies had virtually halted radium production. Standard Chemical maintained its presence in the West End until 1928; the company continued to prospect for new carnotite claims, and in 1926 the Standard even expended five thousand dollars to build a road into Bull Canyon. Apparently, the company hoped that the pitchblende reserves in the Belgian Congo would play out, and that Colorado carnotite would again supply the world’s radium. The company even branched out to another extractive industry: the Standard attempted to locate oil reserves in the West End.\(^{61}\) In its limited capacity, however, the Standard employed only a fraction of the men that it had previously.

Carnotite mining in the West End continued, but only on a small scale. A few buyers purchased ore from those miners diligent enough to maintain their claims. Some refining companies still marketed radium for use in luminescent paint, and uranium for use in glass and ceramic ware.


Producers of "radioactive water, salves, tonics and other nostrums" continued to market their products well into the 1930s; some miners sold ore to those producers. But after 1922 carnotite traded only sporadically.\footnote{Shumway, "History of the Uranium Industry," 80-82.}

For several years those in the West End held hope that carnotite mining would return to its former glory, that "carnotite will come back."\footnote{Deets, "Paradox Valley," 195.} In 1925 and in 1926 enough carnotite ore sold to make observers hope "for a boom in the local mining game." At one point the Nucla newspaper repeated a rumor about a boom town that would spring up in the Paradox Valley near some oil wells.\footnote{Nucla Independent, 5 February 1925, p. 1; "Moving Ore from Long Park Mines," Nucla Independent, 21 January 1926, p. 1; Nucla Independent, 7 May 1925, p. 1.} But no such boom occurred, and carnotite mining did not return. In 1927 Standard Chemical sold its holdings in Colorado to Union Carbide and Carbon Corporation. This sale may have brought hope to the West End, for Union Carbide planned to mine carnotite for its vanadium content. However, the company could begin operations only "when the demand arises"; at the time, no such demand existed.\footnote{J. B. Huffard, "Corporation Acquires Additional Vanadium Property in Colorado," Carbidea 5 (February 1929): 5. The Carbidea, apparently, was a publication of Union Carbide and Carbon Corporation.}
Coincident with the radium bust came the realization that agriculture could not deliver growth and prosperity to the West End. The Hartmann brothers, who had purchased four thousand acres and formed the Paradox Valley Land and Development Company, went broke in their attempts to establish an effective irrigation system. The failure of this company ruined many homesteaders in the Paradox Valley. The group of 150 Hungarian settlers, who arrived at the Paradox Valley in 1917, departed one year later, broke and disappointed. Many other homesteaders relinquished their property and left the area. By 1923 farmers in the Paradox Valley cultivated only thirty-one percent of the total amount of the available, arable land. In 1921 a geologist summarized the problems faced by those who would irrigate the West End:

In considering [irrigation] proposals it should be remembered that the rocks in which the canals and ditches would be built are porous and the ground water table is low. Evaporation is rapid and becomes a serious factor when the long distances through which the water would have to come are considered. The cost of initial construction and the high cost of ditch maintenance, because of silting, breaks, etc., are other extremely unfavorable factors which should be carefully considered before any irrigation scheme is adopted. . . . A great deal of land in the area . . . would be immensely productive if it could be watered. However, the high cost and the

uncertainty connected with such enterprises will probably limit their promotion. 

If, ten years earlier, enthusiastic West End promoters could have read this report, it probably would not have deterred them in their attempts to deliver water to West End farms.

The early successes of ranching in the West End also proved ephemeral. Ranchers competed intensely for graze land and access to the few existing springs. This led to the practice of fencing off the land, and battles between ranchers and "squatters," or homesteaders. The "sin of the stockman," overgrazing, ruined much of what once seemed inexhaustible. Due to these factors the costs of stock raising increased dramatically, and only those with the most favorably located ranches and the most economical modes of operation profited. The Club Ranch, perhaps the most successful in the West End, was "among the last of the ranches of this region having anything like adequate range area for any considerable herd."

To be sure, the pastoral pursuits of the West End were not all failures. Nucla, with its successful ditch company, provided the area a certain economic stability. The town of

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Paradox assumed an "agricultural life," although many could only "eke out a bare existence from their water-starved properties." While these communities survived, it had become evident that the West End was not destined to be an agricultural empire.

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69 Rockwell, Uncompahgre Country, 139.
CHAPTER 3

URAVAN: "THE NEWEST BIG LITTLE TOWN IN THE UNITED STATES"¹

In 1931 a correspondent from Paradox recorded a poignant description of the Depression-era West End:

It's rather heart breaking these days, to the farmers of the valley to have to turn away so many men who come here, hiking the long, weary miles across the desert for work. Some come offering to work for board. Some have hiked so many miles their feet are almost too sore to permit further travel. And then when there is no work for them and they must either tramp back across the desert or take the steep rocky road for Utah, it must indeed be discouraging.²

Very little money circulated in the West End. Most families lived on small farms, or cultivated their own vegetable gardens and thus had produce available. And many people shot game, both in and out of season. As one remembered, "we lived on buckskin and beans, you might say." With so little money available, a barter system took hold in the local economy. Farmers traded produce for other goods and services, and others sold their labor skills for food. The operators of a local coal mine exchanged coal for staples, and paid their employees in the same fashion.³

¹"Mining Town," Montrose Daily Press, 24 August 1939, Uravan, CO. Clippings File, Western History Collection, Denver Public Library (hereafter cited as DPL).


³Alva Hiett, interview by author, 30 July 1993, Naturita, Colorado, tape recording, private collection.
But even in hard times people often find ways to afford their diversions. A West End resident of the time recalled, with a touch of wry humor, one of the consequences of the money shortage:

Back in the Depression days they had a little poker game going on at the pool hall up here at Nucla. And in this game, there's only about ten dollars. Maybe one time one guy would take two or three dollars home. But always between the five or six, sometimes four guys, they would always have money enough to start their poker game. Well, one time there was a traveling salesman that came in. They let him get in the game. He won ten dollars, and there wasn't a game for three weeks. That's how tough it was.4

Montrose County exhibited other signs of the times, and some people turned to illegal means to survive the Depression. The county sheriff arrested a man for operating a still, located "in the isolated and impenetrable vastness of canyon and cliffs of the west end." A Montrose newspaper warned residents of strangers who perpetrated various con games upon the unsuspecting. And in a show of optimism during hard times, a Montrose merchant held a "Back to Normalcy" sale.5

Normalcy lay yet a few years down the road for the West End. The collapse of canrotite mining, and the difficulties

4Ibid.

experienced by farmers and ranchers, took a toll on the population of the West End. By 1930 the combined population of Nucla, Paradox, and Naturita had fallen to 813; that figure represents a forty-two percent decrease from 1920, and fewer residents than 1910.6 Nucla boasted the most residents, and remained the most prosperous West End community. In Paradox most people "marked time and talked about the day when mining would again come into its own."7 Naturita, described during the radium boom as "a brawny camp abustle with radium miners and ore wagons," had decayed into virtual ruin. That village had been the most reliant on the carnotite trade. Down river from Naturita, near the Club Ranch, the Joe Junior mill and campsite lay desolate. The boarding house remained, along with the machinery of the mill, "a shattered red hulk leaning against the canyon wall."8

As always, miners refused to give up hope. The fine particles of gold deposited in the gravel benches along the San Miguel River still intrigued West Enders. In 1931, amid reports that indicated a revival of the gold market, several

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6In 1930 census takers counted 398 people in the Nucla precinct, 221 of whom lived in "Nucla town." Paradox counted 221 residents, and Naturita 199. Nucla was the only West End community divided into precinct and township for purposes of the census. Schulze, A Century of the Colorado Census, 203, 363, 163.

7Rockwell, Uncompahgre Country, 140.

8Lavender, One Man's West, 273, 277.
prospectors set up placer operations along the San Miguel River. The process of placer mining provided a diversion for locals, many of whom visited the sites "to watch the gold being washed out of the gravel." An outfit calling itself San Miguel Exploration undertook the most ambitious of these enterprises. The company hauled a 96,000-pound drag line to the West End to dredge gold from the San Miguel. The dredging apparatus was so heavy that a bridge collapsed under its weight.\textsuperscript{9} The success of various attempts--by individuals and companies--to retrieve gold from the West End rivers was limited. Likely, more than one company met the same fate as the "San Miguel River Gold Placer syndicate," which operated near Naturita. Early in 1936 that operation faced bankruptcy, and sold its equipment at auction.\textsuperscript{10}

A revival of the carnotite industry seemed more likely. Sporadic mining of that mineral took place, and occasionally West Enders received encouraging news. In 1931 the Rare Metals Corporation built a mill near Naturita, the mill designed to extract vanadium from carnotite ore. The plant employed approximately thirty men, and in the early summer


of 1931 miners on Long Park, on the northeast rim of the Paradox Valley, began digging ore for the mill.\textsuperscript{11} By the end of the summer, however, the mines closed, and Rare Metals sold its mill at public auction. According to an authority, "the demand for radium, uranium, and vanadium, like that for most other substances, was small during 1931."\textsuperscript{12} It would be several years before demand would pick up, but it would do so in a spectacular manner.

In 1924 the United States Vanadium Company (USVC) was formed. The company mined and milled roscoelite ore in the vicinity of Rifle, Colorado. From that ore the company extracted vanadium to sell to the steel industry. Vanadium is one of several metals used to strengthen steel. In 1926 Union Carbide and Carbon Corporation purchased USVC, which continued its operations at Rifle. USVC, now a subsidiary of Union Carbide, bought the Colorado properties of the Standard Chemical Company in 1927.\textsuperscript{13} With its purchase of


the Standard's property, USVC appeared poised to expand its operations; the company owned the most favorable mine sites in southwestern Colorado and southeastern Utah. However, the Depression-era economy prevented the company's plans to develop its new properties. The slim market for metals used to make steel alloys was already tightly controlled by other companies. USVC saw its production and sales of vanadium from its Rifle operations decrease yearly from 1927 to 1932. 

In the mid-1930s a revitalization of the steel industry gave hope to metals producers such as USVC. The demand for metals used to produce alloys--such as molybdenum and vanadium--increased, a development reflected in the growth of the Climax Molybdenum Company. That company, owner of Colorado's largest company town (Climax), expanded its operations in late 1935, and doubled its molybdenum production in 1936. Meanwhile, USVC grew concerned about the depleted state of its vanadium reserves at the Rifle mine. With this in mind, and anxious to take advantage of a more favorable metals market, the company planned improvements to its property in Montrose County. 

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14 Shumway, "History of the Uranium Industry," 95-100.

On 1 October 1935 USVC brought a "small force of men" to the site of the old Joe Junior camp and mill on the San Miguel River. The men began the preliminary work of building a mill--designed to extract vanadium from carnotite ore--and of building a town to house the mill workers. Blair Burwell, USVC's general manager, promised "considerable activity in the west end carnotite, radium, uranium and vanadium fields after a considerable period of inactivity." Thus began the vanadium era in the West End.

The company decided upon the unromantic, somewhat awkward, but altogether modern and appropriate name of Uravan for its new town. The appellation incorporates the first three letters of "uranium" and "vanadium" consecutively. It seems fortunate that the company chose not to include the first three letters of the third important constituent of carnotite, radium.

It is said that a company engineer named Benner originated the name; by the early spring of 1936 newspapers referred to the town as Uravan. At that time, U. S. Vanadium employed about sixty men in construction of the various mill buildings. By the summer of 1936 workers had completed the main mill structure, but housing for the work force, estimated at 150, had become "a serious problem." At

that point only a few houses had been erected, with several more in the planning stage. Many of the workers, and their families, lived in tents and tar-paper shacks, not unfamiliar accommodations in the West End mining districts. In fact, a veritable "tent town" sprang up in the Uravan vicinity; residents referred ironically to the collection of canvas dwellings and shacks as "Navaru," Uravan spelled backwards. These tents were sturdier than one might imagine. Residents stretched the canvas over wooden frames, and often installed wooden floors. Some people put two tents together, doubling their living space, and most installed stoves.

By 1937 or 1938 most of Uravan’s original houses had been completed. The company named each residential block by letter, alphabetically. Thus, as originally constructed, the town consisted of blocks A through F, perhaps eighty units. Single men found housing at the boarding house, which stood on the property since the Standard Chemical


18 There is no accurate record of the construction dates of Uravan’s original houses. The following documents give some clues: "Residential Property Appraisal Record, Paradox, Redvale, Uravan, Olathe, Alamo Heights," Tax Assessor’s Office, Montrose County Court House, Montrose, Colorado; T. F. Roberts, "Uravan Housing Review," 14 January 1964, Housing 1964 file, Uravan Purchasing drawer, room 126, Umetco Records.
days. Commercial and community buildings included a drugstore and gas station, recreation hall, commissary, post office, and clinic. Several of these buildings were moved by the company to Uravan from Civilian Conservation Corps camps. The company relocated one such building to serve as the town’s school house; in the fall of 1936 some fifty-three children, aged six to twenty-one, enrolled.\(^{19}\)

The company needed massive amounts of salt for the roasting process, one of the preliminary stages of vanadium extraction. Brine, conveniently deposited by the Dolores River in the central portion of Paradox Valley, provided the source. The company dug wells to pump out the brine, which settled into ponds on the surface. The water evaporated, leaving thick salt beds for harvest. To heat the mill’s roasters, USVC dug coal from a mine near Nucla. The company also installed water- (from the San Miguel River) and diesel-powered generators to supply electricity to the mill and town.\(^{20}\)

By the summer of 1936, USVC spent a reported $60,000 per month on supplies needed to maintain the mill and town. As noted previously, the business leaders of Grand Junction expended considerable effort and money in 1923 to construct a road to the West End. That effort paid “handsomely,”

\(^{19}\)Silver, "History of the Uravan Grade School."

\(^{20}\)“Mining Town,” Montrose Daily Press, 24 August 1939, Uravan Clippings File, DPL.
because USVC chose Grand Junction as the location for its offices. The company purchased materials from businesses in Grand Junction, or had materials shipped through the city in route to Uravan. For their foresight and accomplishment, business leaders of Grand Junction congratulated themselves and their predecessors, although some echoed the dire warnings heard two decades previously in the city of Montrose: "If the people of western Colorado could only realize the potentialities of vanadium . . . they would show a great deal more interest in this industry." 21

In 1936 the condition of the road, known variously as the Gateway Road, Dolores River Road, or Highway 141, was scarcely better than it was in 1923. In some stretches, the road resembled "a mere shelf running along the hillside well above the Dolores river." But USVC had the clout and the resources to improve the situation considerably. And with two or three trucks rumbling over the road each night (to avoid other traffic), the situation demanded improvement. The company assumed some of the task, providing machinery and powder for the necessary blasting. Reportedly, the company itself rebuilt approximately forty miles of highway. Montrose County contributed finances toward improvement of

that part of the road that lay within county boundaries, and, during the next several years, Mesa County found the means, through federal and local sources, to finance several projects on its share of the road. 22

The residents of the West End took in stride the developments of 1935 and 1936. Certainly, there must have been considerable excitement at the prospect of a new town, and more importantly, of a company that would provide jobs and an economic base for the area. But in contrast to the boom days of the 1910s, the news reports of the mid-1930s reveal no evidence of great expectations. West Enders, weary of economic depression and wary of potential busts that seemed to follow each boom, may have adopted a wait-and-see attitude. The town of Uravan, as more than one observer noted, "blossomed almost overnight"; people may not have known what to expect. 23 Although cautious, residents could not help feeling optimistic, a mood reflected in this statement by a Paradox woman: "It begins to seem like old times around here--so much mining talk, and everyone who has


23 "Town of Uravan Needs Mail Route to Serve 700 Inhabitants Dependent upon Accommodation of Truck Line," Montrose Daily Press, 16 December 1937, Uravan Clippings File, DPL. David Lavender also used a botanical analogy to describe Uravan. "Overnight almost it sprouted," he wrote, "and the incomprehensibility of it will not leave me." Lavender, One Man's West, 277.
a claim out digging out a few tons of ore, as they can sell it now."  

Indeed, the arrival of the United States Vanadium Corporation signaled an era of new opportunity. In the years subsequent to the founding of Uravan, the carnotite industry prospered anew. In addition to purchasing ore from independent miners of the area, USVC contracted with independent companies to operate claims that USVC owned. The company built miles of "drill roads," designed to open up the country to exploration, throughout the West End, and in other remote regions of the Colorado Plateau. Many of the miners arrived from established mining centers like Ouray, Colorado. Such miners possessed the equipment and experience to exploit the carnotite fields. A statistic from the Minerals Yearbook reflects the tremendous increase in mining activity in western Colorado and southeastern Utah. Vanadium production increased from 52,000 pounds in 1936 to 980,000 pounds in 1937. The "famous and important" mines in the Paradox Valley and its vicinity provided much of the carnotite ore processed at Uravan.  

In addition to USVC, other companies milled carnotite for its vanadium content. In 1936 the Utah Vanadium

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Corporation constructed a mill at Cedar, in San Miguel County, Colorado. In the same year a group of investors financed the construction of a small mill near Blanding, Utah. North Continent Mines, Inc. operated a mill at Slick Rock, Colorado, beginning in 1939. Also in 1939, Gateway Alloys, Inc. opened a mill at Gateway. The ore capacity of these small mills ranged from fifteen to twenty-five tons per day. By way of contrast, the USVC designed its Uravan mill to treat 125 tons of ore per day, and it was later upgraded to treat 240 tons.

In 1938 it became apparent that the vanadium market would continue to thrive. USVC's strongest competitor, the Vanadium Corporation of America, refurbished the old Rare Metals mill near Naturita. VCA also constructed a town near the mill, and named the town Vancoram, a contraction of Vanadium Corporation of America. (In subsequent years, the town appeared on maps as "Vancorum.") The mill opened in 1939 and processed ore at a rate of one hundred tons per day. VCA competed with USVC for the control of mining claims, but USVC always held the upper hand, and the VCA mill never challenged the dominance of USVC and its Uravan mill. Similarly, the town of Vancorum never attained the

size or stature of Uravan. Actually, Vancorum was more of a housing extension of Naturita.

In the West End Uravan quickly came to dominate, in terms of both population and economic importance. Men came to Uravan from all parts of southwestern Colorado to apply for jobs. Within a few years of Uravan's construction, approximately 250 workers lived in the town, or its vicinity, and the company's payroll ranged between fifty and sixty thousand dollars each month. Apparently, the company met its goal of beginning operations by 1 October 1936. By the 26th of that month, the mill operated twenty-four hours per day, in three eight-hour shifts.

By 1938 Uravan had an estimated seven hundred residents, and the 1940 census shows a population of 862. The company town became the largest population center in the West End, but other communities experienced a good deal of growth tied directly to the carnotite industry. Naturita, described by itinerant writers in the late 1930s as "a scattered village of small false-front buildings," saw its

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28"Mining Town," Montrose Daily Press, 24 August 1939, Uravan Clippings File, DPL. Uravan was always a mill town, despite the title of this article. However, at various times in its history, the town housed some miners, as well as mill workers.

population climb from 199 in 1930 to 302 in 1940. As indicated by news reports, several Naturitans, newly employed, moved to Uravan in 1936. (A few of Naturita’s residents packed up and moved to California during the Depression.) However, the town’s population swelled because of migrants, who arrived not only from relatively near parts of southwestern Colorado, but also from places such as Lawton, Oklahoma, and Jicarilla, New Mexico. "Nearly every day," wrote a Naturitan, "we see someone trying to rent a house in town, but there are few unoccupied houses." 

Nucla, "a compact town of neat frame bungalows," was less touched by the latest surge in the carnotite industry. There, "in the small grassy park shaded by poplars, school children eat their lunches and townsfolk pasture their cows." Increasingly, however, the West End’s population became more mobile. Now a person could live in Nucla and commute daily to Uravan, or to work in the mines. Nucla retained an agricultural atmosphere, but many of its residents labored in various jobs associated with the carnotite industry.

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32 Workers of the Writers’ Program, Colorado, 421.
With the arrival of USVC the West End "opened up."

Just a few years previously the fifteen mile trip from Uravan to Naturita demanded at least two hours. Road improvements reduced the time requirement to a length more comparable to the fifteen minutes one needs today. County road crews made obsolete an old cattle trail that connected Uravan (and the Club Ranch) and the Paradox Valley by constructing a road along the Dolores River. This facilitated travel to the mines of the Paradox Valley, and provided access to USVC's salt works in the central part of the valley. 33 And, to complete the West End's entry into the twentieth century, distances to the outside world rapidly decreased. A reporter proclaimed that "famous 'Norwood hill' has at last been conquered by a splendid state highway down its precipitous [canyon] wall." The same correspondent noted that Mesa County, "anxious to keep running the ore trucks from Uravan," maintained Highway 141 in good repair. 34 To be sure, motorists in the 1940s faced rough, dusty roads; and flash floods occasionally tore down bridges and washed away entire stretches of highway. West Enders would not have the pleasure of driving on pavement


34 "Traveling with the Editor to Uravan and Back Last Sunday," Gunnison (CO) News Champion, 4 September 1941, Uravan Clippings File, DPL.
for many years to come. Nevertheless, they started to lose a bit of their isolation.

During USVC's first five years of operation in the West End the company enjoyed a considerable amount of growth due to increases in domestic and foreign steel production. The coming of World War II brought the company even more business. Because the manufacturers of armaments needed vanadium-strengthened steel, production of vanadium increased as the United States armed itself and its allies. Concomitantly, the federal government involved itself heavily in the production and distribution of various resources necessary for industrialization, resources often referred to as "strategic and critical materials." The federal agencies that decided such matters chose not to classify vanadium as "strategic" or "critical"; but the War Production Board exercised control over vanadium deliveries, giving priority to defense orders.35

In June of 1940, Congress passed legislation that created the Metals Reserve Company. Metals Reserve was designed to facilitate America's industrialization by procuring and stockpiling, from both foreign and domestic sources, those materials deemed necessary for the war

effort. In May of 1942 USVC contracted with Metals Reserve to serve as its agent in the production of vanadium. Metals Reserve financed the construction of additional facilities to mill vanadium, and the company purchased all vanadium produced. Under this program, USVC converted an old lead smelter at Durango, Colorado, to a vanadium processing plant; Metals Reserve owned the plant, but USVC operated it. VCA operated its mill at Naturita for Metals Reserve, and VCA also built a new mill at Monticello, Utah. In addition, North Continent Mines and Gateway Alloys operated small mills at Slick Rock and Gateway, respectively, under contracts with the Metals Reserve Company. With USVC as its agent, the federal government’s Metals Reserve Company bought ore and stockpiled it for distribution to the various mills.

The procurement of vanadium proved successful by any measure. Vanadium production rose to its highest point in 1943; USVC accounted for the bulk of this production, with most of the carnotite ore coming from the Paradox Valley and

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other mines in the West End. In less than two years Metals Reserve had enough vanadium stockpiled to insure any future needs. On 29 February 1944 the Metals Reserve Company canceled its contracts with USVC and other vanadium producers.\(^{38}\) At the end of the war officials estimated that "approximately 60 per cent of the world's supply of vanadium, and 90 per cent of the entire domestic vanadium supply" originated in the carnotite fields of the Colorado Plateau.\(^{39}\)

The end of vanadium production during the war spelled an end to carnotite mining for a time. At Uravan, however, the mill--two mills, in fact--continued to run, and workers carried on as before. Since 1910, the nominal beginning of the mining industry in the West End, the third important element found in carnotite, uranium, had been passed over. Now, in the middle of the war, the federal government wanted uranium, as much as the mills could supply. Had it not been for that nearly forgotten radioactive element, Uravan might prematurely have become a ghost town.

Since the Uravan mill opened, in 1936, it had extracted vanadium from carnotite ores; the waste material from its operations, the tailings, contained unwanted uranium. For years, these tailings had accumulated, not only at the

\(^{38}\)Chenoweth, "Historical Review," 14, 17; Shumway, "History of the Uranium Industry," 130.

\(^{39}\)"Blair Burwell Makes Statement on Uranium Taken from This Region," Daily Sentinel, 8 August 1945, p. 1.
Uravan mill, but at other mills on the Colorado Plateau, as well.

In June of 1942 the United States Army Corps of Engineers assumed control of America’s fledgling atomic energy program. In August of that year the Corps created a new district, the Manhattan Engineer District (MED). From this designation the entire effort to build an atomic bomb came to be known as the Manhattan Project. Very simply put, the MED’s mission consisted of building and operating plants designed to produce fissionable material.⁴⁰ Requisite to this charge was the acquisition of the required radioactive feed materials—namely, uranium.

For its supply of uranium, MED used three major sources: the Shinkolobwe Mine in the Belgian Congo (Zaire); the Eldorado Mine in Canada’s Northwest Territories; and the tailings piles located at various points on the Colorado Plateau. (The Shinkolobwe, with its rich pitchblende deposits, was the same mine that put the Standard Chemical Company out of business in the early 1920s.) The MED looked primarily to the African and Canadian mines because those ores contained relatively high percentages of uranium; American officials also wanted to insure access to the

world’s richest deposits, to keep such resources out of hostile, or potentially hostile, hands. The exploitation of Colorado Plateau resources occurred almost as an afterthought, considering the time and energy that the MED expended to obtain Canadian and African ores. At the time many authorities were not certain that carnitite ores would yield appreciable amounts of uranium. But the stockpiled tailings at Uravan were more accessible than any other source. Moreover, the MED held to a policy of procuring uranium from all possible sources, not only for the Manhattan Project, but also for anticipated future needs.\textsuperscript{41}

In December of 1942 MED procurement officers visited southwestern Colorado to assess the area’s potential to supply uranium. Soon thereafter, MED officials negotiated a contract with USVC representatives. Under the agreement, the government purchased USVC’s stockpiled tailings. USVC constructed a new mill to process the tailings, located across the San Miguel River from the original mill, with financing provided by the government. The government owned the mill, but USVC operated it. When Uravan’s original mill halted the production of vanadium, in February of 1944, the

company reequipped the plant to process uranium. The government reimbursed USVC for all costs the company incurred in this project, including the salaries and wages of its employees. In addition to absorbing all costs, the government paid its contractor a fixed fee. USVC did, however, pay for the operation of its own mill at Uravan. The MED purchased the output from USVC’s original mill "on a unit price basis."\(^{42}\)

Under the same contract USVC constructed a smaller mill in Durango, Colorado, at the vanadium plant belonging to the Metals Reserve Company. Feed for this mill came from tailings accumulated from the Metals Reserve vanadium procurement project. USVC designed the Uravan and Durango mills to produce a "uranium-vanadium sludge." To further process this product, also known as "green sludge," USVC built a refinery at Grand Junction. At that plant, workers separated the vanadium and the uranium, producing from the latter "yellowcake." This uranium concentrate, about sixty percent pure, was then shipped to Linde Air Products Company, of Tonawanda, New York. Linde, also a subsidiary of Union Carbide and Carbon Corporation, further refined the

\(^{42}\)Phillip L. Merritt, "Resume of Production of Uranium Products for Manhattan District in the Colorado Plateau Area," New York, War Department, United States Engineer Office, Madison Square Area, 26 January 1945, RMO-979, 3-4.
yellowcake to black oxide, a more concentrated form of uranium.\textsuperscript{43}

To summarize, USVC operated two mills at Uravan; one was company owned and operated, and the other was government owned and company operated. USVC operated a government owned mill at Durango. Output from each of these plants was transported to Grand Junction for further processing. In addition, the government procured a uranium-bearing sludge product from VCA's Naturita plant, and from a Metals Reserve plant in Monticello, Utah. The sludge from these two plants was further refined by the Vitro Manufacturing Company in Canonsburg, Pennsylvania. From the Vitro Manufacturing Company of Moab, Utah, the MED acquired high grade carnitite ores; these ores were refined in Grand Junction. Also, the MED purchased old vanadium tailings from small mills in Blanding, Utah, and in Gateway, Loma, and Slick Rock, Colorado. These tailings were shipped to Uravan for processing.\textsuperscript{44}

By at least three years USVC anticipated the government's need for uranium. Late in 1939, apparently on its own initiative, the company constructed an experimental plant for the recovery of uranium. The company invested $100,000 in the pilot plant, which was incorporated into the


\textsuperscript{44}Chenoweth, "Raw Materials Activities," 36-37.
existing facilities and designed to treat fifty tons of tailings per day. Naturally, this small plant allowed USVC to experiment with and improve its refining process. USVC held the advantage over competitors, like VCA, when the government called in 1942. In fact, output from Uravan’s pilot plant was first used by MED late in 1942, before USVC’s negotiations with the government took place. By all accounts USVC’s Blair Burwell originated the plan to build the small, experimental uranium circuit.

The pilot plant at Uravan was no secret. And, until the MED censored the press, "there was considerable speculation in the open literature . . . regarding the military possibilities of nuclear fission." But no one discussed such theories in this case. A news reporter in 1939 implied that USVC’s uranium would be used, like vanadium, "in the manufacture of high grade steel."

In March of 1943 Second Lieutenant Philip C. Leahy of the Army Corps of Engineers arrived in Grand Junction with

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45 "Colorado," Engineering and Mining Journal 140 (December 1939): 79; "Colorado," Engineering and Mining Journal 141 (May 1940): 76. Under the title "Colorado" appeared a series of paragraphs that summarized various developments in the field. Neither of these unnamed authors speculated on the proposed use of uranium.

46 Merritt, "Resume of Production," 1.


48 "Uranium Mill May be Built at Uravan, Adding to What Is Already Great Property," Daily Sentinel, 3 September 1939, Uravan Clippings File, DPL; "Vanadium Production in Colorado," Denver Post, 31 December 1940, p. 4A.
his orders in a sealed envelope. As per instructions Leahy rented a hotel room and opened the envelope. Succinctly, the orders instructed Leahy to contact Blair Burwell, USVC’s general superintendent. Burwell would tell Leahy everything he needed to know. Included with Leahy’s orders was a letter signed by Major General Leslie R. Groves, the Officer in Charge of the Manhattan Project. The letter read, "To whom it may concern: if this officer should ask for help, please assist." Leahy carried the letter with him throughout the war, but needed to use it only once.49

As the general contractor for the project, USVC was responsible for the construction, operation, and maintenance of all necessary facilities. Because the MED reimbursed the company for all costs, Leahy and his staff had the responsibility of advancing the necessary money to the company, auditing the company’s expenses, and overseeing its operations. But because of the nature and urgency of the project, and because of the government’s interest in seeing it completed, Leahy also served as a procurement officer; in several instances he provided the means and manpower to insure the completion of the project. Of the project, Leahy knew only that it had to be done in the shortest possible time. He was there to make sure that the plants were built

and that the uranium was delivered. Toward this end, Leahy and his staff proved efficient and helpful. This resulted in more of a partnership between the company and the government than might originally have been designed.

For example, the project’s brain trust, USVC officials and Leahy, realized that USVC did not own enough trucks to haul materials between Grand Junction and the plants at Uravan and Durango. Leahy ordered sixty trucks, which the army delivered. However, the trucks had been designed for use in the desert; the transmissions and rear axles were geared for service much different than what Leahy needed. Also, the trucks had no beds or cabs. Undaunted, Leahy arranged to have the trucks properly equipped, and he put them to use. Leahy also procured a snow plow, and Manhattan District engineers helped to keep open Red Mountain Pass during the winter. Truckers negotiated the pass when driving between Grand Junction and Durango.

Leahy also procured technical expertise for the project. When the company began processing tailings, it recovered approximately sixty percent of the uranium. Leahy felt that the recovery rate could be improved. He managed to hire chemists from private firms around the country "to look at the problem." As a result of their work, the

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51 Leahy, address.
project achieved an eighty-seven percent uranium recovery rate.  

As work on the project progressed, officials realized that they needed skilled manpower at the plants, specifically mechanics, electricians, instrument repair people, and laboratory technicians. Because of the war, so many men served in the armed forces that labor shortages became a serious problem. Often the company hired men whose expertise lay in areas other than milling, "ranchers, farmers, sheep-herders, and what have you." To mitigate this problem Leahy sent word through his chain of command that he needed individuals with certain skills. MED complied, and, during the course of the war, assigned thirty-one enlisted men to the Colorado Area Engineers Office in Grand Junction. Of these, twenty-eight served at Uravan, and three at Grand Junction.  

In October of 1943 Cliff Hiett arrived in Grand Junction, one of the first soldiers assigned to Uravan's mill. Unlike Philip Leahy, who came to Grand Junction without really knowing where he was, Hiett was familiar with the area. Hiett grew up in the West End, graduated from

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52 Ibid.

53 Leahy to author, 3 March 1994; Leahy, address. These soldiers probably belonged to either the Special Engineer Detachment or the Enlisted Reserve Corps, two military organizations designed by the District Engineer to provide technical expertise and manpower to the various Manhattan Project facilities. See Jones, Manhattan, 358-359.
Nucla High School, and worked for two years at Uravan’s vanadium mill. In May of 1942 the Army drafted him. After stops in five different states, Hiett received the orders that sent him to Colorado. In Grand Junction Hiett reported to Leahy, his commanding officer. Leahy was just about to leave for a couple of days, so he asked Hiett if there were anything he wanted to do until Leahy returned. Hiett responded that he wanted to go to Nucla, to see his parents. Leahy, previously unaware that Hiett was from the West End, said that would be fine; in fact, after spending a couple of days in Nucla, he could go down the road to Uravan, where he would be stationed. After fifteen months of duty, Hiett returned to the same job he left. In his absence Uravan had grown considerably.

As USVC officials contemplated war-time expansion, housing undoubtedly constituted one of their major concerns. Part of the remedy came from a federally sponsored program designed to alleviate housing shortages in certain mining centers. Early in 1943 a Montrose contractor won the federal contract to build sixty-eight apartment units in Uravan. The one, two, and three-bedroom apartments were constructed with flat, tar-covered roofs. (The contractor

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54 Cliff Hiett, interview by Estalee Silver, 20 May 1976, Uravan, Colorado, tape recording, private collection. Of the twenty-eight soldiers who served in Uravan, perhaps five or six had worked previously for the company.
built similar apartments in Vancorun.)\textsuperscript{55} Because of this design, the people of Uravan always referred to the dwellings as the "government flat tops," or the "flat tops."

Also in the spring of 1943 construction of the government owned uranium mill began. In accordance with terms of its contract, USVC engaged a subcontractor for this work, the Stearns-Roger Manufacturing Company of Denver. The influx of workers for this project strained the housing capacity of Uravan. In response to a request from Stearns-Roger, USVC moved to Uravan buildings from a Paradox Valley Civilian Conservation Corps camp. The company converted these buildings into dormitories and mess halls.\textsuperscript{56} In addition, USVC appropriated various Civilian Conservation Corps buildings for use in Uravan as office and shop facilities.\textsuperscript{57}

Stearns-Roger finished construction of the new mill sometime near the target date of 15 July. On 23 July 1943 USVC put the "sludge plant at Uravan" into operation, "with a thru-put of 300 tons of sand per day." The new plant at


\textsuperscript{56}C. S. Beech, Stearns-Roger Manufacturing Co. to U. S. Vanadium Corporation, 28 April 1943; L. K. Norton, USVC to Lieutenant P. C. Leahy, 28 April 1943; both letters from Area Engineer Correspondence March to October 1943 file, drawer 260 Ub, room 114, Umetco Records.

\textsuperscript{57}Leahy to author, 3 March 1994; Work Order, 28 June 1944; Work Order W7P-5, 28 June 1944; both documents from Work Orders file, drawer 78 Uf, room 125, Umetco Records.
Durango began operation at a rate of one hundred tons of tailings per day on 10 July. And on 25 August the refining plant at Grand Junction was put into service. Nearly one month later, on 22 September, the Grand Junction refinery met the goal of processing four hundred tons of sludge per day, with a refined product that met terms of the contract. USVC pointed out this achievement to MED officials because, under terms of the contract, the company would not receive its fixed fee payment until its product met the "required specifications." 58

From the beginning of the project, USVC officials struggled with "an acute labor shortage at Uravan." The company had two plants to run, including Uravan’s original vanadium mill. Each plant employed seventy to ninety men during the war years. The company’s Industrial Relations Department worked through the United States Employment Service to attract labor to Uravan, but as of 16 August 1943, "only about fifty percent of the men sent to Uravan have remained more that two or three days." The employees that remained worked "twelve to sixteen hours daily" to meet the company’s required output. 59

58 Blair Burwell, USVC to Lieutenant P. C. Leahy, 7 September 1943; J. R. Van Fleet, USVC to U. S. Engineer Office, Madison Square District, 2 October 1943; both documents from GJWE 11, box #5 file, drawer 260 Ub, room 114, Umetco Records.

59 W. E. Haldane, USVC, to P. C. Leahy, 16 August 1943, Area Engineer Correspondence March to October 1943 file, drawer 260 Ub, room 114, Umetco Records.
Uravan's isolation proved one of the major detriments to attracting steady workers. Stearns-Roger realized this problem during construction of the government-owned uranium mill. Some of its employees left the project each Saturday evening "to attend to personal business," or, perhaps, to find entertainment unavailable at Uravan. Those employees then found it difficult to return to Uravan for a day or two. To alleviate this problem, Stearns-Roger changed its work week from seven eight-hour days to six nine-hour days, thereby allowing workers one day off.\(^{60}\)

Ultimately, however, the factor most responsible for the labor shortage was the demands placed on manpower by the war. The young, skilled, constant workers needed by companies across America streamed steadily into the armed forces, either through voluntary enlistment or conscription. This prompted a USVC official to state: "The type of labor applying for work through the United States Employment Service in these days is generally [of] the drifting class."\(^{61}\) Thus, the company experienced high turnover and absentee rates among its hourly workforce. This problem affected all of the plants under government contract.

\(^{60}\) P. C. Leahy to U. S. Vanadium Corporation, 2 June 1943; P. C. Leahy to U. S. Vanadium Corporation, 24 June 1943; both letters from Area Engineer Correspondence--March to October 1943 file, drawer 260 Ub, room 114, Umetco Records.

\(^{61}\) W. E. Haldane, USVC, to P. C. Leahy, 16 August 1943, Area Engineer Correspondence March to October 1943 file, drawer 260 Ub, room 114, Umetco Records.
Between 1 July 1942 and 30 June 1945, USVC hired, for all of its construction projects and mill operations, 1,874 people. During the same time period, the company terminated 1,390. At Uravan, during the six-month period from 1 January to 30 June 1945, the company hired 123 workers for both mills. In the same period, USVC terminated 138.62

USVC officials worked constantly to solve this problem. First, they addressed workers' complaints about the housing facilities. Apparently, the company employed a number of single men, and to them the company offered the option of renting rooms in the newly built apartment units. This was basically dormitory style housing, with two beds for each room, including the living room. Thus, eight men lived in a three-bedroom apartment.63 That this arrangement represented improvement speaks to the crowded living conditions that existed, and to the prior state of housing in Uravan. The company also allowed workers with families to rent space in the flat top apartments, or other available houses. Undoubtedly, families found the flat tops better than tents or shacks, and it precluded the necessity of commuting from another West End community.

62G. N. Hamm to A. Q. Lundquist, 13 August 1945, Personnel Force Reports, Industrial Relations file, drawer 118 Uf, room 125, Umetco Records; Summary Sheet--Personnel Force Reports, 1945, Industrial Relations file, drawer 116 Uf, room 125, Umetco Records.

63W. E. Haldane, USVC, to P. C. Leahy, 16 August 1943, Area Engineer Correspondence March to October 1943 file, drawer 260 Ub, room 114, Umetco Records.
In its quest for a stable workforce, USVC permitted boys as young as sixteen years of age to work at the mills. Furthermore, officials employed men beyond the national retirement age, established at sixty-five years. However, USVC never hired women to work in the mill, a practice common in American industry during World War II. Without elaboration, a company official wrote: "Work in the mills is not such that they can be used to any appreciable extent." 64

The company advertised the employment opportunities at Uravan in eighteen different Colorado newspapers, and it also bought radio air time. Interested workers from other states also heard about Uravan through the United States Employment Service. USVC received applications for employment from such distant places as Seattle and Hanford, Washington, Ogden, Utah, Palo Alto, California, Sidney, Nebraska, and also from towns around Colorado. 65

To keep the men it valued, the company applied to those individuals' draft boards for deferment from the draft.

64Bob Ausmus, "When Uravan Went to War," unpublished manuscript dated 23 October 1991, Estalee Silver Collection, Museum of Western Colorado, Grand Junction, Colorado; R. M. Mahoney to A. F. Boyd, 13 October 1944; Recommendation for Continuation in Active Employment beyond Normal Retirement Date; both documents from Employees beyond Normal Retirement Age file, drawer 118 Uf, room 125, Umetco Records; J. L. Robison to P. C. Leahy, 21 April 1945, Labor Relations file, drawer 118 Uf, room 125, Umetco Records.

65Advertising, Applications for Employment, and Labor Recruiting file, drawer 118 Uf, room 125, Umetco Records.
Because of the difficulty in obtaining deferments, USVC exercised discretion. The Industrial Relations Department requested deferments for men "in key positions only, . . . whose loss we feel, would be detrimental to our effort in the production of our materials for the War Effort." Company officials did not let themselves be swayed by "sympathy or personal feeling." 66

It proved "almost impossible" to secure deferments for men between the ages of eighteen and twenty-two. For men of other ages, the Selective Service System provided for an appeals process in case a draft board denied deferment. The company appealed to Lieutenant Leahy, the Colorado Area Engineer, "requesting him to give any aid in his power in securing" deferments. 67 USVC also had the option of sending a deferment through the Manhattan District Engineers Office. It is not known how often USVC sent a deferment request to the district engineer's office. But two such requests never made it past the Colorado Area Engineers Office. "After careful review of these applications," wrote the Assistant Colorado Area Engineer, "this office has concluded that they do not warrant certification to the

66 G. C. Muckenthaler to A. Q. Lundquist, 12 April 1944, Correspondence, Inter-Office file, drawer 117 Uf, room 125, Umetco Records.

67 G. C. Muckenthaler to F. B. Hynes, 23 February 1944, Muckenthaler File (file), drawer 170 Uf, room 126, Umetco Records; G. C. Muckenthaler to A. Q. Lundquist, 12 April 1944, Correspondence, Inter-Office file, drawer 117 Uf, room 125, Umetco Records.
District Engineer for his indorsement." Despite this exception, the deferment process likely benefitted USVC and Uravan's contribution to the war effort.68

High turnover plagued USVC until the end of the project. However, the company succeeded in securing a core of dedicated, constant, hard-working individuals. In March of 1945, Leahy congratulated USVC for accomplishments in all areas of production, and for the "steady increase in the rate" of production. Leahy especially admired "the spirit of friendly enthusiastic rivalry" that existed between the various mill departments. This "cooperative attitude" resulted in a "team that has a common purpose of doing the best job possible and yet at the same time endeavoring to do still better."69 Leahy wrote specifically of the government-owned, contractor-operated mill. At company-owned, company-operated plant (Uravan's original mill) different conditions obtained.

Ironically, at the very time Leahy issued his encomium to the superintendent of the government mill, teamwork and

68James C. Deal, Jr. to U. S. Vanadium Corporation, 26 March 1945, Correspondence, Inter-Office file, drawer 117 Uf, room 125, Umetco Records. The Manhattan District Engineer, first James C. Marshall, then Kenneth D. Nichols, was in charge of construction work for the entire Manhattan Project. The Manhattan District Engineer provided a great deal of support to all MED contractors in this matter, as did the various area engineers. Jones, Manhattan, 366-369.

69P. C. Leahy to Fred Hynes, 13 March 1945, Area Engineer Correspondence--June 1944 to March 1945 file, drawer 260 Ub, room 114, Umetco Records.
cooperation showed signs of deterioration at USVC's original mill. Three months later, on 26 May 1945, employees at the USVC mill went on strike. A union official cited eight grievances, "including unauthorized reductions in employees' paychecks and failure to settle grievances over the last three-month period." Union members also complained of the company's seniority system. The accumulated frustrations climaxed when, "without provocation," a foreman struck an hourly employee.  

The union requested that the company transfer the foreman. Initially, USVC refused. Instead, the company's employment manager issued notices to the strikers' draft boards. The company claimed that the workers' absence was "unexcused, . . . arising out of an unauthorized strike." Presumably, the workers' unexcused absences qualified them for the draft. On 2 June the workers "terminated" the strike, although the parties negotiated the matter until 22 June. On that date, an arbitrator recommended that the company transfer the offending foreman.

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70 "Mine Workers Leader Makes Statement on Rifle, Uravan Strikes," Daily Sentinel, 30 May 1945, p. 3.

71 Notifications to Selective Service Boards file, drawer 117 Uf, room 125, Umetco Records. The company sent notices to draft boards in Colorado, Missouri, Oklahoma, Kansas, and Arkansas.

72 A. Q. Lundquist to L. A. West, State Manpower Director, 9 June 1945, Manpower Commission file, drawer 118 Uf, room 125, Umetco Records; Arbitration Report, 11 July 1945, Area Engineer Correspondence--May 1945 to December 1945 file, drawer 260 Ub, room 114, Umetco Records.
It may seem that USVC officials spent much of their time trying to attract and retain a steady work force. The perception would not be unwarranted. The company also had a town to maintain, but it did so with the expressed purpose of maintaining a stable workforce. Toward this end, USVC addressed six specific problems. Residents complained of "dusty roads in and about town"; sand storms created by wind blowing over the tailings piles; "poor and slow laundry service from Grand Junction"; the war-time rations on gasoline and tires, a situation that inhibited residents' ability to travel to larger towns; insufficient goods at the commissary; and, a lack of recreational facilities in the town. Leahy wrote that his office stood ready "to give you assistance in solving or overcoming any of the aforementioned problems or others that may arise from time to time."^73

The company remedied some of these problems, but found others beyond its control. USVC purchased a tank truck to spray water on the roads, in an effort to keep the dust down. Similarly, the company arranged to spray some of the tailings piles with oil, to keep to a minimum the blowing sand; however, officials saw no effective, economical way to spray the untreated tailings. The residents' concerns about gasoline rations, slow laundry service, and a lack of goods

^73 P. C. Leahy to U. S. Vanadium Corporation, 28 July 1944, Area Engineer Correspondence--June 1944 to March 1945 file, drawer 260 Ub, room 114, Umetco Records.
at the commissary could not be entirely solved. These problems had more to do with the general war-time lack of abundance than with any want of effort on the part of the company. For example, the poor laundry service resulted from a "lack of manpower in the laundries." And, Uravan's store may have been better stocked than people realized at the time. Some years previously USVC had purchased the Club Ranch; the company raised cattle to supply meat to its town. Fruit and vegetables, however, were sometimes hard to come by during the war.  

Considering the limited facilities and relative isolation of Uravan, residents had ample opportunity for recreation. Uravan had a swimming pool, which the company maintained during the war years. Residents used the community building for all sorts of activities, from church services to dances. Baseball teams formed, and competed with those from other West End communities. Lieutenant Leahy and his staff contributed to Uravan's social activities with the purchase and operation of motion picture equipment; movies were shown in the recreation hall.  

The company also reconditioned and expanded the Uravan school house, another of the town's buildings that began as a CCC building. In 1944, the year of peak attendance, 190

74 J. L. Robison to Captain P. C. Leahy, 1 August 1944, Area Engineer Correspondence--June 1944 to March 1945 file, drawer 260 Ub, room 114, Umetco Records.

75 Ibid.
students enrolled in grades one through eight. Older students rode a bus to Nucla for high school. During the war West End school officials experienced difficulties in hiring teachers, just as USVC had trouble attracting labor. "It was an acute problem of getting teachers to come to such an isolated area."76

The company could do very little for those who found Uravan lacking. USVC could not change the basic, small town atmosphere. Those who adapted, or were accustomed, to small town living found it a pleasant place to live. Those individuals created "a bustling, happy, friendly, comfortable community, which was obviously busy in operating the USVC corporate mill and the MED mill." Every family or adult individual had an income; "there were no jobless, homeless, or even hungry people in Uravan." And, concerning Uravan's isolation, one resident believed it an advantage--those in isolated communities tend to work harder, and to be more creative, in their pursuit of diversions.77

However, not all small towns had two uranium-producing mills, not to mention a cadre of soldiers living amongst the population. And people must have thought it extraordinary

76Work Order Number HW-36, USVC Contract Account, 5 January 1945, Work Orders--HW Account--Superintendent's File (file), drawer 78 Uf, room 125, Umetco Records; Silver, "History of the Uravan Grade School."

77Leahy to author, 3 March 1994; Ausmus, "When Uravan Went to War"; Cliff Hiett, interview by author, 30 September 1994, Delta, Colorado, tape recording, private collection.
when the company erected chain-link fences around the mill areas, and installed guard houses at the mill entrances and exits.

As an MED contractor, USVC maintained certain security precautions. The company screened potential employees, and those whom it did hire pledged to uphold the Constitution, swearing that they were not members "of any political party or organization which advocates the overthrow of our constitutional form of Government." USVC even kept a list, sent to the company by the Army, of people whom the company should not hire. Employees received colored badges, which allowed them access to specific sites. And, the guards at Uravan were instructed, at least for a time, to carry loaded weapons when on duty.78

But government regulations fell to small town familiarity. For a couple of months, the guards dutifully checked the identification passes of those entering and leaving the mills. Thereafter, "the gates remained open, and the guards waved any and every body through." The soldiers who worked at the mill behaved no differently than the civilians. They performed the same work and reported to the same bosses as everyone else, and received no special

78 Certification to Uphold the Constitution file, drawer 118 Uf, room 125, Umetco Records; Muckenthaler File (file), drawer 170 Uf, room 125, Umetco Records; G. C. Muckenthaler to Guard Personnel, 16 March 1944, and G. C. Muckenthaler to All Guards, no date; both letters from Master Copies file, drawer 118 Uf, room 125, Umetco Records.
treatment. Some of the soldiers brought their families with them. In fact, for a time the soldiers wore civilian clothes because the Army wanted to attract as little attention to them as possible.79

A sense of urgency pervaded the operations at Uravan, an urgency fostered by the secret nature of the project. The company taught employees the importance of and implementation of security measures.80 Officials used codes for certain words, like uranium, in their correspondence. The Army kept secret all statistics, bills, orders, and anything else relating to the project. And, the press refrained from reporting on any of the milling activities in southwestern Colorado.81

If individuals in Uravan did not sense the urgency of the project, they learned of it first-hand in the mills. The mills ran every day, twenty-four hours per day. The shifts rotated, so that a person worked about one week on each of the three shifts. This is the nature of this type of mill work; the plant could not be shut down and restarted every day without considerable inefficiency. The unaccustomed routine for those in Uravan was working for

79Ausmus, "When Uravan Went to War," 1; Leahy, address.

80G. C. Muckenthaler to All Employees, no date, Authorized Overtime file, drawer 118 Uf, room 125, Umetco Records.

81Leahy, address; "Blair Burwell Makes Statement on Uranium Taken from This Region," Daily Sentinel, 8 August 1945, p. 1.
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81 Leahy, address; "Blair Burwell Makes Statement on Uranium Taken from This Region," Daily Sentinel, 8 August 1945, p. 1.
months on end without a day of rest. Cliff Hiett remembered working eleven straight months, seven days per week. Hiett served in the Army, but civilians worked as hard as he did. Employees earned overtime pay for hours worked in excess of forty per week, and for working on holidays.  

The MED project waited neither for traditional holidays--such as Thanksgiving, Christmas, and the Fourth of July--nor for an occasioned celebration. Advised one company official, "all work on the Contract Account will continue without interruption on VE-Day." Later in the year, anticipating VJ-Day, the same man requested "protective measures where necessary to insure that no damage to Government property occurs through riotous celebration by either Contract personnel or the public."  

Everyone in Uravan, the West End, and probably in all of southwestern Colorado knew that the government wanted uranium; there would have been no other reason to process the tailings. However, no one could have predicted the eventual use for the uranium. Cliff Hiett summarized the general feeling: "We knew something was going on, but we didn’t know what form it was going to take. It was just

82Cliff Hiett, interview by author; A. Q. Lundquist to J. L. Robison, 2 July 1945, Work Schedules file, drawer 118 Uf, room 125, Umetco Records.

83A. Q. Lundquist to J. L. Robison, 24 April 1945; A. Q. Lundquist to J. L. Robison, 14 August 1945; both letters from Work Schedules file, drawer 118 Uf, room 125, Umetco Records.
logical that it would be a bomb. People knew there was energy locked up in it." It has been said that one citizen of Uravan occasionally informed his acquaintances that "the war is going to be won right here at Uravan."

Leahy was not informed of the details of the MED project, either. He knew only that the Army wanted uranium, and as quickly as possible. After the successful test of the atomic weapon at Alamogordo, New Mexico, Leahy and USVC officials received a telegram from General Groves's office, informing them that the "MED mission had been accomplished." The company provided a copy of the telegram to all of its employees, but, still, no one knew the nature of the accomplishment. Just like everyone else in the nation, the people of southwestern Colorado learned of the atomic bomb, through press reports, after the deployment of the bomb on 6 August 1945.

The civilians who worked for USVC during the war received a certificate from the War Department and the Manhattan District of the Army Corps of Engineers. The document stated that the recipient had "participated in work essential to the production of the Atomic Bomb, thereby contributing to the successful conclusion of World War II. This certificate is awarded in appreciation of effective service."

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84 Cliff Hiett, interview by author.
85 Leahy to author, 3 March 1994.
The question that inevitably arises concerns whether MED scientists used Colorado Plateau uranium in the first atomic bombs. The statistics indicate that they had very little to use. The MED acquired 18,938,000 pounds of uranium oxide for the Manhattan Project. The African source of uranium, the Shinkolobwe Mine, provided the MED with approximately seventy-three percent of its total. The remaining twenty-seven percent arrived from Canada and the Colorado Plateau. About fourteen percent of the MED’s uranium originated from various sources on the Colorado Plateau; USVC, from operations in Durango and Uravan, supplied sixty-six percent of the total amount of the domestic uranium.86

The MED contracted with three companies to produce uranium concentrates, a later step in the feed materials refining process: the Eldorado Mining and Refining Company, at Port Hope, Ontario; the Vitro Manufacturing Company, at Canonsburg, Pennsylvania; and the Linde Air Products Company, at Tonawanda, New York. Each of these plants produced concentrates from different sources (Canadian, African, and American), but only Linde Air Products processed the uranium from USVC. From these plants, Eldorado, Vitro, and Linde, the concentrates went to other

86 Chenoweth, "Raw Materials Activities," 38.
locations for further refining.\textsuperscript{87} Thus, to trace the source of the uranium used in the first atomic bombs would be a difficult process; if anyone has determined the source, that information is not readily available.

Nevertheless, in southwestern Colorado the general impression exists that Colorado Plateau uranium constituted the primary source of feed materials for the Manhattan Project. That assumption logically extended from the fact that the Army spent considerable time and effort to procure Colorado Plateau uranium. The extent of the MED’s other procurement activities would not become public knowledge for many years. Blair Burwell, USVC’s superintendent, may also have succumbed to a bit of regional pride in this matter. The man known as "Mr. Uranium" maintained that "not a pound of the uranium ore that went into those bombs came from the Belgian Congo or Canada." Reportedly, however, Burwell later claimed that he never made such a statement.\textsuperscript{88} The anonymous author or authors of a book about Canada’s uranium industry wrote the following sentence, striking for its similarity to Burwell’s remark: "There is no evidence that a single gram of Canadian-produced uranium was actually used in the two atomic bombs detonated in 1945, although it had

\textsuperscript{87}Hewlett and Anderson, \textit{New World}, 292; Jones, \textit{Manhattan}, 314.

been employed in various ways throughout the research program."89

Soon after the war ended, the government’s need for the facilities at Uravan also ended. For about two months after the end of the war, mill crews at Uravan worked to "complete the project." Then, in October of 1945, USVC began to lay off employees; by the end of that month, the company had only forty-five hourly employees on its payroll. The few workers that remained dismantled the government-owned mill at Uravan and removed from USVC’s mill the government-owned equipment that the company chose not to purchase. The government allowed much of the equipment to be sold "on site."90 Charles Beech, the Stearns-Roger engineer who supervised the construction of the government’s uranium mill, took advantage of the opportunity. It was later claimed that he paid only six to ten percent of the original cost of the equipment he purchased.91


90 Payroll Analysis and Personnel Report, Industrial Relations file, drawer 118 Uf, room 125, Umetco Records; Work Order Number HP-6, 27 October 1945, and Work Order Number HR-5, 27 October 1945; both documents from Approved Work Orders, WSP Plant--Uravan file, drawer 225 Ub, room 125, Umetco Records.

The gradual migration of workers from Uravan reduced the place almost to a ghost town. Some workers quit voluntarily, and returned to neglected farms and ranches. When possible, the company moved employees to different locations. The soldiers transferred out; many of them received their discharge after the war, but Uravan held no promise of work for them. For the next three years only a few families lived in Uravan; they served as caretakers for the dormant town. In 1946 and 1947 a total of five students enrolled in the grade school, and in the following year, that number increased to eight.92

USVC never intended to abandon its town. Having supplied vanadium for America's wartime needs, company officials gauged a future, peacetime demand for the same. And while they could not have known exactly what the future held for uranium, they probably expected some sort of market for that element, as well. While some geologists and mining engineers continued to question the potential of carnotite, those familiar with the Colorado Plateau believed that the mineral would be an important source of uranium.93

92 Silver, "History of the Uravan Grade School," 2.

Uravan's first ten years marked a significant period of development for the West End of Montrose County. Between 1936 and 1945 the area lost some of its isolation, and the character of the West End changed dramatically. With the construction of a new town and mill, USVC had demonstrated just how quickly the fortunes and economy of a small region could be transformed. With the impetus of a big company behind it, the West End abandoned its singular focus on agriculture. USVC's presence sparked a variety of wage-paying jobs, a luxury to many in the West End. Of course, West Enders had witnessed change during the radium boom of the 1910s, but not on the same scale, and not with such lasting effect.

The fate of the Club Ranch illustrates the point. During the radium boom the Standard Chemical Company built its mill and small camp on the border of the ranch property, and each enterprise functioned without drastic interference to the other. Sometime after USVC began operations in the West End, the company bought out the owner of the ranch. As noted, the company operated the ranch for a time, but that would not last. Eventually all traces of the Club Ranch, "that famous old property," disappeared. "It could be said with some degree of finality that the era of the Club Ranch had finally come to a close." 94

94 Howard E. Greager, In the Company of Cowboys (New York: Vantage Press, 1990), 195; for similar observations, see the final chapter of Lavender, One Man's West, 299-316.
In 1914 Secretary of the Interior Franklin K. Lane suggested that the federal government assume control of America’s radium industry. Under his proposal, the government would have purchased carnitite ore from miners on the Colorado Plateau, processed the ore at federally owned treatment plants, and distributed radium to American physicians. Radium showed promise as a cure for cancer, and some legislators believed it the role of government to provide the nation’s hospitals with radium. The bill that came from Lane’s proposal enjoyed a great deal of support, but it also generated intense opposition. After lengthy debate in both houses of Congress, the bill never came to a vote. Traditional free enterprise won the day, and one can only speculate on the course of events had elected representatives voted for federal control of the radium industry.

Two years prior to America’s entry into the Second World War, President Franklin Roosevelt set in motion the process of building an atomic bomb, still only a theoretical possibility at the time. Nearly six years later, scientists working for and sponsored by the government succeeded in

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"harnessing the power of the atom," at a cost of roughly two billion dollars. The success of this program set the stage for government control of the nuclear industry, an industry that encompassed miners on the Colorado Plateau, scientists engaged in research, and specialized manufacturing firms working under government contract.² The government created an industry that profoundly affected even tiny communities on the Colorado Plateau.

The Atomic Energy Commission (AEC) assumed control of America’s nascent nuclear program on 1 January 1947. The tasks laid before the Commission were enormous. Unlike the Manhattan Engineer District, which pursued a single goal, the AEC simultaneously developed a variety of programs, including weapons production, research in a number of fields, and the construction of different types of reactors. Scientists and government officials anticipated great peaceful applications of nuclear fission.³ For these programs the AEC required tremendous amounts of the raw material, uranium.

The AEC negotiated with Canada and Belgium to purchase uranium from what the Commission believed were still the

²This contrast between government inaction during the radium era and government involvement during the uranium period was drawn by Shumway, "History of the Uranium Industry," 150-156.

best sources available. However, at the famous Shinkolobwe mine in the Belgian Congo, ore reserves neared exhaustion, and the Canadian mines were difficult to exploit. Other countries, like South Africa, seemed likely sources of uranium, but there was considerable uncertainty about uranium deposits around the world. Because of this uncertainty, and to insure a supply independent of international politics, the AEC wanted to develop a domestic source of uranium.\(^4\)

In 1947 the AEC estimated uranium ore reserves on the Colorado Plateau at one million tons, not nearly enough to satisfy the Commission's needs. Within a few years one state—Colorado—would produce more than one million tons of ore within a single year. By 1959 estimates of ore reserves had grown to 89 million tons. The experts' low estimate in 1947 points to the vastness of the Colorado Plateau; by the late 1940s relatively little of the 100,000 square mile area had been prospected.

To locate additional ore reserves, and to create a supply of uranium, the AEC initiated various programs to stimulate uranium production. To administer the procurement program the Commission opened the Colorado Raw Materials Office in Grand Junction. In 1952 the office became known as the Grand Junction Operations Office.

\(^4\)Ibid., 147-149, 172-174.
To acquire uranium ("in the interest of the common defense and security"), the AEC issued a series of "circulars." These public decrees established parameters for the types and grades of ore that the AEC would buy and the incentives toward which miners would work. Nine circulars were issued between 1948 and 1957. The most important, Circular 5, Revised, guaranteed prices for ore based upon the ore's uranium content; established a price paid for the ore's vanadium content; and allowed payment to producers for the cost of hauling ore to mills and ore buying stations. Also enticing was the sixth promulgation, which promised the payment of bonuses to producers who developed newly discovered deposits. The mine owner collected the bonus, up to $35,000 for certain grades of ore, on the first ten thousand pounds of uranium from properties that fit certain criteria. Circular 5, Revised and Circular 6 were issued in the summer of 1951.5

Because uranium producers were reluctant to prospect for new deposits, the AEC, assisted by the United States Geological Survey (USGS), initiated an exploration program.

On several separate occasions the AEC withdrew from the public domain tracts of land deemed worthy of examination; altogether, about seven hundred square miles were withdrawn. Within these areas the AEC and the USGS conducted geologic investigations, geophysical research, and airborne surveys. The reports generated by these studies were eventually made available to the public.

However, the land withdrawn was not immediately available to the public. The AEC contracted with private drilling companies to take core samples from the withdrawn land. If the analyzed core samples showed uranium deposits, the AEC leased the land to mining companies willing to extract the ore. In return, the producers paid a royalty to the government. Between 1949 and 1954 the AEC let fifty such lease agreements. The Commission returned to the public domain land on which it failed to find deposits. The drilling program commenced in 1949. Each year thereafter exploration financed by private concerns increased and the Commission's drilling activities decreased; in the mid-1950s the government ceased its exploration and drilling.

The primitive state of roads on the Colorado Plateau caused the AEC some consternation, and the Commission "felt obligated to help rectify this situation." Road improvement was needed to facilitate travel to mills and

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6 O'Rear, *Summary and Chronology*, 12.
mine sites. The Bureau of Public Roads allocated the funds, in most cases, to state and county agencies; however, the government required a small financial offering from the state or county in which the road was being built. Between 1951 and 1958 the AEC contributed some $14 million to build or improve 1,253 miles of roadway in six western states, while the states’ share came to about $3 million. Ninety different projects were completed, including both dirt roads hewn by bulldozers and smooth blacktop byways.

Of course, the uranium producers needed outlets to sell their ore. In the late 1940s the AEC anticipated the construction of several privately owned mills that would process uranium ore. However, the Commission also planned for a number of buying stations to handle the influx of ore in areas not served by a mill. Typically, the AEC would build a station in a region that needed a market. If the supply of ore were great enough, the Commission contracted with a private company to build a mill near that location. Then, the AEC would sell to the mill the stockpiled ore that had accumulated, and the mill would become the outlet for the producers. During the 1950s the AEC established eleven ore-buying stations in Arizona, New Mexico, South Dakota, Utah, and Wyoming.

AEC officials formulated the entire uranium procurement program during the Commission’s first few years of existence. Most of the programs and incentives remained in
effect for approximately ten years. Periodically the AEC abandoned or modified certain programs, depending upon the efficacy of a particular program.

The AEC devised these incentives with the ultimate goal of acquiring uranium concentrate, the product of the milling process commonly called yellowcake. The concentrate consists of approximately 85 percent uranium oxide ($U_3O_8$). To obtain this concentrate the AEC contracted with private milling companies. These mills procured ore, either from independents or from the companies' own mines, and extracted the uranium for sale to the AEC. When negotiating milling contracts, the AEC took into account the incentives that it offered to the producers (miners). Thus, the miners still received the guaranteed price for ore, and haulage costs, when they sold their ore to a mill. By 1954 nine mills operated, and by 1961 twenty-seven mills in ten western states produced uranium concentrate. These mills varied tremendously in both output and length of service. Most were located in Colorado, New Mexico, Utah, and Wyoming.

The carnotite ores of southwestern Colorado and southeastern Utah also contained vanadium, in amounts that averaged five times more than the contained uranium. The AEC not only paid miners for the vanadium content of their ore, it also bought from the mills in that particular area of the Colorado Plateau any vanadium not sold on the market. This prevented the vanadium market from affecting the output
of uranium; it was also an added bonus for those uranium mills. The Grand Junction Office of the AEC purchased and stockpiled vanadium from 1949 to 1959; in 1960 1.5 million pounds of that product was sold to the highest bidder. (The AEC maintained a policy of "getting the most for the taxpayers dollar, while insuring the miller a fair return.")

Until 1958 the mills were allowed to sell uranium concentrate only to the government. In 1958 it became legal to sell yellowcake to private concerns, but no such sales were consummated until 1966. The AEC continued to purchase \( \text{U}_3\text{O}_8 \) through 1970, but after that year utility companies purchased all of the concentrate produced. Between 1948 and 1970 the government purchased from domestic sources nearly 350 million pounds of uranium oxide in concentrate, at a cost of nearly three billion dollars. The government acquired another 280 million pounds of uranium oxide from foreign sources. By the time it halted procurement, having purchased one hundred million pounds more than needed, the Commission sought a method of disposal for surplus uranium.

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\[ \text{7"Bids Asked on Vanadium Pentoxide," Forum (Nucla, CO), 28 April 1960, p. 2; O'Rear, Summary and Chronology, 14.} \]

But AEC officials could not foresee this success when they began the Domestic Uranium Procurement Program in 1947. They faced an uncertain supply and an urgent demand, so these officials created an economic atmosphere conducive to the production of uranium. The AEC wanted a boom, and it set off the biggest rush for minerals in American history, the only "government prompted, government subsidized, government sponsored, and government financed mineral hunt" in American history.⁹

Naturally enough, the activity started slowly. In 1948 the AEC took delivery of nearly 232,000 pounds of uranium oxide in concentrate. In 1949 production actually decreased, though only slightly. In 1951 the AEC issued Circular 5, Revised, which gave mine operators a more favorable return on their investment; coincidentally, uranium production nearly doubled over the total from 1950. Production increased yearly from 1950 to 1961, in which year the AEC bought more than thirty-five million pounds of uranium oxide. For several years uranium production was concentrated in southwestern Colorado and southeastern Utah, but by the late 1950s the mills with the largest production were in New Mexico and Wyoming.

At the height of the boom, in the mid to late 1950s, uranium procurement had grown to an industry with yearly expenditures of $100 million, by "even the most conservative

⁹Look, U-Boom, 133, 134.
estimates." Perhaps ten thousand people worked in various phases of the industry throughout the Colorado Plateau. Twelve hundred people worked for the AEC and the USGS, government agencies that established offices in Grand Junction. That town became the "hub of uranium operations in the Plateau." Also centered in Grand Junction were mining, exploration, trucking, supply, and construction companies, all of which found ample business opportunities during the boom.\(^1\) Other, smaller towns across the area grew in response to the government's uranium procurement program.

The uranium boom focused national attention on the Colorado Plateau. It attracted not only well financed companies and corporations, but also weekend prospectors hoping to get rich. For several years, stocks in uranium companies traded wildly in Salt Lake City. Money and people poured into isolated areas of the Colorado Plateau.\(^2\)

In 1947 the most likely place to find uranium was in those areas of Colorado and Utah that had already been mined fairly extensively. The famous and important mines of the

\(^{10}\)Union Carbide Corporation, *Mesa Miracle*, 6-7.

Paradox Valley, and adjacent areas of the Uravan Mineral Belt, held most of the known ore reserves. Therefore, the AEC negotiated the first milling contract with the Vanadium Corporation of America, for production from VCA's Naturita mill. That contract became effective in May of 1947. In October of that year, USVC agreed to produce uranium at its Rifle mill. In 1949 the AEC opened an ore-buying station at Monticello, Utah; an AEC owned mill soon followed at that location. Also in 1949 VCA and USVC signed contracts for mills at Durango and Uravan, respectively. Of the first five uranium mills built after the war, two were located in the West End.

Montrose County became, by far, the leading uranium-producing county in Colorado. In 1957, for example, the county claimed fifty-seven percent of the state's output. The worth of this uranium was estimated at nine million dollars, and the production came from 245 separate mining operations. In the same year, Colorado's second leading county, Mesa, produced uranium worth nearly three million dollars from 109 mining operations. And, San Miguel County produced uranium valued at nearly two million dollars from 119 operations in 1957.

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The long-term figures are equally impressive. The AEC bought uranium concentrate from 1947 through 1970. During those years miners dug from Montrose County 6.2 million tons of ore, which contained thirty-one million pounds of uranium oxide. The uranium oxide from Mesa County and San Miguel County ores, combined, approximated twenty-three million pounds. Thus, the County of Montrose accounted for fifty-seven percent of the uranium from Colorado’s three leading uranium-producing counties.¹⁴ (No other county in the state produced uranium in such impressive quantities.)

As one would expect, many companies attempted to capitalize on the government’s uranium purchase program by mining and milling uranium. By 1961 twenty-seven mills operated in the American West. Some of these ventures lasted only a few years, while others sold uranium to the AEC for ten years or more. One of the major players in this industry was Union Carbide Nuclear Company, once known as the United States Vanadium Corporation. USVC became Union Carbide Nuclear Company in 1955, and the company remained a subsidiary of Union Carbide and Carbon Corporation.

Union Carbide’s mills at Rifle and Uravan produced uranium during the entire course of the AEC procurement program. These were the only two mills that could claim such a record of longevity. In addition, Union Carbide owned a mill at Gas Hills, Wyoming, which processed uranium

from 1960 until 1970, and one at Maybell, Colorado, which operated from 1957 to 1964. Each of these plants accumulated an impressive record of production. However, in terms of the amount of ore processed and the amount of uranium extracted from that ore, the Uravan mill stood as the most important. From 1947 to 1970 the Uravan mill produced more uranium than all but four other mills in the United States. Some other mills in other states extracted uranium at a higher per day rate; but Uravan’s mill ran at a relatively consistent level for a period of time that exceeded other mills.\textsuperscript{15}

While the company claimed a healthy share of America’s uranium industry, Union Carbide did not dominate; however, it certainly maintained a dominant status in southwestern Colorado. From mills in Uravan and Rifle, Union Carbide produced fifty-eight percent of the uranium concentrate sold to the AEC from the state of Colorado. The Uravan mill alone produced thirty-five percent of Colorado’s uranium during the AEC procurement program.\textsuperscript{16}

The production of vanadium was also important to Union Carbide’s operations. Seven mills, five in Colorado, one in New Mexico, and one in Utah, extracted vanadium in addition to uranium. During the 1950s the milling companies sold this product to the AEC. Eventually, the AEC purchased more

\textsuperscript{15}Albrethsen and McGinley, \textit{Summary History}, B-7, B-8.

\textsuperscript{16}Ibid., B-7.
than twenty-eight million pounds of vanadium concentrate, and Union Carbide’s Uravan plant accounted for one-third of this total. Union Carbide and other companies sold vanadium on the open market after the 1950s.

Naturally, this meant a great deal to the people of the West End. Many people credit "Carbide," as the company was known familiarly, for bringing jobs to a cash-starved area. The company became the largest employer and most dominant economic force in the area, and its influence extended to all areas of the uranium production chain.

The company’s original contract with the AEC required the Uravan mill to treat approximately five hundred tons of ore per day. VCA’s mill at Naturita, in contrast, processed one hundred tons per day. By the mid-1950s both plants had been upgraded, Union Carbide’s to one thousand tons per day, and VCA’s to 325 tons per day. Carbide employed about 250 at its Uravan mill, while only about one-half as many people worked for VCA.

Union Carbide initiated an aggressive exploration program. The company staffed geologists and mining engineers, but for much of its exploration and assessment work the company hired independent drilling companies. In

17Ibid., B-5.

18USVC became Union Carbide Nuclear Company in 1955. Although many people remember the former name of the company, everyone refers to it as "Union Carbide," or simply "Carbide." To avoid confusion, the latter two terms will be used here.
addition, the company engaged drillers to perform the development work necessary to maintain a claim. By law, claim owners had to perform a certain amount of development work on their claims each year.

When Union Carbide decided to mine a claim, the company hired independent mining contractors to do the work. During the 1950s Carbide operated all of its mines with this arrangement. (Later, in the 1960s, the company mined some of its own ore but still contracted with small mining companies.) All ore from a Carbide-owned mine was shipped to the company’s mill at Uravan. But the company also bought ore from independent miners and companies that worked mines not affiliated with Union Carbide. Of course, both Union Carbide and its mining contractors engaged truck drivers to haul ore from the mines to the mill, and to haul yellowcake from the mill to the AEC sampling plant at Grand Junction. 19

Thus, it seemed that nearly everyone in the West End either worked for Carbide, or worked for someone who contracted with Carbide. It was even said that Union Carbide’s "wage rates have tended to set the pattern for employers in the Uranium Basin," simply because Carbide employed the most people in the area. The company "was the hub of the uranium business" in the West End. The Vanadium

19Bill Hosokawa, "It’s Uranium, and the Bleak Colorado Plateau Is the Nation’s Chief Source," Empire (Sunday supplement to the Denver Post), 16 November 1952, 7.
Corporation of America, on the other hand, employed far fewer people than did Union Carbide, and VCA hardly bothered to expand or increase its holdings.  

The Uravan contract, effective 1 July 1949, specified that production would begin on 1 January 1950. However, the Uravan mill required extensive reconstruction before it could be placed into operation. Anticipating the AEC contract, the company began hiring late in 1948; in December the town housed about thirty employees. All through the following year more workmen arrived, and by December of 1949, just prior to the commencement of mill operations, Uravan’s population stood at seven hundred. The town blossomed, it must have seemed, almost overnight.

Uravan continued to grow. By 1952, 215 people worked for the USVC mill, and Uravan had about one thousand residents. In the mid-1950s the company employed 250, and the town housed, by various estimates, 1,200 to 1,500. But it is difficult to establish a firm number, because people erected cabins, tents, and shacks at various places along the San Miguel River near Uravan. A small transient community formed at Atkinson Creek, about one mile from Uravan, complete with a boarding house. A local reporter referred to these ramshackle villages as Uravan’s "sprawling suburbs along the San Miguel canyon and on the adjacent

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mesa." He described Uravan as "the boomingest big little town in Colorado."\(^{21}\)

A relatively new facet of twentieth century living arrived in the West End: trailers and mobile homes. A 1954 picture of Uravan shows about twenty-five small, mobile dwellings placed along the river opposite the mill. This row of trailers lay adjacent to Highway 141, the West End's narrow, dirt-covered highway. Outside of several trailers hung clothes from the day's wash. One can imagine the reaction of those residents to the dust raised by a passing car or truck.\(^{22}\)

Union Carbide reserved the housing in Uravan for those who worked at the company mill. But as the company's employees began to outnumber its houses, some workers made due with some type of temporary housing on the outskirts of Uravan. Others who lived in Uravan's "suburbs" were miners, who also established several small camps for themselves and their families farther from Uravan, near the larger mine sites. Some of the larger camps had electric power, but the cabins and trailers had no phones and no running water; residents hauled water from Uravan or other towns. The

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\(^{21}\)"East End Groups Impressed by Nucla H.S. Needs," Nucla Forum, 11 December 1953, p. 1. The West End's only newspaper, the Nucla Forum, commenced publication in June of 1953. One year later, the editors changed the name of the weekly to the Forum. This name remained until the early 1970s, when it became the San Miguel Basin Forum.

roads leading to these outposts were rough, steep, and occasionally impassable. Buses delivered the children from the various mining camps to Uravan’s school. One camp, called Long Park and located on the northeast rim of the Paradox Valley, had its own school house during the 1950s. Some remote camps had no bus service, and high school students from those areas boarded with Nucla families during the school year.23

Many families in the West End lived in housing that we might consider primitive. For example, some Uravan families moved into houses built without bathrooms, and used a community bath facility. One family lived in a trailer that measured sixteen by eight feet; they later built a twelve by eight addition, nearly doubling their living space. A woman remembers moving to Nucla in 1954 and finding nothing to rent. An old dentist’s office finally became available--it had no bath, no kitchen, no source of heat and no insulation, but it did have "a single basin with one faucet (cold water)." 24

In 1954 Nucla’s official population stood at eight hundred and Naturita’s at 1,200. Both towns struggled to


24 Interview #7; Interview #11; Teresa Sales, "Those Happy Days," San Miguel Basin Forum, 9 October 1974, p. 8.
house incoming residents. The Nucla Forum reported that "several thousand people in the region live in trailers, 'temporary' government housing or substandard rentals." Because of a lack of "long term financing for housing," relief was slow in coming. Apparently, speculators and lenders were initially hesitant to invest in the West End. At the time, trailers cost ninety dollars per month to rent.

Meanwhile, at company-owned Uravan, residents paid rent in the amount of fifteen to thirty-five dollars per month. Between 1954 and 1956 Union Carbide completed about seventy new houses in Uravan, and the company gradually expanded or improved many of its older houses.

Providing public services burdened the residents of Nucla and Naturita in a similar manner. New water systems in those towns cost about $55,000, and the citizens debated painful tax increases to pay for such improvements. Uravanites also received a new water system, in 1953, but they did not feel the cost; they relied solely upon the company to provide city services.

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West End school populations also boomed. Nucla’s high school, the only one in the area, doubled in size between 1947 to 1953, from an enrollment of seventy-eight to 157. The elementary schools in Naturita and Uravan, combined in one district, grew from a total of 344 students in 1953 to 607 in 1956 (see Table 1, following page). County tax revenues generated by the uranium industry financed the construction of new schools for the area. The assessed valuation of West End properties increased by fifty percent from 1953 to 1954. Most of this increase resulted from mining assessments and the expansion and increased production of the mills in Uravan and Naturita. This increase also meant that the West End accounted for about one-third of the county’s assessed valuation.

The West End became a busy place during the 1950s, and one can imagine the myriad activities and the assortment of people who came to take advantage of the opportunities: miners, mill workers, drillers, equipment operators, construction workers, truck drivers, geologists, and other

1955, when the company changed its name to Union Carbide Nuclear Company, it published UCN Photonews.


Table 1.--School Enrollment by Grade in Uravan and Naturita, 1953-1958

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Enrollment figures available only for School District 25, which consisted of the Naturita and Uravan elementary schools. In 1961 the people of the West End elected to organize all West End schools into one district.


professionals engaged in the uranium business. With all of this type of activity came certain other business opportunities, such as mining supply stores, restaurants, bars, gas stations, and several other service-oriented businesses. Some people took advantage of the boom in
mobile housing by opening trailer courts, and at least one entrepreneur began selling new trailers.29

The West End boomed, and an appropriate question concerns whether these towns took on the negative characteristics sometimes implied by the term "boom town": drunkenness, gambling, prostitution, violence, and a general lack of law and order. Such activity is an often observed aspect of boom towns, and is generally attributed to an influx of newcomers who feel no sense of responsibility for the community in which they find themselves.30 There is no question that the West End during the 1950s attracted colorful and occasionally unsavory characters. The bars of the West End did a booming business; those outlets attracted a decidedly rough and rowdy segment, people who, it seemed, spent most of their free time drinking and fighting. The West End also experienced an unprecedented level of crime. During the height of the boom, the local newspaper described "a rash of robberies recently reported in this part of Colorado." During lulls in the crime spree, police stayed busy arresting people for driving while intoxicated, fighting, and "drunk disturbance."31


It was during this time, perhaps, that Naturita acquired its unwanted reputation of having few attractions besides the bars. "Nasty-rita," some have called it, a suggestive and pejorative pun on the pronunciation of the name: "natta-rita." Described during the 1950s as a "city of trailers," the town lay on the crossroads of the West End, and it served as the most convenient gathering spot.\(^3\) Nucla and Uravan had bars, and those towns experienced certain boom town problems. But to many people’s recollection, Naturita attracted the more notorious characters. It may well be that Union Carbide’s control of Uravan induced Carbide employees to stay out of trouble. Nucla, geographically speaking, was more removed from the activity, and less touched by the mining boom. In addition, Nucla had a more stable population that predated the uranium boom.

Another negative trait of boom towns is the absence of positive social interactions, recreational opportunities, cultural attractions, and a general lack of what one might call community spirit. Boom towns, generally speaking, spring up in isolated areas with harsh climates and few services for the increasing population. The work that boom towns offer, in this case mining and milling, is physically arduous. Such demands, along with the frustrations of "life

cooped-up in a trailer" with few of the comforts, or even necessities, of modern life, may lead to "alcoholism, drug abuse, child abuse, and depression." This "social malaise" may extend to young people, who respond with poor performance in school, delinquent behavior, and other transgressions of societal rules. 33

Towns in the West End fit the pattern of this "syndrome," and there is some evidence that the towns succumbed. 34 Reportedly, many marriages dissolved under the "stress" of the times. People who lived through the era remember not only bar fights, but domestic violence, murders, and suicide, as well. In 1956 the local newspaper printed a depressing list of the social problems that plagued the West End: "adolescent drunkenness, truancy, unmarried mothers with no one to turn to for advice, [and] occasional families who are utter failures at rearing each successive child." This writer opined that "the San Miguel Basin may not have more of a juvenile problem than other areas in Colorado, but it would be hard to find a community that has less facilities for dealing with such problems." 35


34Righter, Making of a Town, 4.

One must acknowledge that social problems of this sort existed, but the incidents cited above constitute only part of the picture. Moreover, these social blights plague most communities, not just those in which the population and economy grow at a highly accelerated rate. The evidence suggests more strongly that West Enders succeeded in building relatively healthy communities and responded creatively to the challenges posed by the uranium boom. Some residents participated in town beautification and held various events to raise money for community projects. People often donated their time and energy to helping those who found themselves in trouble. West Enders formed groups and associations of all kinds and there was a great deal of involvement in the youth organizations like the Cub Scouts and Girl Scouts. People organized athletic teams for youngsters and adults. Parents devoted considerable time to solving the problems in the expanding school system, and the parent-teacher conferences always drew large audiences. In response to the aforementioned juvenile delinquency, citizens met and planned an extended recreational program for youths. They even invited an expert from the state Department of Welfare to address the problem.36


36This information is available from almost every issue of the Forum during the 1950s.
Union Carbide played a roll in several community projects. For example, when the Lion's Club of Uravan built a baseball field near that town, Carbide donated the lights and the local San Miguel Power Association furnished the poles and wiring for the project. Uravan's swimming pool was unique in the West End, and anyone could come to Uravan to swim for very small fees. And, Union Carbide helped to support Uravan's hospital (later, a clinic), which was open to everyone in the West End.

Many West Enders rejected what they saw as pernicious influences that threatened their communities; they vigilantly encouraged the preservation of a traditional, principled, and conservative way of life. New churches arose almost as often as bars or liquor stores, and one dispute pitted supplicants of the former against patrons to the latter. The details of the following incident illustrate not only the amount of interest that West Enders showed in their communities, but also the level of open and honest debate that existed.

Pete Peters operated Uravan's general store, the San Miguel Trading Center; Union Carbide owned the land and building, but Peters ran the store on a contract with the company. Peters also ran the drugstore, and in 1954 he decided to add the sale of packaged liquor to that business. He obtained the approval of Carbide's plant superintendent, who considered it "desirable for Uravan to have all the
services or facilities that would be available in any other town of comparable size." Peters claimed to have number of customers who wanted him to carry packaged liquor.37

Uravan's physician led the considerable opposition to this proposal. The Home Builders, a Uravan church-related group, also disapproved, and they gathered three hundred signatures on a petition that explained their opposition to the liquor store. The doctor also conducted a survey that revealed that eighty-five percent of Uravan's households opposed the liquor store.38

Peters' request initiated intense debate in the West End. The Montrose County commissioners convened a meeting in Uravan to discuss Peters' application for a liquor license. The opposition lined up, and Peters found himself virtually alone. In another public forum, the newspaper, Peters again cut a lonely figure. In a number of letters residents voiced concern that liquor sales in Uravan would only increase the incidence of alcoholism, drunken driving, and family disintegration. Uravan's doctor believed that the sale of liquor would "demoralize the youth and parents of this area." A correspondent from Naturita congratulated Uravanites for "keeping their town clean" by opposing liquor sales. A Uravan resident suggested that citizens had a duty

to prevent others from obtaining alcohol. The issue even
drew a response from California, from a couple who were
gratified "that so many of the citizens of the West End were

Only one wrote in support of the sale of packaged
drink in Uravan. In an open letter to the town physician,
a Uravan man urged the West End not to revisit the "Noble
Experiment Days." While he admired the doctor's "skill as a
physician and . . . sincerity as a preacher," the writer
suggested that alcohol sales were not the doctor's concern.
He made the democratic appeal for the right to choose:

\begin{quote}
Many have used alcohol profitably and wisely. The
discreet and temperate use is to be condoned
rather than prohibited.
Let's let Pete worry about the liquor store, you
worry about your hospital and church, and me worry
about my next drink.\footnote{"Forum's Forum," \textit{Forum}, 10 December 1954, p. 2.}
\end{quote}

The county commissioners, perhaps swayed by public
opinion, denied Peters his license. On this matter, one can
not know for certain that a majority of Uravan residents
really opposed the liquor license; perhaps they simply were
not loud and insistent enough. Just a few years later, the
county commissioners approved Peters' second application for
a liquor license. However, the actions of those opposed to liquor sales demonstrate the degree to which many in the West End involved themselves in their communities. In this, and in many other matters, citizens took active roles in shaping their towns.

Problems facing those in the West End grew in relative proportion to its economic and population growth. The region lived the proof of the adage that states, "The more things change, the more things stay the same." During the 1950s, as during an earlier time, roads occupied a prime position on the list of West End priorities.

For much of the uranium boom of the 1950s West Enders negotiated roads layered with dirt or gravel. A trip to Grand Junction could easily turn treacherous--the rough surface caused numerous flat tires, and sometimes a flash flood washed away portions of "Highway" 141. Other times motorists found themselves stranded, unable to proceed because of water rushing over the roadway.

Too often accidents on the narrow, twisting roads left motorists seriously or fatally injured. A reporter counted eleven accidents in eighteen months on state road 97, which connected Nucla and Naturita. Another well-known stretch of roadway, Norwood Hill, claimed its share of accidents. Automobile wrecks constituted a somber fact of life for

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41 "License Denied T.C.,” Forum, 17 December 1954, p. 5; Peters interview.
those in the West End, and the high volume of heavy truck traffic compounded the problem. To be sure, accidents were often the fault of the drivers involved; police officers cited "excessive speed" or a failure to use caution in bad weather as the cause of several. Nevertheless, it was clear that road improvement needed to be addressed.\textsuperscript{42}

The road problems also stood as the major obstacle to continued economic growth. West End promoters envisioned such growth, of which the uranium boom was only the beginning. They believed that the West End was the "missing link" in a transcontinental highway that would connect Denver with southern California. This link would be old State Highway 80 (present-day Highway 141), which ran from Naturita in a southwesterly direction to Slick Rock, in San Miguel County, and on to Dove Creek, in Dolores County. From there, the transcontinental highway would extend through southern Utah and on to California. Promoters of an improved Highway 80 pointed out that the mills in the West End received more than one quarter of their ore from trucks traveling by that route. The highway also served the lumber mills that operated near Norwood, in San Miguel County, and ranches throughout the San Miguel Basin. But, the highway represented something much bigger: "transcontinental

trucking, commercial travelers and tourists." It "would do more to build our economy than mining and logging have done together."\textsuperscript{43}

One editorialist encouraged Montrose County officials to take the lead in this effort. He believed that if the county improved the road, more people would use it. Once the traffic reached a certain level, the state would see the need to take over maintenance.\textsuperscript{44} The only problem with this plan was that the vast majority of Highway 80 lay in San Miguel County. In fact, the entire effort to promote Highway 80 suffered from an ambiguity: no one explained how the highway would be routed from the West End to Denver, through the mountains of the continental divide.

This grand vision for Highway 80 captivated some in the West End, but other roads concerned them, as well. Highway 141 was the vital link to Grand Junction, and Highway 90 covered the distance from Naturita to Paradox and on to the Utah state line, serving some of the more important mines in the West End. The AEC expressed willingness to contribute a considerable chunk of money toward the improvement of these roads, but state and local governments kept a tight lid on the respective treasuries. The \textit{Forum} newspaper alleged that the State Highway Department had allotted only $22,000 for

\textsuperscript{43}\textit{"The Forum Fotogravure,"} undated, special issue of Nucla’s \textit{Forum} devoted entirely to highway 80; untitled editorial, \textit{Forum}, 20 April 1956, p. 3.

\textsuperscript{44}Untitled editorial, \textit{Forum}, 20 April 1956, p. 3.
roads in the "Uranium Basin," out of a total budget of $35 million. Montrose County officials seemed content to wait out the situation, hoping that someone else would come through with the money.

In 1954 the AEC proposed a $1.5 million project for Highways 141 and 90. The AEC’s plan depended upon a $500,000 contribution from the local and state government. In response, the State Highway Commissioner commented "that Montrose County might be able to furnish the half million dollars." In turn, a Montrose County Commissioner blithely suggested that Union Carbide would come up with the money, once the roads got bad enough. This exchange earned the "Laugh of the Week" in the Forum newspaper.

The dispute between the county and state governments resulted, in part, from the designation of West End roads. For example, parts of Highway 141 were in the state road system, while other parts of it remained in county control. Not until the summer of 1956 did the state take all of 141 into its road system. Highway 80 became a part of the state system in October of 1957. The state administrators refused to appropriate money for non-state roads; and, they

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continually postponed giving roads in the West End a state designation.47

Meanwhile, West Enders fumed, and they pointed out the irony of the situation. The uranium industry generated millions of dollars in revenue, and played a key role in the national defense; yet, those engaged in the business faced unnecessary challenges. A long time Nucla resident put it this way: "We hauled $43 million worth of uranium ore over these roads last year. In the process we wrecked $1 million worth of new trucks on those rough roads."48 West End promoters vented anger at Montrose County officials because of the perceived lack of support from the county seat. Increasingly, however, they realized that the county could not or would not deliver the needed money, and they begin to apply more pressure to state politicians. It especially irked the West End that the AEC offered up to ninety percent of the necessary funds, but the state still stalled. According to the local newspaper editor, "Colorado's share of AEC access road money had been cut by hundreds of thousands of dollars because of the two-year delays that are common here (Utah has been utilizing such money in 8 to 12 months)." Even the editor of Uranium magazine weighed in on


the subject, writing that Colorado failed "to hold up its end of the concerted drive to step up production of uranium on the Colorado Plateau."\(^{49}\)

The West End appealed to the state through county officials, elected representatives, uranium industry spokesmen, and concerned citizens, who attended numerous meetings on the topic of road improvement. Another helpful influence came from Club 20, a Colorado political organization formed to represent the interests of those counties located west of the continental divide. This group lobbied hard for good roads on the Western Slope, and placed the uranium basin high on its priority list.\(^{50}\)

Through the eventual cooperation between the state and the AEC, West End roads gradually improved. The progress came slowly, in yearly projects that improved several miles of roadway at a time. Highway 141 was not completely paved until 1964.\(^{51}\) And, the route for a transcontinental highway bypassed Montrose County altogether; it was built from Denver through Grand Junction.


\(^{51}\)"Five More Miles to be Paved on 141," Forum, 7 March 1963, p. 1; "Bid Opening is June 9 on 141 Project," Forum, 28 May 1964, p. 18.
Other amenities arrived on a pace roughly equal to that of paved roads. Not until 1958 did the West End gear up for the advent of dial telephones, and not until 1960 did most residents in Uravan have telephone service at all. Until that year the people of Uravan used a phone at the town drugstore; and they used a nearby bulletin board to post phone messages for one another. Unfortunately, the upgraded service in the West End eliminated the jobs of telephone operators, one of the few instances of a layoff during the uranium boom.\(^{52}\)

Television sets were an uncommon luxury; many people have only a vague recollection of getting a television in the late 50s or early 60s, and their choice of programming was limited to one station. That was accomplished in 1957 by the locally formed TV Association, which raised money from interested citizens to buy several signal repeaters for the West End. Local chronicler Betty Zatterstrom points out that such modernization cannot be attributed solely to the uranium boom. "Boom or not, I suppose television would also have ‘snuck-in’ somehow," she wrote.\(^{53}\)


\(^{53}\)"A Brief History of Television Reception in the San Miguel Basin," \textit{Forum}, 27 October 1960, p. 1; Betty Zatterstrom, '"The Times--They were a changin'’--The Mid-50’s,' \textit{San Miguel Basin Forum}, 14 January 1993, p. 6.
"Boom or not," the West End consisted of small, isolated communities that lacked the conveniences of larger towns. For example, the area suffered for want of a hospital, according to local physicians. One estimated that the West End averaged one child birth per day. Expectant women either delivered without hospital facilities, or drove to Montrose or Grand Junction for obstetric care. For a short time during the early 1950s, Doctor Akers ran a hospital at Uravan, but the endeavor failed. Thereafter, the West End had doctors, but no facilities to care for child births and emergencies. Residents relied on an ambulance service funded by subscription, five dollars per year for each family, and run by volunteer drivers. 54

The Nucla-Naturita ambulance service proved its worth on a number of occasions. Once, a Uravan woman needed medical attention in Montrose. Her husband considered delivering her in his own car, but then decided to call the ambulance because of icy roads. With his wife safely in the ambulance, the man followed in his car. At some point during the trip he lost control of his car, which careened over the edge of Norwood Hill. He emerged from his automobile, unharmed, and probably thankful that his wife

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traveled in the ambulance. His car remains where he left it that day.\textsuperscript{55}

The story offers a loose analogy to the condition of the West End. The people of the area proceeded down an uncertain path, close to a precipice. The area had grown tremendously since 1950, and the boom provided West Enders with an unprecedented standard of living. But the road they traveled was not of their own making, and they had no control over the future path of that road. For example, in 1954 the AEC announced that a uranium mill would be erected in the Paradox Valley, near Bedrock. In 1956 the federal agency signed a contract with the company that would invest 2.5 million dollars in the project, and some speculated that Bedrock would grow to a community of five hundred.\textsuperscript{56} But these plans were never realized; no new mill was built. This was no great disappointment to the West End, but it illustrates the West End’s level of dependence upon the AEC, companies like Union Carbide, and, by extension, uranium. All of the West End’s growth and prosperity rested on the uranium industry, and the future of that industry lay with institutions and businesses far removed from the West End.

\textsuperscript{55}"A Narrow Escape," \textit{Forum}, 17 January 1958, p. 1. The newspaper reported inaccurately some details of this adventure. The author thanks the man’s family for contributing additional information.

This is not to say that people lived in constant fear of losing their jobs because of a bust in the uranium market. But they acknowledged that the business could be risky. Men who joined the Uravan mill in the early 1950s knew that the company agreed to relatively short term contracts with the AEC; some did not anticipate a future beyond the length of the contract. And, there were many at the time who had lived through an earlier boom and bust period. While not anxious, West Enders abided a seldom spoken realization that "some day the uranium bubble may break when the government stops its inflated monopoly buying."57

One cannot ignore the value to the West End of its agricultural enterprises, referred to as "the year-in and year-out backbone of the Uranium Basin’s economy." But these mostly small, family run, often "marginal" operations formed a quiescent economy, unable to attract the jobs and money lured by uranium. In fact, many men went to work in the mines or mills to bring home the money needed for the family ranch or farm. Some farmers worked mining claims that they had held since before the uranium boom. In the Paradox Valley, one claimed, "nearly every farmer ... made a little from uranium." A man who worked in Uravan and helped on his father’s ranch drew a clear distinction

between the two endeavors: uranium was the best thing that could have happened to the West End. One who has not lived through it cannot imagine what the boom did for people. Vividly, he recalled that for the first time a man could put his hand in his pockets and not find them empty; he actually had some money to spend.\textsuperscript{58}

It comes as no surprise, then, that uranium captured the loyalty of those it served. The unstable element also captivated their fancy; uranium became a sign of the times, and the multifaceted uranium industry represented a meal ticket in more ways than one. For example, hungry West Enders enjoyed meals at a Nucla cafe with the evocative name of the "Pick N' Shovel." In Naturita, shoppers took advantage of "Uranium Values" at one department store, or drove to Nucla to browse the racks at the "Atomic Apparel Shop." For evening entertainment some imbibed at a bar called "Atomic Recreation" in Nucla--bar owners in Naturita also gave their establishments names inspired by uranium mining. At the time there was even a brand of whiskey marketed with the name "Uranium Whiskey." Others opted for

a movie at the "Uranium Drive-In," located on the hill between Nucla and Naturita. The proprietor of a shuttle service, which transported travelers from the West End to Montrose, named his business the "Uranium Express," and held a contest to choose a "Uranium Queen." In 1955 the town of Delta hosted the "Uranium Bowl" college football game. (Delta had no obvious connection with the uranium industry, but the high school football stadium was probably bigger than Nucla’s, and more accessible to fans.) Uranium achieved its most prominent place as part of the Nucla town seal; the emblem featured the words hunting, fishing, and uranium inscribed in a circle around the town name.59

The uranium rush drew considerable national attention, and the interest of thousands of prospectors. Newspapers and magazines supplied the public with stories of prospectors discovering rich deposits of uranium ore. Cottage industries--stores selling geiger counters and other necessities for prospecting--mushroomed in towns around the

59 This information was gleaned from several editions of the Forum newspaper of the 1950s. The fascination with the atomic age occurred throughout America, and manifested itself in "songs, movies, place names, and advertisements." Naturally, the excitement generated by atomic power grew stronger in those places more closely associated with certain aspects of it. Business people in Las Vegas, Nevada, near the AEC’s nuclear test site, employed various "atomic themes" in promotions, advertisements, and to attract visitors. Residents could see the atomic tests from Las Vegas, and tourists came to witness the blasts. A. Costandina Titus, Bombs in the Backyard: Atomic Testing and American Politics (Las Vegas: University of Nevada Press, 1986), 86-100.
Colorado Plateau. Anxious prospectors inundated the clerks at county court houses with mining claims.60

Most prospecting occurred in southeastern Utah, on relatively unexplored, unclaimed land; in the Uravan area much of the land was already claimed by the bigger mining companies. But even in the Uravan Mineral Belt there was still room for the independent prospectors. One Nucla man "scratched for years" before staking a claim that would become the "fabulous Opera Box mine." Another local "parlayed a $1200 grubstake into six figures." Others, of course, "went broke" in their search for uranium. A West End rancher spent so much time and money in a futile search for uranium that his ranch failed of neglect.61

The West End also witnessed one authentic land rush, which attracted uranium hunters from as far away as Texas and Wyoming. In 1954 the AEC opened for claiming eighteen thousand acres of land on Atkinson Mesa, near Uravan. At the appointed hour on 12 November, an estimated one thousand prospectors poured into the area. A reporter observed that the mesa "looked like a crowded golf course on the Fourth of July." Many people staked their claims early, and others

60 Ringholz, Uranium Frenzy, 76-77; Husband, "'History's Greatest Metal Hunt,'" 21-22.

"paid little attention to evidence of prior staking or ownership." In the attendant confusion, there appeared to be enough transgressions "to keep every lawyer west of the Mississippi busy for years on title suits." Later, the Montrose County Clerk's office recorded approximately two thousand claims. Union Carbide officials, who knew intimately the Atkinson Mesa geology, laid no claims. 62

The uranium boom profited West Enders, for the most part. Many owned mines that they worked or leased, and others started mining, drilling, or trucking companies that contracted with the bigger companies like Union Carbide. Many more earned a good living from work in the mines or mills. The owners of bars, restaurants, hotels, and service stations probably earned as much in the West End as they could have anywhere else. However, the West End historian Wilson Rockwell believed that the boom of the 1950s had an impact similar to the radium boom of the 1910s: "The big money was made by independent operators and corporations on the outside, most of whom pulled out when the boom finally came to an end." 63

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Most West Enders would probably agree with this assessment. Many of those with the experience to profit in the uranium industry had come into the West End from other areas. And they did not stay after they had made their money. The West End benefitted from school construction, upgraded roads, and the improvement of some public services. But the residue of wealth did not last, and the benefits existed only as long as uranium remained profitable.

The year 1958 is often given as the end of the uranium boom. For the West End it began early in the year, when the Vanadium Corporation of America announced that it would close its Naturita mill. VCA could not come to terms with the AEC on a new contract, probably because of the condition of the plant. It was the oldest uranium mill in America, and its facilities were outdated by standards of the day. Thus, it operated with much less efficiency than other, competing mills. West Enders suspected as much: one man regarded the VCA operation as "a bailing wire outfit," a reference to the method by which the company effected repairs. Another man, using similar terminology and the same impassive delivery, described VCA as a "fly-by-night outfit." One hundred twenty-five men lost their jobs as a result of the VCA closure. The local newspaper editor estimated that figure at only five percent of the mining and
milling jobs in the entire uranium basin, an area that included San Miguel County. He saw "no need for panic."  

However, in 1958 something much bigger was in the works. The AEC's procurement program had succeeded beyond expectations, and the agency realized that "it was no longer in the interest of the Government to expand the production of uranium concentrate." For years the AEC had predicted that demand for uranium would arise in the private sector, from utility companies that operated nuclear power plants. Then, as the AEC's needs for uranium decreased, commercial demand would increase. But the technology for those power plants lagged behind expectations, and it became clear that significant commercial demand would not materialize for a number of years. Thus, the federal agency sought to limit the production of uranium while keeping the industry alive and healthy.  

In 1958 the AEC curtailed exploration by modifying certain aspects of its program. While it continued to honor previous contracts, the Commission announced that from 1962 to 1966 it would purchase uranium concentrate that originated only from those ore reserves developed before 24 November 1958, the date of the announcement. This dampened

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enthusiasm for exploration, because the AEC withdrew its guaranteed market for new discoveries.\textsuperscript{66}

Simultaneously, the Commission began to implement an allocation system for the delivery of uranium ores to the mills. AEC geologists assessed 2,500 mining properties on the Colorado Plateau, and found eight hundred that met eligibility criteria. The AEC allocated, from 1962 to 1966, the delivery of ore from these properties to the mills; the AEC based each mining company's allotment on ore reserves developed before 24 November 1958. For small mining companies, which usually did not control enormous ore reserves, the AEC based the allotment on the small companies' past ore production, as measured from 1 July 1956 to 30 June 1960.\textsuperscript{67}

These actions had no immediate effect on uranium production as a whole. The delivery of \(\text{U}_3\text{O}_8\) to the AEC continued to increase yearly until it peaked at thirty-five million pounds in 1961. Thereafter it decreased, by about three to four million pounds per year, until 1971, when the AEC bought only 2.5 million pounds. From 1959 to 1961 the milling companies produced as much as their contracts with the AEC would allow. Then, in 1962 the allocation system took effect, as well as a new, lower price for uranium concentrate paid by the AEC to milling companies. In 1955

\textsuperscript{66}Taylor and Yokell, \textit{Yellowcake}, 31-32.

\textsuperscript{67}O'Rear, "Summary and Chronology," 18-19.
the AEC paid an average of $12.25 per pound; after 1961 it paid only eight dollars per pound. Activity in the uranium industry decreased correspondingly. Based on production, then, one may conclude that 1961 marks the end of the uranium boom.

Indeed, the early 1960s were not lucrative for the West End, as employment in the mines and mill decreased. Some small mining companies found the AEC’s new quota system unprofitable, and gave up the business. The Golden Cycle Corporation, a large, diversified mining company, lost its uranium claims in the West End to another AEC decision. Golden Cycle had mined AEC controlled land on Atkinson Mesa, near Uravan, since 1953. (This was not the same land that was opened to the public in 1954.) In 1962 the AEC declined to renew any leases on the lands it controlled, and Golden Cycle suddenly had no ore to mine. The company laid off fifty miners.

The working population at the Uravan mill declined, as well. In 1960 Union Carbide employed an average of 224 workers at its mill. By 1964 the number had dropped to 152. Other statistics reflect the downturn in the uranium industry. In 1960 Montrose County had 285 mine operations that produced 509,338 tons of ore. In 1965 the county

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68 Albrethsen and McGinley, "Summary History," B-6.

counted only 135 operations that produced 264,584 tons of ore. The total worth of Montrose County ore dropped from nearly eleven million dollars in 1960 to 5.2 million dollars in 1965.\(^7^0\)

Had the uranium market collapsed completely, the West End may have faced economic ruin. West Enders were fully aware of this dependence. In 1961 VCA returned to Naturita to operate an ore concentrating plant, which was designed to treat ore in a preliminary fashion before it was shipped to VCA's Durango mill. West End merchants purchased a two-page ad in the local newspaper, thanking VCA for its return to Naturita. Unfortunately, VCA officials closed the concentrator less than two years later, due to "continued high cost and unprofitable operations."\(^7^1\)

But the West End's uranium deposits were far from depleted, and the AEC continued to provide a market, albeit a less lucrative one than before. And, the West End had a


strong, resourceful supporter in Union Carbide, a company with the means to endure the uranium slump.

Union Carbide Corporation, the parent company, was heavily involved in the uranium business. Through different subsidiaries the giant corporation mined uranium in Colorado, Utah, and Wyoming. It operated mills in Gas Hills, Wyoming, and in Maybell, Uravan, and Rifle, Colorado. Union Carbide also operated for the AEC the Oak Ridge National Laboratory and three other facilities involved in atomic research.

In the 1960s and 1970s Union Carbide continued to produce vanadium, from mills in Rifle and Uravan, and from a mine and mill near Hot Springs, Arkansas. The corporation marketed its own vanadium alloying agent, called Carvan. Also, other divisions within Union Carbide Corporation used vanadium in the manufacture of alloys. For the Uravan mill, and for those in the mining business, the production of vanadium became more important as the government’s purchases of uranium decreased.72

Union Carbide remained operational in the West End for more than two decades after the bust of the early 1960s.

But the events and political decisions of that time served as a reminder to West Enders that they enjoyed no guarantees. They began to realize, or take more seriously, the possibility of a permanent closure of the mines and mill. The end of the boom forced them to realize that control of the uranium industry lay well beyond their reach. These unsettling notions spawned a certain restlessness, and a question difficult to answer. The editor of the local newspaper felt obligated to respond:

Many persons have recently asked me, "What’s going to become of this area?" Perhaps the best answer is simply--"Just what we make of it." Things aren’t going to get much worse even if we do nothing but if we all roll up our sleeves and go to work to promote our entire area . . . they could get to be one heck of a lot better."73

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CHAPTER 5

URAVAN: "A COMPANY TOWN IN THE TRUE SENSE OF THE WORD"¹

To read one side of the story, Uravan had very little to recommend it during the early 1950s. Described as a "camp" during this time, some workers believed "the only good [thing] about Uravan is the ability to leave once in a while." A number of employees stayed on the job for only a short period of time. In the booming '50s the competition for workers was intense, and many left Uravan for the lure of better jobs.² The housing conditions at Uravan probably added to the discontent. Some of the houses available were quite small, and some lacked indoor plumbing and other modern conveniences. As noted, people lived where they could, in tents, shacks, and trailers. Sometimes men moved to Uravan without their families, staying in a bunkhouse until they could arrange housing for their families.

However, this disaffection was not universal; many people were simply grateful to have a steady job, considered the best paying job in the region. Those attracted to Uravan came from small towns, farms, and ranches around southwestern Colorado; having endured the Depression and the


war years, they were not accustomed to a grand style of living, nor did they expect more than Uravan offered. For example, one woman considered it no inconvenience to heat the bath water on a stove. Of living in Uravan in the 1950s, she said, "If you never had anything, you felt like you were bettering yourself all the time." That statement pretty well reflects the condition of Uravan at the time. Perhaps its population grew too fast, but by the mid-1950s the company had completed a number of improvements to the town, including a street paving project, the addition of bathrooms to many of the houses, and the construction of about seventy new houses.

Opinions of the town remained divided, however, and high turnover rates plagued Union Carbide for a number of years. In 1954 the company hired 104 mill workers and lost ninety-six. Of those who left, fifty-one had worked less than eight months. In 1955 the company hired 181 and lost exactly the same number. Of those, sixty-one worked their jobs less than one month. The place seemed impermanent, a feeling fostered by the knowledge that Union Carbide operated on an AEC contract—no one knew for sure if the plant would continue to operate beyond the terms of that

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3Interview #8.

agreement. Also, many of the people coming to Uravan were young: men, perhaps just out of military service and entering the workforce for the first time; women, many newly married, who were just beginning to plan their futures. Union Carbide offered such people employment, but they could not be sure if that would conform to their goals. One man came with his wife intent to work only through the winter, until they decided their future plans. They stayed and worked for thirty winters. A woman whose husband served at the mill for approximately the same number of years captured the feeling: "Uravan was just a stopping place on your way to the rest of the world."  

Union Carbide officials always struggled, to a certain degree, against high turnover rates. Nevertheless, the company benefitted from the arrival in the 1950s of a core of dedicated employees who actually liked the place. In 1961 the company employed 144 hourly mill workers. Of those, twenty-nine had been on the job for at least ten years, and ninety-one had been employed at least five years. In 1976 the company counted 116 hourly mill employees. Thirty-eight of them had twenty or more years of service, and sixty-two of them had served nine or more years.  

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5 Interview #16.  

In the 1960s and 1970s the turnover rates among hourly employees leveled off and remained constant. For example, in 1960 Union Carbide employed, as an average throughout the year, 157.5 hourly workers at its mill. Twenty-nine men left that year, for a turnover rate of 18.4 percent. The company experienced a nearly identical rate in 1964, when it employed an average of 114 and lost twenty-one for the year. In 1974 the company employed 107 mill workers and lost twenty-one, a 19.63 percent turnover rate. These figures reflect the general trend in the uranium industry, which was never so vibrant as in the 1950s. Then, when mine and mill production peaked, jobs were widely available and there was less risk involved with leaving one job for another. The figures also represent a stabilization of the workforce; over time, the company managed to find workers who appreciated the living and working conditions at Uravan. A long time Uravan resident explained the trend in a practical way: turnover rates fell during the 1960s "because people were starting to work on their pensions." (For the number


8 Interview #21.
of people who worked at the Uravan mill through the years, see Table 2 on the following page.)

Most new arrivals to Uravan formed their opinions quickly; "you either loved the place or you hated it." Those who hated it usually left within a few months, and those who stayed at least a year usually remained much longer. Those who made the decision of whether or not to stay at Uravan based their decision upon a set of factors common to most of us. That is, Uravanites assessed their housing and working situations, their ways of life, and the general qualities of their lives to determine whether Uravan best suited them. Such basic decisions were not unique to Uravan.

But in many ways the town was unusual, even unique in southwestern Colorado. Uravan functioned as an old-fashioned company town: a town that existed for one purpose only, to mill uranium, and one that was maintained by strict company control. Like most company towns, Uravan was isolated, and located in a harsh environment. To live there, a person had to accept the limitations of a small town. On the other hand, because of the company, residents enjoyed benefits and conveniences not usually found in small towns.

It was a town of which residents were intensely proud; yet, virtually all of the town’s working inhabitants came

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9Interview #28.
Table 2.--Number of Employees at the Uravan Mill

<table>
<thead>
<tr>
<th>Year</th>
<th>Hourly</th>
<th>Nonexempt</th>
<th>Exempt</th>
</tr>
</thead>
<tbody>
<tr>
<td>1957</td>
<td>183</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>1960</td>
<td>157</td>
<td>33</td>
<td>37</td>
</tr>
<tr>
<td>1961</td>
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<td>27</td>
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<td>1963</td>
<td>122</td>
<td>24</td>
<td>28</td>
</tr>
<tr>
<td>1964</td>
<td>114</td>
<td>19</td>
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</tr>
<tr>
<td>1968</td>
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<td>15</td>
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</tr>
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<td>13</td>
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</tr>
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</tr>
<tr>
<td>1972</td>
<td>100</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td>1973</td>
<td>95</td>
<td>13</td>
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<tr>
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<td>1975</td>
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<td>29</td>
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<tr>
<td>1976</td>
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<td>NA</td>
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<td>1977</td>
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</tr>
<tr>
<td>1981</td>
<td>87</td>
<td>14</td>
<td>25</td>
</tr>
</tbody>
</table>

Figures are not available for all years. NA means that reliable figures are not available for that particular year.

Jobs classified as "nonexempt salaried" included secretaries, typists, clerks, warehouse employees, various assistants, and others. Nonexempt employees were paid a salary based on a forty hour week, but received overtime pay for any hours worked over forty per week. These employees had no supervisory responsibilities.

The "exempt salaried" group included superintendents, foremen, engineers, and others with supervisory responsibilities.

The list includes only mill workers, although some miners and others lived in Uravan.

Figures are from various "Manpower Reports," "Personnel Reports," and "Employee Lists," Umetco Records.
from somewhere else, and no one could expect to live there beyond his working years. Uravan represented home in the truest sense to an entire generation of people who grew up there; yet, it no longer exists. Its thirty-five year post-war history offers an interesting glimpse of life in a company town.

The physical shape of Uravan conformed to the canyon that surrounded it, long and narrow, and through which meandered the San Miguel River. Within this elongate pattern stood 167 houses clustered in nine blocks, each named after one of the first ten letters of the alphabet, with the letter I omitted. Some time during the 1960s the company attempted to rename the streets, giving each the name of a gemstone; however, these names never took hold, and former Uravan residents still refer to the streets, or blocks, by the letter designations.

Blocks A through F, 92 units, constituted the oldest houses in Uravan. By modern standards, and perhaps even by standards of the day, these were small and poorly built. Sixty-one had two bedrooms, twenty-two had three bedrooms, two had four bedrooms and seven had one bedroom. The houses ranged in size from 629 square feet to 1850 square feet, but most fell into the 650 to 1000 square foot range. These older dwellings averaged, approximately, 870 square feet. Many of the houses had been expanded in one way or another,
and the square footage cited above reflects those enlargements.\textsuperscript{10}

Most of the houses in blocks A through F had been constructed in Uravan’s first, pre-war life. By the company’s own standard, these units provided only "adequate accommodations," although the houses in blocks B and F were said to provide, "in general, . . . comfortable facilities."

Some were of frame construction, but many, in blocks C, D, E, and F, had exterior walls of "tar-paper and rough slab construction." Also described as "tar-paper shacks," these houses provided little insulation. Another problem with some of the older houses resulted because they had been built directly on the ground, without solid foundations. Thus, the floors sometimes rotted and had to be replaced.\textsuperscript{11}

Also counted among the older houses were the flat top apartments, those built under government contract during the war. By all accounts, these one, two, and three-bedroom units were the most undesirable alternative. Tenants lived

\textsuperscript{10}T. F. Roberts, "Uravan Housing Review," 14 January 1964, Housing 1964 file, Uravan Purchasing drawer, room 126, Umetco Records (cited hereafter as Roberts, "Uravan Housing Review"); "Residential Property Appraisal Record, Paradox, Redvale, Uravan, Olathe, Alamo Heights," Tax Assessor’s Office, Montrose County Court House, Montrose, Colorado (hereafter cited as Residential Property Appraisal Record). Many of Uravan’s houses, at various times, were enlarged. One can not know for certain that these tax records were accurate regarding the dimensions of the houses. But the records correspond roughly with descriptions of the houses, and with some company records relating to the houses.

\textsuperscript{11}Roberts, "Uravan Housing Review"; Interview #17; Interview #22.
with small rooms, small yards, cold and hard concrete floors, and "the general congestion resulting from sixty (60) families living in so small a physical area." The apartments also had thin walls; a former tenant noted that "any argument in the whole section that you was in, you heard." For all of its drawbacks, there was a time when a family might have welcomed the chance to move into the apartment complex. A man who moved to Uravan in the 1950s remembered that the flat tops were "swank," compared with living in a tent.12

The newest houses in Uravan, built in 1956, were the twenty-three two-bedroom houses on J Block. In Montrose County tax records these were all listed at 760 square feet in size. The houses were poorly insulated and required quite a lot of maintenance; the most pressing problem proved to be "leaking roofs," which the company eventually replaced entirely.13

With some exceptions, most people regarded the houses in G and H Blocks as the best living accommodations. Of these fifty houses, built in 1954 and 1955, thirty-eight had three bedrooms, two had four bedrooms, and ten had two bedrooms. The smallest had 720 square feet of living space, while the largest had 1388; the approximate average square

12 Roberts, "Uravan Housing Review"; Interview #23; Interview #22.

13 Residential Property Appraisal Record; Roberts, "Uravan Housing Review."
footage was 908. These houses were attractive and solidly built, with hardwood floors, utility rooms, and a reasonable amount of storage space.

As of 1964 Uravan had two trailer courts. The "old" court had twenty-three spaces, and a wash house that included shower and toilet facilities. At the time, some of the trailers still in use had no such conveniences. The "new" trailer court had thirty spaces, and was "limited to modern trailers with bathrooms." For single men, Uravan had five bunkhouses, each with four rooms.

As the owner of Uravan's houses, Union Carbide took responsibility for all maintenance to the houses. In addition, the company paid the cost for room additions and enlargements. The company employed carpenters and a maintenance crew that performed much of this type of work, although at other times house improvements were performed by independent contractors. The company provided paint and materials for residents to paint their houses, and tenants were allowed to build fences and outdoor storage facilities. None of Uravan's houses had garages.

If Uravanites found their housing inadequate in any way, one aspect of those accommodations alleviated their apprehensions: they paid less rent, probably, than anyone in

14 Residential Property Appraisal Record; Roberts, "Uravan Housing Review."

15 Roberts, "Uravan Housing Review."
southwestern Colorado. In 1964 Union Carbide rented some of its houses for as low as $11.50 per month. This rate applied to some of the older one-bedroom houses. Forty-four dollars represented the highest rent, charged for the four-bedroom houses on B and H Blocks. On average, the people in C and D Blocks paid the lowest rent, nearly sixteen dollars. The residents of G and H Blocks paid the highest average rates, thirty-seven and thirty-nine dollars, respectively. The average rent for all Uravan houses stood at about twenty-nine dollars per month in 1964. In addition, renters paid for gas and electricity usage.

Union Carbide officials designed the rent policy specifically to make Uravan more attractive to the company's employees. The rent collected by the company covered only a small fraction of the housing maintenance costs and property taxes. Even more remarkable was the fact that rents hardly increased over the years. In 1983 residents still paid rents ranging from $27.50 to about $50.00 per month.

The low rents provided the intended incentive to live and work in Uravan. Most people mention the rents as one of the benefits to living in the town. To one man, "the rent

\[16\] Ibid.

17Union Carbide followed a tradition established and maintained by the owners of other company towns. "Rental charges for company houses have always been low and frequently have served as an added inducement to live in an isolated area." James B. Allen, The Company Town in the American West (Norman: University of Oklahoma Press, 1966), 89.
of the houses was probably the best thing about living in Uravan."\(^{18}\) Their enthusiasm for the low rents may mask some of the shortcomings in the housing situation. Early in 1960 Uravan’s plant superintendent solicited from a group of nine company men, salaried employees, "a brief memorandum on housing and employee facility problems." He asked his coworkers to explain the effect of these problems "on the procurement and holding of personnel," both salaried and hourly.\(^{19}\)

All of the respondents listed the small size of the houses as Uravan’s worst problem. Not only did families feel cramped, they had little storage space, both inside and outside, they had no "hobby area," and the yards were rather small. Other problems included the lack of sidewalks, small spaces in the trailer court, an unusual accumulation of dust in the houses, and "sub-standard" housing for single employees. The respondents generally agreed that Uravan’s housing conditions negatively affected the recruitment and retention of employees. The potential salaried employee "will think several times before moving from a more elegant house [elsewhere] into a \textit{simpler} house [in Uravan]." And, 

\(^{18}\)Interview #15.

\(^{19}\)Company Houses and Land, General file, drawer 7 UaZ, room 124, Umetco Records. The contents of this file consist of a memo to nine Union Carbide employees, dated 2 February 1960, and the responses to that memo. Although not listed as "confidential," the respondents will remain anonymous. These documents will hereafter be cited as "Memorandum on Housing and Employee Facility Problems."
"any hourly man that is a good conscientious worker and practices good housekeeping generally by his very nature would not live in a house like C, D, E, and F blocks or the flattops."  

The previous two responses, submitted by different men, suggest that not only were Uravan’s houses small, but that they may not have been entirely sound. Another commented specifically on the quality of the houses, which he termed "inadequate." Caustically, he wrote that "moving into a house in sore need of repair, with a poor paint job, dripping, encrusted faucets, with green corrosion products on the bathroom chrome, with a rattling furnace is usually enough to suggest inadequacy." He continued at some length in this vein, calling some of the houses "shabby." This charge describes less the overall state of the houses than it reflects the condition of a few of the houses at this particular point in time. The company painted the houses on a regular basis, and there is every indication that the company repaired plumbing, and other, similar problems.

Apparently in direct response to the comments contributed by these men, the company enlarged several of Uravan’s older houses between 1960 and 1964, and set aside land for a new, more spacious trailer court. In fact, the company improved various aspects of the houses on a regular

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20 Ibid.

21 Ibid.
basis. By making these improvements, company officials struck a balance; without spending a tremendous amount on new houses, they achieved their goal, to their apparent satisfaction, of reducing employee turnover by offering more attractive housing.

Some may assume that Uravan residents made sacrifices to live there. Some families lived in very small houses for long periods of time. The town’s water system was not up to the standards of modern day city dwellers. For many years the water occasionally took on a rusty hue, apparently because of iron water lines. Some residents remember an unpleasant taste to the water, probably because of high salinity. But those who chose to live in the town were satisfied with their situation, and most would agree that the company tried to accommodate a family’s needs. Those who placed a greater emphasis on a bigger, or "more elegant" home probably disliked Uravan and chose not to live there. But it is not the case that Uravan residents accepted sub-standard housing in exchange for low rents. The rural West End had never been an affluent place, and the quality of Uravan’s housing compared to that available in Nucla and Naturita. From Uravan one did not have to travel very far, only to the nearest mining camps, or to even smaller towns.

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in the mining regions of southwestern Colorado, to find people who lived with fewer conveniences.

The great disadvantage to life in a company town lies in the fact that residents had no opportunity to own their houses. In the 1950s some company town managers began to sell to their employees the company-owned houses. The idea was that workers who could fulfill a part of the American Dream, that of home ownership, would be happier, more satisfied with their circumstances, and more interested in and committed to both the town and the company. Reportedly, the idea worked, and the companies also benefitted from having less money tied up in real estate. But Union Carbide's managers thought the idea impractical for Uravan. Selling houses would have further involved the company in the real estate business; if retired workers continued to live in Uravan, the company would have had to erect new houses for new workers. Also on the minds of company officials was the possible day that the mill would close. In that case, home owners would have been left with virtually worthless property. No one anticipated or predicted a shutdown, but company managers recognized the possibility.

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24 Interview #28.
Not all who worked in Uravan chose to live there. In 1964 about seventy-one percent of all mill employees lived in company houses, and in 1976 the ratio remained virtually the same.\textsuperscript{25} The others lived nearby, usually in Nucla or Naturita, but sometimes in Paradox or Norwood or other towns. Those who lived outside of Uravan sometimes had pre-established residences elsewhere. Others chose to buy or build a house in Nucla, for example, because they wanted to have their own property.

In assigning houses, Union Carbide always gave preference to salaried personnel and to those with job seniority. In the early 1950s company officials actually devised a mathematical formula to determine a "house factor." The house factor resulted from adding an employee's monthly salary and his length of service as numbered in months. He with the higher house factor received the first choice. While this housing formula may have been abandoned, some form of it remained. In later years the company considered these factors when reviewing housing applications: the employee's length of service; the number and sex distribution of his children (the parents of a boy and a girl might get a three-bedroom house, so that children of different gender occupied different rooms, while

the parents of two children of the same sex might get a two-bedroom house); and job classification. By any formula, the company generally presented the salaried employees with a choice of houses upon their arrival in Uravan. Meanwhile, most of the hourly workers experienced some time in the flat tops before they acquired the length of service to move into a house.

Accorded their preference, salaried personnel tended to live on blocks B, G, and H. Some of the A and B Block houses were desirable because they were bigger, and because of that street’s location in a shady area. The plant superintendent always lived in a big house on B Block. With the exception of the superintendent’s house, and perhaps a few others, hourly workers were not excluded from the preferred houses. Given time and, likely, a certain amount of persistence, some hourly workers moved their families into the preferred houses. In 1959 eleven hourly mill workers lived in G and H Blocks. In 1976 seventeen hourly mill workers rented houses on those streets. It was not always the case, however, that Uravanites of any job category sought housing in these blocks. A number of residents lived comfortably in houses in the older blocks.

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for many years. In some cases, men with salaried positions and many years of service chose to live in older houses. And one might consider the case of a blue collar worker, with plenty of seniority, who declined opportunities to move from his older house. He and his family had grown quite comfortable with the house; the company had expanded it as his family grew, and they had arranged everything to their liking. Besides, he did not like the idea of living next to the salaried types.27

In the early 1960s Union Carbide began to operate its own mines. Previously, the company had hired independent mining contractors to mine its claims. As they hired miners, company officials also sought to house them. Thus, as the boom of the 1950s subsided the housing at Uravan remained full, because miners took up any vacancies that resulted from a reduced mill crew. But not all of Union Carbide’s miners chose, or were able, to live in Uravan, primarily because the town was not convenient to some of the mines. In 1964 the company employed 142 mining personnel in all job categories (hourly and salaried workers). Only sixty-five of them lived in Uravan.28 In addition, Union


28Roberts, "Uravan Housing Review."
Carbide provided housing to employees of Uravan’s business establishments and to school teachers. Although Uravan’s residents had no personal financial commitment in the matter, and despite the plain appearance of their houses, most of them took a great deal of pride in their neighborhoods. They kept beautiful lawns, cultivated fruit trees, planted gardens, and, in general, maintained a pleasant atmosphere. In fact, it was considered something of a "sin... not to keep your lawn watered and cut."

"Neat and well-kept," although "not what you’d call pretty," wrote an observer in 1979. In the 1950s others described Uravan’s "orderly rows of cottages, cabins, [and] houses," the appearance of which indicated "a personal pride in the town as well as a company interest."[29]

Indeed, it was a "policy of the company to maintain the community in an attractive and safe manner for the benefit of all residents." Union Carbide issued explicit instructions to each renter regarding the upkeep of virtually every aspect of the houses, including yards, fences, sheds, wood piles, alleys, and the "space behind alleys." The company forbade residents from keeping unlicensed and inoperative vehicles on the premises. The rules extended to the maintenance of the insides of the houses. (There were notorious examples of homes in such an

[29] Interview #17; Bill Conrad, "Company Town: 'Is Not What You’d Call Pretty,'" Daily Sentinel, 18 July 1979, p. 29; Maness and Jacobs, Uranium Crazy, 53.
ill-kept state that the company considered them health hazards. The company "helped and encouraged" residents to keep the houses and neighborhoods free of trash, junk, or other unsightly mess by scheduling a yearly collection date for the removal of accumulated refuse.\(^{30}\) Normally, the encouragement achieved the desired results, but occasionally the company had to apply more pressure. For example, in 1981 the company evicted a family whose house was considered "a fire, health and safety hazard." Previously, the employee had "not complied with the various requests to bring the house into safety compliance."\(^{31}\)

Union Carbide encountered its most serious problems with non-employee residents—not the school teachers and employees of Uravan’s business establishments, but miners and truck drivers who worked for other companies. The company rented some of its extra houses and trailer spaces to these contract employees, although the total number of such rentals was probably small. One company official had much to say about the contract employees, but his comments


\(^{31}\) Union Carbide to Uravan resident, 18 March 1981, Housing Increase Proposals, Uravan Correspondence file, drawer F11172-F11197, room 126, Umetco Records.
reveal even more about the attitudes of company-employed residents:

We did have many problems with employees of mining and trucking contractors in collecting rent as well as in maintaining the houses, lawns, fences, etc., up to the standards required. They seemed to lack the "community pride" that most UCC [Union Carbide Corporation] employees living in Company housing exhibited by maintaining their residences up to the standards required. We attributed some of this to what we felt was a feeling of not having a "permanent" job and that the Uravan housing was an interim situation until they moved on to some other job. . . . We did receive many complaints from UCC employees living in Uravan regarding the manner in which the above mentioned non-UCC employees maintained their Uravan residences.32

The company's obligation extended to other matters of community etiquette. For example, the company held accountable the parents of children who damaged or vandalized property. In rare instances the company evicted families with uncontrollable, mischievous children.

The company even policed barking dogs. A man on F Block once received from his company a letter informing him that his dog was a "nuisance." The company representative asked him to "please make arrangements to keep the dog inside so the noise will not disturb others," or to "get rid of her." One week later, after "continual complaints about the dog," the man received a missive that informed him of three choices. He might: "keep the dog inside at all

32 Confidential Letter, 7 June 1983, Uravan Correspondence file, drawer F1172-F1197, room 126, Umetco Records.
times"; "get rid of the dog"; or, "move out of Uravan and accept this as your ten day prior written notice that the rental agreement is terminated."\(^{33}\)

Despite the company's tone in this particular instance, no Uravanites characterize the company's methods as Draconian. And, one might imagine that the company usually employed a bit more tact, or acted less abruptly. Nevertheless, Union Carbide felt obligated to enforce a set of standards believed to be fair and beneficial to the whole community.

Grouped together at the southeast end of the town stood a collection of buildings that one might call the business district. Union Carbide leased to the United States Post Office Department a small building for mail service. Next to the post office, on Main Street, was the Recreation Hall, a one time Civilian Conservation Corps building that had been moved to Uravan during the war. As originally built the wooden structure was tall and long, with a steeply pitched roof. At some point during its history, the company added two wings to the sides of the Recreation Hall. The building served its purpose as a community center; in it, Uravanites held meetings for all of its civic and service organizations. The Rec Hall also served as a church,

\(^{33}\)Union Carbide Nuclear Company to Uravan resident, 13 February 1959 and 20 February 1959, Housing 1959-1960 file, Industrial Relations Department drawer, room 126, Umetco Records.
theater, and dance hall. It housed the community library, the roller skating rink, and in the basement, even a shooting range.

Next to the Rec Hall was the drugstore. The services included fountain drinks and meals, such as soup and sandwiches. In the late 1950s the company arranged for the services of a pharmacist. After the issuance of a license, also in the late 1950s, the proprietor of the drugstore sold packaged liquor there.

Originally the drugstore housed a tavern, which served only beer; later, the tavern was moved next door to the old service station. By company preference, the tavern closed each night at 10:30, and did not open on Saturday or Sunday. A new gas station was established on the highway at the southeast entrance to the town.

Directly across the street from the drugstore stood Uravan’s monument to its history, the Boarding House. In the post-war period, the Boarding House was used primarily as a dining hall. The meals were served "family style," delivered from the kitchen on big platters to tables full of diners. The Boarding House is fondly remembered for its good food by those who ate there, and stories are told about the huge meals consumed by the miners, mill workers, and truck drivers who frequented it. Workers also bought sack lunches, to carry to work with them, from the Boarding House.
The Boarding House is also remembered for a small basement room in which several men gathered regularly to play poker. And for many years single men took rooms in the upstairs portion of the Boarding House. Eventually, however, the company ended that convenience because "there were things going on up there that shouldn’t have been going on." In 1960 the Boarding House survived a recommendation that it, along with the adjacent bunk houses, be demolished and replaced. Some considered the buildings "fire traps."\(^{34}\)

Of course, Uravan also had a store, the San Miguel Trading Center. It functioned not as an old-fashioned company store, but as a small town general store in the classic sense; the store management offered customers groceries, dry goods, appliances, furniture, hardware, and work clothing. What the store’s proprietor did not keep on hand, he could usually order, and for the Christmas season he stocked toys. The store’s owner also allowed customers to purchase on credit, billing them at the end of each month.

Pete Peters operated nearly all of Uravan’s business establishments. Before the Uravan renaissance in 1949, Peters owned an interest in the Fremont Trading Company, a partnership that operated a store and hotel in the company

\(^{34}\)Interview #28; J. F. Brenton to J. L. Lake, 18 February 1960, Company Houses and Land, General file, drawer 7 UaZ, room 126, Umetco Records.
town of Climax, Colorado. Fremont won the contract to run Uravan's store, and Peters took responsibility of his company's interests in Uravan. Almost immediately, the Fremont partnership formed the San Miguel Trading Center (SMTC). Eventually, Peters owned complete interest in SMTC. Although Peters spent a considerable amount of his time tending his businesses in Uravan, he lived in Grand Junction.35

Union Carbide negotiated, and through the years amended, separate contracts with Peters for each of his enterprises. Peters rented most of the buildings, the gas station, general store, drugstore, and tavern, from the company for a certain percentage of the sales from each. The company allowed Peters use of the Rec Hall to show movies, specifying only that he pay for janitorial service. Peters also maintained the company's swimming pool, under a contract that repaid him his costs, and paid him a certain percentage of those costs.

Peters was a shrewd businessman; his training, he said, came during the Depression, when a person learned to "stay on his toes." Then, if a person did not learn his trade well, "there was a hundred men behind you that would take your place."36 Peters knew how to take advantage of opportunities, even in a small place like Uravan.

35Peters interview.
36Ibid.
For example, in the late 1950s Union Carbide’s managers explored the possibility of obtaining a pharmacist for Uravan. Naturally, Peters offered to hire one for the drugstore. But it was not at all clear that a pharmacy would pay for itself, given the small population base in which it would operate. Therefore, Peters proposed that he be allowed to sell packaged liquor from the drugstore, as well. The increased revenue from selling liquor would compensate for any loss on the sale of prescription drugs. The company approved his proposal.\(^{37}\) (In 1954 the Montrose County Commissioners denied Peters a liquor license, but they granted him one in 1958.)

Peters also proved a tough negotiator, and on a number of occasions he won Union Carbide over to his position. SMTC began to experience financial troubles in the early 1960s, as the downturn in the uranium industry negatively affected SMTC’s income. Because there were fewer miners and mill workers in the West End, Peters sold less from his store, boarding house, tavern, gas station, and drugstore. Union Carbide found itself in a bind, as well; in 1962 the company denied its employees a wage increase because of fiscal restraints. A company official hopefully, if somewhat naively, suggested to Peters that he should expect

\(^{37}\)Ibid.; A. C. Sada to H. K. Jackson, 10 February 1958, and Confidential Letter, 28 February 1958; both documents from San Miguel Trading Center, Store, Boarding House file, Contracts and Leases drawer 4 UaZ, room 126, Umetco Records.
and accept "a cycle of reduced profits," just as the company had. Peters rejected the suggestion. \(^{38}\)

The first matter the two parties discussed was the Boarding House. This operation never made a profit; the company wanted it run at cost, as a benefit to the people of Uravan and the West End. SMTC's margin of profit came from its other operations. That arrangement suited Peters fine; for him, the Boarding House represented the "best advertising that we had at Uravan." But in the early 1960s the Boarding House began to lose money. Union Carbide officials reluctantly agreed to allow Peters to raise prices for rooms and meals at the Boarding House, the first such increase since the prices were set in 1950. \(^{39}\)

Then Peters experienced "financial difficulties" with his other enterprises, which were supposed to show a profit. In 1964 he tried to convince Carbide that he could not continue to operate under the terms of his contract. Peters wanted the company to reduce the percentage of his sales that he paid in rent. Initially, Carbide officials refused to compromise, so Peters informed them that he would have either to "reduce the scope of our services," in order to make his operations more efficient, or he would have to close down his businesses. Faced with this ultimatum, Union

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\(^{38}\) O. J. Malacarne to L. P. Twichell, 13 April 1962, San Miguel Trading Center, Store, Boarding House file, Contracts and Leases drawer 4 UaZ, room 126, Umetco Records.

\(^{39}\) Ibid.; Peters interview.
Carbide officials agreed to rework the contract, and Peters stayed in business. 40

Finally, in 1966 Peters claimed continued financial losses on the operation of the Boarding House and the pharmacy. His other businesses, he wrote, could "no longer support" the Boarding House. The pharmacy was not "self-supporting," because of "the reduced number of people in the Uravan area" who used the pharmacy. Furthermore, Peters had trouble finding a pharmacist who wanted to live in Uravan; to attract one, Peters would have to "increase the salary by two to three thousand dollars a year." Faced with these difficulties, Peters asked for, and received, a direct subsidy from Union Carbide. Beginning in 1966 the company paid SMTC $225 per month, "so long as a licensed pharmacist is maintained in the Uravan drugstore." Union Carbide also paid the San Miguel Trading Center $500 per month "for operating the Uravan boardinghouse." 41

From these examples one should not assume that the relationship was one sided, that Peters took advantage of Union Carbide. When they negotiated the contracts, Carbide


41Peter H. Peters to H. K. Jackson, 18 February 1966; C. P. Martin to P. H. Peters, 13 February 1976; both documents from San Miguel Trading Center, Store, Boarding House file, Contracts and Leases drawer 4 UaZ, room 126, Umetco Records.
officials had at hand SMTC's financial records. It would seem unlikely that Union Carbide tolerated cozenage or duplicity. The deals agreed upon by Union Carbide reflect, rather, the cost of business in the West End. Uravan's slim population precluded the high volume sales that a grocer or druggist needs. Union Carbide officials demonstrated their desire to provide certain services and conveniences for the people of Uravan. Instead of paying to maintain the pharmacy and Boarding House, the company could just as easily have allowed those businesses to close.

Carbide opposed "any changes that would increase the cost of living of our employees." For twelve years, from 1963 to 1975, meals at the Boarding House cost an average of $1.17, and single rooms at the bunk houses cost $4.33 per week. (Bunk house residents could buy meals for $2.50 per day.) In 1975 the cost for meals at the Boarding House increased to an average of $1.47, and single rooms in the bunk houses increased to seven dollars per week.\(^{42}\)

Union Carbide also monitored the prices for groceries at the general store. In 1962, and again in 1964, a company representative compared the prices for groceries at four outlets: one in Naturita, one in Nucla, the San Miguel Trading Center, and a market in Grand Junction. His survey

\(^{42}\)O. J. Malacarne to L. P. Twichell, 13 April 1962, and James D. Hainey to Union Carbide Corporation, 20 June 1975; both documents from San Miguel Trading Center, Store, Boarding House file, Contracts and Leases drawer 4 UaZ, room 126, Umetco Records.
showed the cost of eighty-four different grocery items, and the total cost of those items. In both years SMTC had the lowest prices; in 1962 the three other stores in the survey charged, on average, 1.9 percent more for the same items, and in 1964 the other stores charged, on average, 2.8 percent more. It should be noted that this price comparison did not include figures from the big chain grocery stores in Grand Junction. Those stores generally sold goods for less than an independent, small town market. According to Peters, Union Carbide also surveyed the prices for groceries at chain stores and found them only two percent below the prices charged at the San Miguel Trading Center.43

Union Carbide’s mission to provide for the needs of its employees extended to medical care. The company equipped a clinic, and paid a salary to a doctor and nurse. For this salary the doctor conducted yearly physical examinations for all company employees, and tended to accidents in the mines or the mill. The company required only these basic duties of its doctor, and allowed him to establish his own, independent practice, on which the company placed few restrictions.

The clinic was well equipped; the company bought medical devices that many small town clinics do not have.

43Study of Grocery Costs in Uravan Area, 20 February 1964, San Miguel Trading Center, Store, Boarding House file, Contracts and Leases drawer 4 UaZ, room 126, Umetco Records; Peters interview.
The company also kept an ambulance, but reserved it for mill and mine accidents. Uravanites, like other West Enders, used the Nucla-Naturita ambulance service when they needed emergency medical attention in Grand Junction or Montrose. As late as 1969 an "ambulance card" cost West Enders only five dollars per year. With the purchase of a card, a person paid nothing when he or his family member required the ambulance service. Without the purchase of a card, the ambulance service charged a person twenty cents per mile for the emergency trip.\textsuperscript{44}

Usually, Union Carbide employed very good doctors; most of them were well regarded by Uravan residents, and even by Nuclans and Naturitans, who were welcome to visit Uravan's doctor. However, doctors did not always stay long at Uravan, and Carbide officials spent a lot of time recruiting and persuading physicians to establish a small town practice. This proved a difficult task at times, because good doctors gravitated towards bigger towns that offered bigger and better medical facilities. On two occasions Uravan residents found themselves in the care of what one man called "the outcasts of the medical community." These two doctors, one a "drug addict" and the other a

\textsuperscript{44}Interview #18; "Ambulance Fund Drive Starts," \textit{Forum}, 21 August 1969, p. 1.
"psychopath," were as infamous in Uravan as other doctors were esteemed. The company had to fire both of them.\textsuperscript{45}

The company provided its town with a deputy sheriff, through an agreement with the Montrose County Sheriff’s Office. Throughout Uravan’s history a deputy lived in the town, in a house rented to him by Union Carbide. A volunteer fire department, equipped by the company, served the town. Uravan’s mill operated continuously; at any given time there were on duty mill workers who were trained and ready to respond to a fire.

The Uravan Community Church was an important part of the lives of many residents, and one only minimally affected by the company. In the 1950s a group of Uravanites formed this non-denominational Christian Church. In the early years the group relied on lay ministers, or pastors who came to Uravan from other towns. Eventually, they contacted Village Missions, an organization designed with the goal of "ministering to the spiritual needs of the rural and suburban communities of North America." When the Uravan Community Church needed a pastor, Village Missions sent one of its missionaries. The community was expected to provide the pastor’s salary and to tithe a small amount to Village

\textsuperscript{45}Interview #18; Interview #30.
Missions. However, if the community had trouble providing for the pastor, Village Missions contributed.\textsuperscript{46}

Village Missions sent a steady stream of missionaries to Uravan; from 1957 to 1980 the town was served by ten different pastors. Dedicated as these men must have been, few stayed more than a one to two year period. The town had three pastors who stayed for two to three years, and one particularly steadfast missionary who remained for nearly four years. This man still serves Village Missions, in the position of chief executive officer.\textsuperscript{47}

In 1961 the Uravan Community Church membership consisted of nineteen families, but Sunday attendance averaged about 150. Uravan's Catholics went to a Catholic Church in Nucla, and there was a newly built Mormon Church in Naturita. In Uravan in the early 1960s there was a small number of people who belonged to the Congregational Church, which was served by a minister from Nucla. A smaller number belonged to the Episcopal Church; they met informally, once a month, and were served by a minister from Grand Junction.\textsuperscript{48} But in Uravan it would have been difficult to


\textsuperscript{47}Information provided to the author by Village Missions, Dallas, Oregon.

\textsuperscript{48}F. Willis Dale to O. J. Malacarne, 9 May 1961; O. J. Malacarne to A. C. Sada, 8 August 1961; both letters from Uravan Community Church file, Contracts and Leases drawer 4 UaZ, room 126, Umetco Records.
maintain a church; because of the town's small population, the Episcopal Church, for example, simply did not have enough members to conduct regular services. Also, there was a certain amount of turnover in Uravan; a small congregation might be ruined when some of its members moved from town. The Uravan Community Church, apparently the most suitable to the greatest number of people, remained the biggest in Uravan.

Union Carbide's involvement in the Uravan Community Church extended only as far as allowing the group to use the Recreation Hall and providing a house for the pastor. In the early 1960s the Community Church asked the company to donate land on which the congregation would build a church. The plan was never carried out, however, perhaps because company officials feared that such a move would be taken as a show of support for one group over another. If the company granted land for the church, there would be "no end to the requests for space to build churches." The company preferred a building to which all groups had access. 49

Union Carbide's involvement in and control of other aspects of its community--concerning housing, town maintenance, its business establishments, and its medical services--fit a certain model for company towns. The

49 Unsigned memorandum, Union Carbide Nuclear Company, 28 July 1961; O. J. Malacarne to A. C. Sada, 8 August 1961; both documents from Uravan Community Church file, Contracts and Leases drawer 4 UaZ, room 126, Umetco Records.
historian James B. Allen, in *The Company Town in the American West*, discovered that most company town managers charged low rents for company-owned houses and provided some type of health care for the community. Union Carbide's lease agreements with the San Miguel Trading Center also fit the pattern of modern company towns; in the latter half of the twentieth century company town managers increasingly removed themselves from mercantile operations, and allowed independent companies or individuals run the business establishments.50

Historians coined a convenient term for the type of management found in company towns: paternalism. The word describes a system of management or government whereby those in charge behave like a father towards his children. The father, or the company, provides for, protects, nurtures, and disciplines his children, or the company's employees. More useful, perhaps, is a dictionary definition: "a relation between the governed and the government, the employed and the employer, etc., involving care and control suggestive of those followed by a father."51 As we have seen, Union Carbide provided care and exercised control to a degree that one might call paternalistic.

But the term is distasteful, fraught with negative implications. According to Allen, "it connotes a type of

50 Allen, *Company Town*, 89, 95-97, 138-139.

51 Quoted in Allen, *Company Town*, 122.
company control destructive of personal liberty."  

Under a paternalistic system, the thinking goes, the governed lose their initiative, become dependent on the benevolence of some authority, and end up working not for themselves, but for the benefit of those in charge. The word implies a relationship in which the governed cannot adequately provide for themselves. And, it suggests that something is expected from the governed: undue loyalty, obedience, and adherence to a set of rules. Historians also describe communist systems of government as paternalistic.

These negative aspects of paternalism would seem an extreme way to characterize the administration of Uravan, at least to most of those who lived in the town. Yet, one man, a salaried employee, viewed the company-owned town in just such a light.

Literally Uravan itself is a dead end for the salary people. We come because the salary and work seem interesting. We work to make more profit for the company, and at the end our future lies in a promotion to Valhalla (Grand Junction) or to the Holy of Holies (New York). I would classify Uravan as a relatively normal but not lavishly constructed company town which has no visible means of support. The "company" giveth and the "company" taketh away blessed be the profits for U.C.N.C. [sic] . . . The company man and the person who can tolerate being a little bit socialistic (company socialistic) are the type who like Uravan.

\[52\] Ibid.

\[53\] Memorandum on Housing and Employee Facility Problems.
This lament may reflect only the frustration of a single disappointed man. It is true that Uravan existed only to profit the company, and that everything done by the company at Uravan was designed, in some way, to increase the profits. But all companies operate in a similar manner, and profits are always the bottom line.

The opinion cited above may also reflect a philosophical opposition to a situation in which a person feels more beholden to the company than he thinks appropriate. Undoubtedly there were others who resented having to ask the company for permission to move into a different house, who disliked calling the company to make repairs to their houses, who took offense at the many rules issued by the company, who did not want to rely on the company to pave the streets and hire a doctor, who objected to the idea that the company would decide the hours during which the tavern remained open. One might imagine that certain people, those who wanted to involve themselves in town government for example, would not have appreciated life in a company town. It may have been dissatisfaction of an ideological sort that prompted another man to write, as a partial explanation of why he left Uravan, "I'm just not sold on company towns!"54

54Employee’s Termination Survey 1962-63-64 file, Uravan Purchasing 1962 drawer, room 126, Umetco Records. The company always had a high rate of turnover in the mining department; these twenty-four letters, each addressed to a "Dear Former Employee," represented the company’s attempt to
It should be noted that Union Carbide refrained from the more egregious forms of paternalism. The company never forbade its mill employees from organizing a workers union, nor from using company property to hold union meetings. The company certainly did not attempt to tell its employees how to vote, and no one felt pressure to shop for high cost goods at company-owned business establishments. In an earlier day, company town managers often practiced such coercion.55

The most obvious, negative consequence to life in Uravan was that residents had no opportunity to own houses or property in the town. It must have been unsettling for employees who, upon retirement, found themselves without the home they had occupied for so long. Many former residents remember that some people encountered problems when they left Uravan, because they had not planned adequately, had not saved enough to invest in a house somewhere else. One might reasonably assume that the restriction on home ownership made Uravan undesirable to a lot of people.

Some residents remembered others who grumbled about excessive company control. The company required that fences be built in a certain way, although the company also provided the materials for the fences. Also, the company

55Allen, Company Town, 121-123, 131-132.
painted the outside walls of the houses in colors of the company's choosing. Such control, however, hardly represents a gross infringement upon individual freedom, and probably few residents regarded it as such.

Most of those who lived and worked in Uravan for a number of years embraced what the historian Allen called a "positive" sort of paternalism, a system that benefits both the company and the workers. Allen pointed out that workers who paid very little rent had the unusual opportunity to save money for their retirement. Union Carbide relied upon workers who enjoyed small town living; by enhancing the community, the company was able to attract and retain, to its benefit, those types of workers. The company's efforts helped to make "isolation not the handicap one might suppose." After all, not all small communities of eight hundred to one thousand inhabitants can afford an olympic sized swimming pool, or realize the benefit of a pharmacy.

Uravan's long-time residents express a deeply felt appreciation for Union Carbide. Most would agree with the man who said, "The company went out of its way to make things decent." They speak of the benefits provided by the company, with no hint of resentment over company control. In fact, they realized that the company's policies

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56 Interview #24; Interview #21.
57 Allen, Company Town, 123-124.
58 Interview #22.
were necessary to the system in place. Where else, one might ask, would the annoyance of a neighbor’s barking dog be so swiftly eliminated?

The conditions under which Uravan existed distinguished the town in other ways, as well. Except for the younger generation, everyone came to Uravan from somewhere else. A person’s extended family—grandparents, uncles, aunts, cousins, and even brothers and sisters—usually lived elsewhere. Uravan had no retired, respected elders living within the community, and no cemetery, a sure symbol of a community’s permanence. Thus, some may have had trouble thinking of Uravan as "home," or as anything more than temporary. The town’s dependence upon a single industry, and the markets that controlled the industry, may have caused some to question the town’s potential longevity, and to question their own future in that town. It is interesting, however, that few former residents mention such things as signs of Uravan’s instability, or as a negative consequence of living there. Most, it seems, accepted the unusual conditions of life in the company town, and made the best of it. The threat of a collapse in the uranium industry must have been considered, but the industry had established a solid track record in the West End. Uravan residents took for granted that the mill would continue to operate; or, they simply chose to worry about other matters.

59 Interview #21; Interview #24.
Long-term residents structured their lives around the premise that their jobs were permanent.

If Union Carbide controlled Uravan, the company's mill complex dominated it. Several buildings, including a carpentry shop, warehouse, offices, and a laboratory, sat on the valley floor near the town. The mill itself was a collection of gray, metal buildings and structures, some built at the base of the mesa behind Uravan, others attached to the inclined surface of the mesa, and still more at the very top, a few hundred feet above the town. In the early years, when the mill was relatively small, most of it could be seen from town. Only the ore crushing plant stood atop the mesa. Over time the company expanded the mill, incorporating new technology along the way; eventually, most of the structures relating to the milling process were located on top. Thus, it looked in the 1950s like a "jumble of mill buildings has climbed out of the canyon." In 1980, however, the buildings appeared to "cascade down the ... ridge above Uravan."60

The complex process of extracting uranium and vanadium from raw ore involved several steps. Simply put, the ore went through a crushing and grinding process, ending up as fine particles of sand. It was then leached in big tanks with a sulfuric acid solution, which removed both the

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60 Lavender, One Man’s West, 315; Sheri Poe Bernard, "Uranium Travels Grim-Looking Path into 'Yellowcake,'" Daily Sentinel, 9 November 1980, p. 29.
vanadium and uranium. Union Carbide used so much sulfuric acid, about 5,900 tons each month, that the company produced its own. The acid plant, located on top of the mesa, was constructed in 1961.  

The resultant "pregnant liquor," the solution from the leach tanks that contained both uranium and vanadium, was drained to ion exchange columns, each of which contained 350 cubic feet of anionic exchange resin. About one thousand pounds of uranium collected on the resin in each column; the uranium was then "eluted," removed from the resin by a wash in an acidified brine solution. The product from this process, the "eluate," was then pumped to an area of the plant called "yellowcake precipitation." The uranium was precipitated by heating the solution and adding ammonia. This precipitate, now called yellowcake, was then "filtered, washed, dryed, [sic] calcined, and finally drummed." 

Meanwhile, the solution containing the vanadium went through a solvent extraction circuit. During the early part of Uravan's history, the mill produced a finished vanadium product. In later years the Uravan mill produced a vanadium "liquor" that was shipped to the company's Rifle mill for further processing.

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The men who performed the various mill tasks—and they were all men for a long period of time—carried job titles that must have been informative to those intimate with the mill operation: SX operator, IX operator, B-Leach operator, B-Thickener operator, Aerofall operator, sample bucker, and Yellowcake operator. Other classifications would be more understandable to non-initiates: ore receiver, maintenance mechanic, plumber-pipefitter, maintenance carpenter, acid operator, machinist, dozer-shovel operator, dockman, and truck driver. The company also hired carpenters, painters, auto mechanics, and, of course, laborers. The last job title on this list was one generally avoided, but, like the flat top apartments, one that many people occupied for at least a short period of time.

Because of the tremendous amounts of chemicals used in the mill, the work was potentially hazardous. The presence of heavy mill machinery, trucks, forklifts, and hoists added to the potential. Accident reports from the late 1950s and early 1960s illustrate the nature of accidents in the mill: there were several cases of burns, some caused by acid, others caused by an overflow of a red cake precipitation tank and hot yellowcake dropping from a dryer onto a man’s arm. One man received a dose of steam and ammonia full in the face when a valve broke. He saved his vision with the use of safety glasses. Another exposed himself to too much vanadium; that caused "vanadium toxicity," a severe
congestion of the lungs. Once, three men tried to empty a barrel of sodium sulfhydrate into a "green sludge precipitation tank"; fumes overcame the three, one of whom fell down a flight of stairs. In the Aerofall Mill a small fire erupted, traced to an accumulation of lubricant under a piece of machinery. At the ore receiving bin a contractor's truck rolled, apparently unattended, off the bin and into a company truck. On two occasions a forklift overturned because of operator error. Twice the operators of crane hoists experienced mishaps, once when the boom of the crane hit a power line. Mill workers suffered cases of back strain and sometimes hernias caused by exertion, and once a man broke his ribs in a fall. On three occasions in Uravan's entire history, dating to 1936, men died in mill accidents.

Despite these distressing incidents, former mill workers maintain that theirs was not a dangerous occupation. They do not discount the hazards, but speak with the confidence of men who knew their jobs well and knew how to avoid accidents. Most accidents, employees suggested, resulted from an individual's lack of attention to

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63 1958-'59-'60'-61'-62-'63 Accident Reports, Uravan file, Ura-V033 drawer, room 126, Umetco Records. This file appeared complete. If so, there were fifty accident reports between May of 1958 and July of 1963. Many of them resulted in no, or only minor, injuries to workers.
prescribed procedures and safety rules. A reading of the company's accident reports confirms their opinion.

The workers' attitudes also reflect the sincere belief that Union Carbide's management placed a priority on their well being. Said one, "They put safety first, and we really got to feeling that they meant it. It wasn't just production first and safety second, but it was safety first." Another man remembered that, "from the top management clear down," everyone "put a lot of effort into safety."  

The company employed a safety engineer who instituted and coordinated various programs. For example, there were frequent and regular safety meetings. These served not only to stress the point, but also to provide information regarding new chemicals or processes in the plant. The company also provided first aid training to the mill crews. The company attempted to "sell safety to employees" through various types of training and education.

Company representatives investigated each mill accident, and in their reports recommended the means by which to fix the problem or to avoid the situation that precipitated the accident. Union Carbide installed certain

64 Interview #23; Interview #3.
65 Interview #7; Interview #38.
equipment, like fire extinguishers and emergency shower heads, in the mill. The company expected mill workers to wear steel-toed boots, as well as other protective clothing designed for certain jobs or certain areas of the mill: safety glasses, hard hats, gloves, ear plugs, and respirators. In the case of an accident, Uravan's doctor was never far away; in one instance, he arrived on the scene within five minutes. Another time, an injured man was in the doctor's clinic within nine minutes. 67

That safety measures were paramount at Uravan may been seen in the company's newsletter, the USV Photo News (later called the UCN Photonews). The company used this bimonthly periodical to emphasize the importance of safety, not only in the work place, but also at home and while driving. The newsletter contained articles, tips, reminders, and cartoons that reinforced the safety message. As announced in the pages of the company newsletter three Uravan workers formed the charter membership of the "Wise Owl Club," a select group of men "whose eyesight has been saved by the use of safety goggles on the job." Within a few years at least three more had joined the club at Uravan. 68

67 1958-'59-'60-'61-'62-'63 Accident Reports, Uravan file, Ura-V033 drawer, room 126, Umetco Records.

The company’s efforts in this matter paid off. Some mill crews took great pride in maintaining a good safety record. A man intimate with Union Carbide’s program boasted that his company established a record far better than those of other uranium mills. He further claimed that "we won national recognition for our safety from the National Safety Council several times." That organization gave its "Award of Merit" to the Uravan mill in 1961, for 710,000 man hours of accident free operation. In 1964 the Uravan mill celebrated "the best safety record of any mineral industry in the state of Colorado." 69

One of the distinguishing aspects of mill work in Uravan was the shift schedules followed by many employees. Because it never shut down, Union Carbide provided for three shifts of operators to attend the mill. The day shift worked from 8 a. m. until 4 p. m. The swing shift worked from four o’clock until midnight; at that time, the graveyard shift took over and worked eight hours. For the sake of fairness, the mill crews rotated shifts; each crew worked one week on each of the three shifts.

Typically, a mill crew worked seven days on the swing shift, from Tuesday until Monday, four o’clock to midnight each day. There followed two days off, or exactly fifty-six

69 Interview #3; "Emphasis on Safety," UCN Photonews 50 (Second Quarter 1961): 6-7; F. W. Wyatt to All Mill Employees, 27 May 1964, Parties, Company, etc. 1964 file, Uravan Purchasing drawer, room 126, Umetco Records.
hours, because the swing shift ended on Monday at 12 p.m., and the crew returned to work on Thursday at 8 a.m. Then, the crew worked seven day shifts in a row, until the next Wednesday. There followed only one day off, a period of time known as "short change"; thirty-two hours later, at 12 p.m. on Thursday (Friday morning), the crew reported for graveyard shift. The crew worked seven straight graveyard shifts, from Thursday to the following Wednesday, 12 p.m. to 8 a.m. each day. At this point, the crew might need a respite, and the schedule makers allowed for one. The crew received four full days off, Friday through Monday. But this time period, known as "long change," actually consisted of 128 hours. The crew left work at eight o'clock in the morning on Thursday, and returned to work for the swing shift at four o'clock in the afternoon on the next Tuesday (see Table 3, on the following page).

In 1976 thirty-two hourly employees, out of a total of 116 in Uravan, followed the rotating shift schedule outlined above; eight foremen also worked this shift schedule. During each twenty-eight-day period, the men on this particular shift worked twenty-one days and had seven days off. During three out of four weeks, mill crews worked forty hours per week. During the week of "short change,"

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70Operations Schedule, Shift Schedules file, drawer 290 UaZ, room 126, Umetco Records.
Table 3.--Operations Schedule for Mill Operators, Uravan Mill, 1975-1976

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O = Off
D = Day Shift, 8 a.m. to 4 p.m.
S = Swing Shift, 4 p.m. to 12 p.m.
G = Graveyard Shift, 12 p.m. to 8 a.m. The Graveyard Shift actually began at 12 p.m. the previous day. Thus, the Thursday Graveyard shift began at 12 p.m. on Wednesday, and the workers left at 8 a.m. on Thursday morning.

Each of these mill crews, designated here as A, B, C, and D, consisted of two shift foremen and eight mill operators.

however, each man put in forty-eight hours. Of course, the mill workers received overtime pay for hours worked in excess of forty per week. They earned holiday pay, two and one-half times the normal rate, for hours worked on major holidays.\footnote{Interview #30.}

Other crews followed different shift schedules. The Ore Receivers, Sampler Operators, Sample Buckers, and Yellowcake Dryer Operators worked ten days consecutively on the day shift. After four days off they returned to the mill for ten consecutive days on the swing shift. They got another four days off before returning to the ten-day period of day shifts. These crews, consisting of ten employees in 1976, worked no graveyard shifts. The three people employed as "Utilityman" worked a schedule that consisted of graveyard and swing shifts only.\footnote{Ore Receivers, Sampler Operators, Sample Buckers, Yellow Cake Dryer Operators (schedule); Utilityman Shift Schedule; both documents from Shift Schedules file, drawer 290 UaZ, room 126, Umetco Records.} Some employees, the carpenters, mechanics, electricians, warehouse, and lab employees, worked strictly days.

But those individuals who accepted the jobs with rotating shifts, especially those with graveyard shifts, faced an unusual burden. Some adapted to the schedule; most, it seems, disliked it, but accepted it as part of their jobs. Some hated it, but tolerated it for many years.
Others hated it and left Uravan. As a source of discontent, as a reason many people left Uravan after only a short period, the rotating shifts and the graveyard shift ranked high.\textsuperscript{73}

Union Carbide recognized the problems associated with the mill’s shift rotations. Not only were employees dissatisfied with the peculiar hours, the shift schedules presented a safety concern. The managers at the mill realized that an employee who changes his sleep pattern every week may not be in the highest state of mental and physical readiness when he comes to work. It was once proposed that crews work for more than one week on each shift. For example, a crew might work for a month, or even two months at a time, on each shift. This would give a person the opportunity to adapt to a new schedule. But the idea never caught on with the employees themselves. Apparently, enduring one week of the graveyard shift was difficult enough. "When it came down to a vote, [the workers] got to thinking about that month on the graveyard, and they voted it down."\textsuperscript{74}

The redeeming feature of Uravan's shift schedules was the four days off known as "long change." Many of the men in Uravan indulged their passion for hunting or fishing during long change. A family could use the time to go to

\textsuperscript{73}Interview #30; Interview #24.

\textsuperscript{74}Interview #3; Interview #10.
Grand Junction or Montrose, for shopping or business. A person might schedule his vacation time to coincide with his four days off, thereby gaining a longer vacation. Or, the mill workers simply enjoyed more time with their families. Generally speaking, the long change made the graveyard shifts worth while.

An employee who found himself on a mill crew that worked rotating shifts had the opportunity to "bid" on other jobs. Following the agreements between Union Carbide and the workers' union, the company posted all hourly job openings. Any worker who so desired submitted his application for that job to the company, and company officials decided whom to hire based upon the applicants' qualifications.

Uravan's workers organized in 1950, shortly after the town and mill reopened. Reportedly, Union Carbide opposed unionization, though not strongly enough to dissuade the workers. The company successfully opposed the unionization of Uravan's Laboratory employees and Metallurgical Technicians. This was a group of workers, fourteen of them in 1960, classified as nonexempt salaried. The company paid the nonexempt personnel a salary based on an eight-hour day and forty-hour week. But the company paid these employees overtime for any excess hours, and the nonexempt personnel carried no supervisory responsibility. Union Carbide's warehouse employees and office personnel, also classified as
nonexempt salaried, were also not organized. Even the mine workers declined the opportunity to form a bargaining unit.

Thus, only the mill workers belonged to a union. For many years, membership among those employees was nearly complete, and union members were well satisfied with their organization. The workers, it seems, appreciated having the details of their working relationship spelled out in the labor agreements. For example, the union protected its members from arbitrary or unfair management decisions by negotiating a grievance procedure. This allowed management and labor to settle disputes in an orderly manner with both sides represented. The labor agreements also assured the fair distribution of overtime hours, and the opportunity for mill workers to bid on other jobs. These provisions, and many others, allowed the workers more control over their working conditions.

By all accounts the relationship between management and labor was genial, although one union man qualified this characterization by adding, "as far as unions and companies are concerned." He claimed a "great deal of respect for the company officials," and noted that "most of them had respect, or at least they said they did, for the union." Perhaps company officials were sometimes reticent, but they did, indeed, appreciate the union. A supervisor at the

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75 Interview #7; Interview #32.
76 Interview #15.
mill put it this way: "You'll not get many of them to admit this, but I think a good share of the immediate supervisors, from the superintendent on down, were in favor of having the union there." Because of the union's influence, he maintained, the mill ran in a more efficient, orderly, and safe fashion. Each employee was trained for and assigned to a certain job, and the company never pulled a man off one job to put him on another. Likewise, the mill supervisors, except in the case of emergencies, never performed the work intended for mill operators. Another salaried employee agreed that the union promoted the company's goals; because "management knew exactly what to expect from labor," fewer misunderstandings arose. The grievance procedure benefitted the company because it helped keep to a minimum the lingering frustrations caused by unresolved differences.\textsuperscript{77} The union also cooperated with company officials on the safety issues that were so important to them.

Only once in Uravan's post-war history did the differences between union and management become intractable. In the early part of 1965 Uravan's union members felt they deserved a raise greater than what Carbide offered during the negotiation of a new labor agreement. The union voted to strike, and it began on 1 March 1965. The strike idled 110 workers at Uravan, and 105 workers at Union Carbide's

\textsuperscript{77}Interview #5; Interview #22.
Rifle mill. The company negotiated the same agreement with both groups.\textsuperscript{78}

For three weeks, the Uravan mill produced no vanadium or uranium. Supervisors maintained certain parts of the mill--they kept the pumps running, for example--to keep it clean and free of damage. The union granted the company's request that a plumber and an electrician remain available to fix any problems that arose in the town. A few mill workers wanted to stay on the job, but the supervisors forbade it. The warehouse continued to receive shipments, because those workers were not on strike.\textsuperscript{79}

The strikers set up a headquarters at the basement of the boarding house, and a picket line at the entrance to the mill. They allowed miners into the warehouse to pick up supplies. However, they refused to let ore haulers into the mill to stockpile their ore. If a trucking company had insisted on crossing the picket line, the strikers would have allowed it, but the ore haulers respected the strikers' position.\textsuperscript{80} It would have been possible to stockpile the ore at the Uravan mill, although it is not clear that the mill supervisors would have attempted to deal with a great influx of ore.


\textsuperscript{79}Interview #5; Interview #7.

\textsuperscript{80}Interview #15.
The tone of the strike was decidedly low key; it even reflected some of the small town pleasantness that characterized Uravan. No one made any threats, and some of the supervisors stopped to chat briefly with strikers as they crossed the picket lines. One mill worker remembered, "We didn’t carry guns, we didn’t carry ball bats. What we carried was a deck of cards to play cribbage." The men brought in cakes and pies from home and sat around drinking coffee. However, some of the strikers began to feel "awful nervous and wringy before the thing ended." 81

Despite the strike, and the presence of a federal arbitrator, the company refused to meet the union’s demands. After three weeks, the two sides reached a compromise. Instead of a raise of five to seven cents per hour, as originally proposed, the company gave the workers six to eight cents per hour. Union members realized they had gained virtually nothing. One man complained that the union was not strong enough. He believed that, during the strike, the picketers should have stopped all incoming deliveries, and that the union should have made no concessions. But, for the most part, the workers were satisfied with the outcome. In the years following the strike, bargaining with the company was easier, and the workers "got real good raises without even much negotiation." Any radical action

81 Interview #7; Interview #15.
during the strike could have caused irreversible harm to the relationship between union and management. 82

One cannot easily summarize the entire thirty-five year relationship between Uravan's workers and management. During those years the attitudes, goals, and philosophies on each side varied from year to year. What may have been important during one bargaining session may not even have been at issue during another. The opinions of one group toward the other probably evolved over time. Discussing the strike, a union member recalled the tension and frustration that existed among the workers at that specific time: "Union Carbide was just like any other company. They're only going to give you what it takes to satisfy you, one way or the other." It is worth noting, however, that in a long, candid interview, the same man made a contradictory statement. Concerning concessions made by the company to the workers, he said, "I always felt that Union Carbide would go one step further than halfway." 83 In both cases, one cannot doubt his sincerity; he enjoyed a long, productive career at Union Carbide.

Notwithstanding the reason for the strike of 1965--namely, the rates of pay--former Carbide employees felt that their pay and benefits were good. That is, they do not complain about their pay, and they do not mention it as one

82 Interview #43; Interview #15; Interview #7.

83 Interview #7.
of the reasons that people may have disliked working in the mill. Likewise, retired employees appreciate their pensions; while working, they had the opportunity to invest in a company savings plan, to which the company contributed. Employees received two weeks of paid vacation upon the completion of one year of service, and an extra week of paid vacation after five, ten, twenty, and thirty years of employment. 84

The staff personnel at Uravan, classified as "exempt salaried," consisted of men who worked in both the mining and milling operations of Union Carbide. The company employed a plant superintendent, who coordinated the entire Uravan operation, including the administration of the town. Responsibility for the operation of the mill itself fell to the mill superintendent. Also at the mill were a plant engineer, safety engineer, instrument engineer, plant metallurgist, chief chemist, and personnel manager. Through the years, job descriptions and job titles changed. By the 1970s Carbide employed an environmental coordinator, a B-Plant superintendent, an area superintendent, and, instead of a personnel manager, an administrative supervisor. The operation of the mill also required shift foremen, mill foremen, maintenance foremen, a storeskeeper, and a master

mechanic. In 1961 thirty-five to thirty-eight exempt salaried personnel worked at Uravan in the mill department. In the mid-1970s there were approximately thirty.\textsuperscript{85}

The salaried positions in the Uravan mining operation included a mine superintendent, chief engineer, chief geologist, production engineer, safety engineer, and ventilation engineer. The company also employed shift foremen, a drill foreman, geologists, and surveyors. In the early 1960s the mining department at Uravan employed about forty staff members. Shortly thereafter the number decreased to a range of approximately twenty-five to thirty; by 1980 there were only nineteen.\textsuperscript{86}

Often the company's salaried personnel transferred to Uravan from other divisions or companies in the vast organization of Union Carbide Corporation. Such a transfer involved a move from as near as Rifle, Colorado, or from as far away as New York, California, Kentucky, or West Virginia. Union Carbide's Colorado Plateau Operations office, within the corporation's Metals Division, was

\textsuperscript{85}Uravan Milling Operations, Monthly Manning Reports 1961 file, IRD Correspondence 1-61 to 12-61 drawer, room 126, Umetco Records; Personnel Reports, January 1974 and January 1975; from 1974, 1975, 1976 Employee Relations Files drawer, room 126, Umetco Records.

located in Grand Junction. That office administered a network of mining and milling operations in the western states. The company also recruited recent college graduates and people with experience in companies independent of the Union Carbide organization. Consequently, the staff personnel, unlike the hourly employees, were often unfamiliar with southwestern Colorado, and unaccustomed to life in a small town like Uravan.

Uravan acquired the reputation of a "training ground" for salaried personnel. Men would come in, absorb a few years of valuable experience at the Uravan mill, and then leave, transferred to another position at a different location. Sometimes, a person worked a few years at Uravan, took a transfer to another location, and came back to Uravan at a later date. "Assuredly," wrote one man, "that is why we came to Uravan, . . . to qualify for promotion." In his view the town suffered because of the turnover in the management positions. It led to a lack of "leadership" in the community.87

Despite the perception that Uravan functioned as a "training ground," there are many examples of men who served in staff positions for many years. This held especially true for the various foremen, who often acquired their

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87 Memorandum on Housing and Employee Facility Problems. The man who wrote this was the same who hoped for a "promotion to Valhalla (Grand Junction) or to the Holy of Holies (New York)." See page 203.
positions after several years of hourly work at Uravan. In 1976 most of the foremen in the mill had more than twenty years of experience at Uravan. But also in the positions that required more specialized training, the various engineers, metallurgists, chemists, and administrators, there are many examples of men who worked for ten years or more.

In the 1950s Uravan's plant superintendent noted that "the line of demarcation between staff people and Union people extends beyond the plant." It would be difficult, in Uravan, for the two groups to avoid one another. But this line of demarcation, he suggested, negatively affected Uravan's community spirit, stability, and social relationships. He was optimistic, however, that "like the ingredients of a good stew, relationships and community spirit improve with time and association." 88

The superintendent's prediction seems to have been accurate. Many people remember that during the 1950s class lines were more rigidly drawn than in later years. To one person it seemed as rigid as a military base; salaried employees lived in one part of town, the hourlys lived in another, and the two groups stayed separate. At that time, it has been said, company officials encouraged the

88R. D. Van Zante, "The West End of Montrose County has Grown Up," Uravan History file, drawer 2UaZ, room 126, Umetco Records. This appears to have been a presentation that, along with a film, was given at a West End social gathering.
supervisors to dissociate themselves from the mill workers. 89

Sometimes, the salaried personnel behaved in ways less than egalitarian. Reportedly there existed a "500 Club," the membership of which was open only to those who made five hundred dollars or more per month. 90 While this club may not have lasted long, many Uravanites remember that a few salaried people carried a condescending attitude toward the non-salaried workers. Undoubtedly, some mill workers harbored resentment that, for example, staff members received better houses.

Generally speaking, however, the community coalesced after the 1950s, when the work force began to stabilize. There were always certain distinctions; each year at Christmas the company staged a banquet reserved for staff members. (Some workers did resent that.) And, every Labor Day the union sponsored a picnic for its members. Some people mention that the "line of demarcation" existed more between the mining and milling departments than between the hourly and salaried employees. Two former residents, of different backgrounds and generations, mentioned that "cliques" formed in Uravan. 91 That the townspeople tended

89 Interview #18; Interview #5.
90 Interview #35.
91 Interview #35; Interview #2.
to associate with those with whom they had the most in common is no surprise.

Uravan's plant superintendent served as a mitigating influence in the relationship between the different groups. The townspeople had a good deal of respect for the superintendents, and they set the example, through their own attitude and actions, for social relationships in Uravan. By all indications, the company had very capable men who filled this position. The superintendent's wives also played a role. They often involved themselves in community activities, and in the process, worked to bring people together. 92

Another source of community cohesion came from those residents least likely to recognize a "line of demarcation": the children. Because they tended to associate with whomever they pleased, the children helped to "break down" the barriers that might have been erected by adults. There was in Uravan a high rate of participation in children's activities and organizations. The supervision of these activities, for the sake of the children, helped people come together as a community. 93

When talking about the community structure, many former residents mention the fact that, in Uravan, there were no unemployed people. This gave the town a certain vitality, a

92 Interview #21; Interview #7.
93 Interview #4; Interview #3.
"busy" atmosphere, and kept to a minimum the number of malcontents. There appears to have been little anxiety concerning the continued operation of the mill, and few who treated Uravan as only a temporary situation. On two occasions--once in the early 1960s and once in the early 1970s--the company reduced its work force. While these reductions no doubt caused some concern, they represent exceptions rather than a rule. Moreover, the layoffs affected only the least senior members of the work force. Thus, for most Uravan's history, the work force remained stable, and this gave the community a stable base.

There was no lack of community involvement in Uravan. Citizens held positions on the local school board and in the Uravan PTA, served as leaders in various scouting organizations, and instructed the local youth in such activities as swimming, archery, and shooting. People formed clubs of various kinds, and joined service organizations like the Lion's Club and the VFW, or served as officers in the workers' union. The more athletic minded joined a bowling league (at Nucla's bowling alley), men's softball and basketball teams, and women's volleyball teams. For many years Union Carbide sponsored a baseball team that played against other teams in southwestern Colorado. At one time the manager of the team felt obligated to announce that the Uravan club consisted strictly of amateur players. It fielded no one who received "pay for playing baseball," and
no one "under contract to a semi-pro club or professional team." It was widely concluded, however, that Carbide offered summer jobs to men who happened also to play baseball.

Long-time Union Carbide employees express a deep appreciation for life in a small town. Many of the men in Uravan pursued the easily accessible outdoor pastimes like hunting, fishing, and camping. Those who liked Uravan enjoyed their isolation, in which they created their own entertainment. They remember, not without some nostalgia, that for many years no one in Uravan had television sets; even after television became more common, in the early 1960s, the programming was so limited that television played only a minor part of daily life. They remember most fondly the friendships created among people with similar interests and goals, and fostered by the intimate nature of the small town.

The newcomer or visitor to Uravan sometimes had trouble understanding the residents' affinity for their town. A Union Carbide employee once told a school teacher that it was "worth quite a few hundred a month just to live in this area." Apparently, the teacher believed just the opposite, that she should receive "quite a few hundred a month" extra for enduring life in the West End.

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94 "To Whom It May Concern," *Forum* 12 May 1960, p. 5.

95 Interview #23.
Dissatisfaction may have been more common among the salaried employees, some of whom felt they deserved better than Uravan offered. Addressing the question of how the town could be improved, one salaried man complained that Uravanites shared an overly complacent attitude. He resented "the idea that since we live in the sticks we should act like it." As an example, he referred to the service station, which was surrounded by "a sea of mud and gravel and [that] seldom if ever is cleaned. The help situation is so short and lax that it is usually faster to fill your own tank than wait for service." One might imagine the scene: the small town gas station attendant sits inside, dozing off with a newspaper folded over his lap and his legs propped on the desk. Meanwhile, impatient customers line up outside, waiting for service.

The inconveniences and slow pace bothered other people, as well. A woman recalls a couple that came to Uravan from New York. "I can't even imagine the shock, and they didn't last long. But I remember that they couldn't believe that their daughter couldn't take ballet lessons." Some talked about missing the cultural events, shopping centers, and entertainment that Uravan lacked. They suffered "canyon fever," which resulted from isolation and monotony. A short time away from town palliated the symptoms.

96 Memorandum on Housing and Employee Facility Problems.

97 Interview #37; Interview #35.
Sometimes, it took a person a while to accustom to Uravan’s climate. A woman remembers a neighbor who had arrived from one of the eastern states. In Uravan he inherited a nice lawn, but he neglected to water it. When someone asked him why he did not water, he replied, "I was just waiting for the rain." 98 In the West End, several months might pass without significant rainfall.

Those unfortunates who never quite adapted to Uravan provided a source of amusement for others. But even among the salaried personnel there were those who not only lived in the town for many years, but who also came to appreciate its rustic charms. Two salaried men affirmed the positive aspects of the town. "The years that we lived in Uravan and watched our children grow were the happiest years of our life." And, from another, "We couldn’t have found a finer place to raise our children, because there was nothing down there to bother or hurt those kids." 99 Both statements reflect the widely shared sentiment that life in Uravan centered on family activities.

One man who grew up in Uravan called the experience "the best thing that ever happened to me." 100 The town’s immediate surroundings offered children endless opportunities to explore and play. And, their parents

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98 Interview #21.

99 Interview #35; Interview #28.

100 Interview #25.
devised an almost endless list of activities to keep the children occupied. Children participated in various team sports, scouting organizations, and school and church-related activities. Many children learned to shoot in either the gun club or the archery club. There were fishing trips and excursions to nearby ski resorts. The Recreation Hall provided the setting for roller skating, sock hops, school plays, movies, and many other events. Uravan's olympic-sized swimming pool attracted children from all parts of the West End. At the pool children received swimming lessons and the opportunity to join the swim team.

It is clear, however, that when a man says his young life in Uravan was "the best thing that ever happened to me," he refers to more than just fond childhood memories of swimming and playing in the hills around the town. The children, in retrospect, are grateful for their inheritance of an uncomplicated lifestyle, for the values they learned as youngsters in a hard-working town. They value the "close-knit community" in which they grew, and remember in Uravan a spirit of cooperation, helpfulness, and friendliness that excluded no one. "Everybody watched out for everybody else. That's something I've never found anywhere else."\textsuperscript{101}

Uravan's school accommodated children in classes from kindergarten through eighth grade. Union Carbide leased the

\textsuperscript{101}Interview #2.
land for the school building to the school district for thirty dollars per year; under that agreement, the school district paid for gas, electric, and water service. The company built a pedestrian underpass beneath the busy road, the main entrance to the town, that separated one part of the Uravan school from the other. To accommodate the population boom of the 1950s, the school district had constructed a new classroom building and gymnasium at Uravan.

Upon graduation from the eighth grade, Uravan’s students went to Nucla for high school. The change was not extraordinary. In addition to a variety of sports teams and clubs at the high school, those who spent their formative years in Uravan remember roller skating, bowling, dances, and the drive-in theater. The more adventurous attended "beer parties," which probably occurred more often than the parents of Uravan’s youth realized.

Uravan’s baby boom generation, those born in the late 1940s and early 1950s, did not experience the full effect of the social transformation that occurred in America during the 1960s. Apparently, most teenagers in the West End did

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102 School Lease Agreement, 1 May 1964, School District RE-2 file, Contracts and Leases drawer 4 UaZ, room 126, Umetco Records. In a 1953 amendment the company extended the original lease, dated 1 June 1943, to a period of forty years. Amendment to Lease Agreement, 1 May 1953, School District RE-2 file, Contracts and Leases drawer 4 UaZ, room 126, Umetco Records.

103 Interview #27; Interview #2.
not try unduly to shock their parents, rebel against established norms, or, in most cases, experiment with illegal drugs. One who graduated from high school during the 1960s said that marijuana use was uncommon, and that none of his male classmates wore long hair. He described Uravan and the West End as a "red neck," meaning conservative, society, with a perspective on life that reflected more the 1950s than the 1960s. For example, when a young, unmarried girl got pregnant, her parents sent her away until the baby was born, presumably to avoid the embarrassment of the situation. In other such cases, it was expected that the boy who fathered the child would take responsibility by marrying the girl.\textsuperscript{104}

The youth of Uravan and other towns in the West End attached no particular stigma to mining, mill work, or life in the West End. There does not seem to have been a widespread desire to escape the lifestyles of their fathers and mothers. Upon graduation many West End boys "put in down at Carbide." Many of the young women, according to one, "wanted to get married and start a family."\textsuperscript{105} But the uranium industry never expanded a great deal, and jobs in the West End were not always there for those who would otherwise have wanted to stay.

\textsuperscript{104}Interview #17; Interview #27; Interview #25.

\textsuperscript{105}Interview #27; Interview #2.
Others left to go to college. Union Carbide offered very well-paying summer jobs to young people who attended college and were the children of company employees. In fact, because of the educational background of Union Carbide’s staff employees, Uravan’s high school graduates may have been more inclined or encouraged to attend college than were those in other parts of the West End.106

It has been said that "Uravan was wonderful for men, children, and dogs." The women of the town, in contrast, often experienced "boredom and discontent." The wife of a salaried employee related her initial reaction to Uravan, one that she felt was probably typical for women in her position. "My God, so this is Uravan. We had copper water. We had that Uravan crud from the water. They couldn't believe that this was the place where they would have to live." She lived in the town for many years, however, and said that she, and other women, remember Uravan with great fondness. For her, the people and the intimacy were the redeeming features of the town. She felt that living in Uravan demanded some sacrifices, "but you couldn’t find the happiness and the family unity that you had with your family and your friends in Uravan."107

Many others repeat this sentiment. "It was a close community; everybody helped one another and if there wasn’t

106 Interview #34.

107 Interview #18; Interview #31.
anything to do, people got together and did something." The women formed numerous clubs; one resident belonged to seven different groups during her stay in Uravan. As one might expect, women involved themselves quite often in organizations designed to benefit their children. The PTA meetings were heavily attended, and members staged pot luck dinners and bazaars to raise money for various projects. Church-related activities, including Sunday School and Vacation Bible School, constituted another important part of the lives of many Uravan residents.

For some, however, the activities listed above describe not the opportunity for things to do, but rather the lack of such opportunity. One woman insisted that there "was nothing to do" in Uravan. She had "no idea" what other women did to pass the time, but for her, the routine of life in Uravan was not terribly exciting. She recalled her first six months in the town: "I had coffee with everybody . . . I took a lot of pills for the first six weeks, and thought, 'I can't live here.' I just about went crazy, and I decided I'd better stop taking pills and just accept it, so I finally did." She easily explained the high turnout for events like PTA meetings. "Well, like I said, there wasn't an awful lot to do." For her, the redeeming feature of life in Uravan was the opportunity to work a full-time job.

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108 Interview #29; Interview #36.

109 Interview #26.
Other women worked outside the home, not only for their own satisfaction, but because they simply needed the extra income. Sometimes the wives of Union Carbide employees taught in the school district, and some women found employment with the school district in other capacities. Women took jobs in Pete Peters's San Miguel Trading Center, drugstore, or boarding house. Peters also hired housekeepers; they cleaned the bunkhouses and the staff house, in which visitors to Uravan stayed. Perhaps twenty people worked for SMTC in various capacities. Others worked for stores and businesses in Nucla and Naturita. But the women who worked for local businesses endured a discrepancy in wages that grew during the years. One woman recalls that during the early, post-war years, she earned almost one-half of what her husband earned at Union Carbide. Nearly three decades later, still working, she earned about thirteen percent of what her husband earned at Carbide.110

Union Carbide employed some women as typists and secretaries. In 1959 nine women worked in Uravan as typists or secretaries. In 1976 only four women worked in similar capacities. The position of nurse, apparently, was always filled by a woman.

No women worked in the mill until the early 1970s. It is not clear what prompted Carbide's managers to begin hiring women. It may have been pressure from women who

110 Interview #4.
desired the opportunity to work; or, it may have been that the company felt an obligation to hire women to comply with guidelines issued by the Equal Employment Opportunity Commission. In 1971 the company issued an Affirmative Action Compliance Program report. The report indicated that five women worked in the milling operation; the company classified four of them as "office and clerical" workers, and one as a "professional." In 1972 the mill operation provided employment to four women: a secretary, a typist, a clerk, and a nurse. However, in 1976, six women worked in the mill itself; a "dockman," a sample operator, two laborers, a "utilityman," and a Yellowcake Dryer operator. These employees all began working for Carbide between August of 1973 and December of 1975.11 Thus, it appears that the first woman hired for mill work began in 1973.

It is impossible to determine whether enough jobs existed to satisfy the demand. Some people who commented on this issue agreed that those women who wanted employment could find it, though others felt that such was not the case. But even as late as the 1970s, many women in Uravan

did not want to work outside the home. Also, because of the low rents in Uravan, and a generally low cost of living, fewer women felt the financial need to get a job. Professional women, those who wished to pursue careers, would have found Uravan impossible. Union Carbide sometimes found it difficult to hire men to fill its salaried positions, because the wives of the potential employees chose not to live in a small town that limited their own goals.¹¹²

For many women, tending the needs of their families provided work and challenges enough. They regarded Uravan as an ideal place for their families, and specifically for their children, for several reasons. Most people considered Uravan a safe, secure place with very little crime. The people of the town trusted most of their neighbors; this familiarity further supported residents' sense of security. And, if needed, a person could always find someone to take care of her children for a while. It seemed also that children were exposed less to the negative influences that one sometimes finds in bigger communities. The Uravan school was a point of pride, and the focus of activity within the community. The classes were small and the teachers were well known to the parents, two factors that many people feel were benefits of life in Uravan.

¹¹²Interview #30.
Of course, people can raise happy children in most places, large or small. One might wonder why anyone would choose Uravan, with its hulking, unsightly uranium mill serving as a backdrop. Some former residents will admit that the mill was "ugly." Occasionally, odors from the mill drifted through the town, but these were not particularly obnoxious and some residents do not remember any odors.

James B. Allen, in The Company Town in the American West, wrote that in a company town, the "company business" became "a regular and accepted part of the community." The "giant pile of overburden," the "towering stacks of the smelter," and the "dynamite blasts from the pit" that marked a copper mining community, for example, would strike the visitor as peculiar and undesirable. But for company town residents such things constitute a way of life, and go all but unnoticed. In Uravan, as in other company towns, the mill shifts regulated the lives of families and the community. The mill, with its regularly sounding whistle, the passing ore trucks, and the big evaporation ponds on the highway identified both Uravan and a way of life into which many people settled and found comfortable. They have to reflect on the matter, or to be reminded, to realize that Uravan was unusual in both appearance and community structure.

Allen, Company Town, 106-107.
One cannot overestimate the strong affinity that former residents hold for Uravan. They are proud of the town they built, and the work they accomplished. Former residents convey a clear sense of this pride, and also the feeling that they belonged to something special and to something that can not be duplicated. Uravanites keep track of one another, and attend annual reunions, one held at the old ball park near Uravan and another in Grand Junction.

Union Carbide engendered a loyalty that plays no small part in the residents' fondness for their town. Uravanites appreciated the simple fact that Union Carbide's jobs allowed them to make good wages, and to remain in an area in which they preferred to live. Former residents frequently mention the company's largesse: the swimming pool, a pass for which cost a family almost nothing; the company's sponsorship of athletic teams; the company's donation of tools or materials for community projects in the West End; the big Christmas parties the company gave for children; the summer jobs given to college students. "Carbide," according to one, "couldn't be any better to the people who worked there." A man who had experience working for other companies said that Union Carbide "can never be matched as to compassion and fairness. . . . To me, Union Carbide was the company, they were my company." The company repaid its employees' loyalty. When layoffs occurred, the company
tried to transfer laid off workers to other locations, or to
rehire the laid off workers at a later date.114

Of course, there must have been throughout Uravan’s
long history many people who felt no sense of belonging or
pride, and who found nothing particularly attractive in the
town or the mill. But the short-term, disaffected residents
left no lasting mark on the place, and contributed little to
the community that others remember so fondly.

Visitors may have found the town singularly
unattractive and unappealing. In 1970 a writer for McCall’s
magazine passed through and, obviously unimpressed,
described Uravan as a "dismal . . . dusty mill town."115 A
resident without the benefit of a national audience issued a
rhymed response that reflects the pride felt by many others.

Uravan

"A dusty, dismal mining town"
And certainly not very pretty
Closed in between two canyon walls
Ninety miles to the nearest city

We don’t have much in Uravan
And not much to be thankful for
A post office, drug store, garage
And, oh yes, there’s the friendly store

But there are some things I would like
To name--and here’s a few
Our kids are home in bed by nine
There’s nothing else to do

114 Interview #32; Interview #35; Interview #30.

The town's unemployment rate
Has hit an all time low
Because if you don't work here mister
Then you pack your duds and blow

There is no crime in Uravan
No robberies, rapes or drugs
Our kids COULD walk the street at night
And worry not of getting slugged

Our loyalty runs pretty high
In this "dirty dismal mining town"
We sorta take offense to it
When someone tries to put us down

Oh yes we're proud of Uravan
The town that never sleeps
For Carbide's mill runs day and night
And seven days a week

And so in passing, may I say
Before I put my pen to bed
What other ONE WHOLE TOWN can say
We thank you for our daily bread

So if by chance the AEC or Willard Wurtz116
Would close us down
Then everyone in Uravan
Would leave this dismal mining town

I wonder how our cause would go
If to Montrose we fled
And sent this note to Welfare
"Thank you for our daily bread"117

116 Willard Wirtz (the name is misspelled in this copy of the poem) was the Secretary of Labor in the late 1960s. He proposed federal regulations concerning the level of radon gas in uranium mines. The level he advocated, some said, would force the closure of most uranium mines.

CHAPTER 6

"THOUGH OTHERS COME AND GO, . . . THEY
HAVE ALWAYS HAD CARBIDE"¹

The uranium industry that sustained Uravan provided a great deal of support to the rest of the West End, as well. Developments in the industry in Colorado followed those in other states, and in the industry as a whole. Throughout the 1960s the uranium market was relatively stable, although not robust. The total domestic output of uranium was far less in the 1960s than it had been during the uranium boom of the 1950s. Whereas in 1961 twenty-seven uranium mills operated in the western states, by 1968 only sixteen mills produced uranium; by the end of that year the number decreased to thirteen.²


an additional amount of U₃O₈ equal to the quantity so deferred." Eleven companies, including Union Carbide, negotiated stretch-out contracts with the AEC.³ The contracts ensured prices and demand through 1970, and prevented a collapse of the market.

In the later half of the 1960s uranium industry observers began to anticipate increased demand for uranium from utility companies, then in the process of planning and constructing nuclear power plants. In 1966 utility companies began to order uranium in large quantities for the first time; Westinghouse Electric Corporation negotiated one contract for concentrate worth seventy million dollars. In a separate deal, Union Carbide also sold concentrate to Westinghouse, four million pounds of uranium oxide to be delivered from 1970 to 1973. This may have been Union Carbide's first commercial sale of uranium. The trends indicated "that this country will be hardpressed by 1980 to provide enough uranium for its nuclear power industry."⁴

That prediction was not far off the mark, but the industry had another slump to endure. The AEC purchased uranium until the very end of 1970. Thereafter, all sales

³Albrethsen and McGinley, Summary History, 5.

involved private concerns. By 1971, the first year of strictly private sales, the uranium market had grown "soft under conditions of excess supply." During the first few years of private sales, utility companies bought far less uranium than had been anticipated. The AEC, which controlled a huge stockpile of uranium, "proposed a schedule for disposal of this stockpile over a period of several years." To say that the uranium industry's reaction to this proposal was "negative" probably understates the case. According to one observer, the possibility that the government's "uranium stockpile will be dumped on the market" represented a "specter that haunts private uranium companies." The AEC later decided not to burden the market with its own excess uranium.  

In 1972, amid a market of "continuing oversupply, excessive stocks, and soft prices," Union Carbide officials reduced work schedules at the Uravan mill to a five-day week. The company also reduced its work force at the mill to 125, an all-time low. (This figure represents the total number of employees at the mill.) Simply put, the company

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sought "to reduce the production rate to match product sales." 6

Union Carbide also sold vanadium, and that product helped the company gain a better return on its mining and milling activities. In 1966, for example, Colorado produced seventy-two percent of the nation's vanadium, and Montrose County had Colorado's highest production. However, by the early 1970s the market for vanadium, like that for uranium, atrophied. Thus, in the early 1970s the production and sale of vanadium did not compensate for the reduced output of uranium. In fact, in 1972 Union Carbide suspended operations at its vanadium and uranium mill in Rifle. In 1973 the Rifle mill reopened, but the mill produced only vanadium and operated with a much smaller work force than before. 7


Union Carbide's reduced production schedule at the Uravan mill forced the closure of more than one half of the mining operations in the West End and adjacent mining areas. Many of the mines had been operated by smaller companies, the owners of which could not remain competitive in the slim market. But even Union Carbide, the West End's largest uranium industry employer, had to close one of its more productive mines, the Eula Belle, and terminate the employment of thirty miners there. At one time, the Eula Belle provided employment to forty or fifty miners. Foote Mineral Company, formally the Vanadium Corporation of America, had thirty mines in Montrose County in 1967. But those mines fell inactive in 1968 when the mill in Shiprock, New Mexico closed. Climax Uranium Company, which also mined ore in Montrose County, closed its Grand Junction mill in 1970.8

These developments left the West End in a recession. Expressed metaphorically, the West End had "been riding the uranium gravy train for a long time. Now it looks as if we are coming to a very rough section of track." From 1969 to 1972 the assessed valuation of West End properties fell

about $1 million, mostly due to the decrease in mining activity. A "gloom" settled in, caused by "little payroll . . . a lag in the uranium demand, high costs of living . . . rising interest rates and costs of being in business and staying in business." West End residents began to explore more earnestly the possibility of developing alternative sources of income.

Economically, as well as geographically, West Enders had always seen themselves as a region separate from the east end of Montrose County. Most developments in Montrose hardly affected the West End; in fact, West End residents felt more closely allied with neighboring San Miguel County. They shared more interests with the people of Norwood, a farming, ranching, and sometime logging town in San Miguel County, than they did with the people of the east end of their own county. Similarly, developments in the uranium industry determined the economic fortunes of both the West End and the far western portion of San Miguel County, although very few people lived in that part of San Miguel County. And, West Enders felt more closely allied with Telluride, the seat of San Miguel County, than they did with Montrose. The editor of Nucla's newspaper expressed these sympathies in 1954: "We are convinced that the West End of

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Montrose County and San Miguel Co. are one unit economically and socially, if not politically." Accordingly, he changed the name of his paper from the Nucla Forum to the Forum, "serving the West End and San Miguel Co."\(^{10}\)

No doubt, the West End's isolation provided the grounds for some alienation. One resident pointed out that she lived closer to the seats of three different counties--Dolores, San Miguel, and Ouray--than to her own county seat, Montrose. But she, and apparently a few others, had also grown indignant over the perceived lack of support the West End received from its county seat. "Montrose treats the West End," she wrote, "just like Denver treats the western slope."\(^{11}\)

In 1968 the editor of Nucla's newspaper explained this feeling of neglect. In a series of opinion pieces he enumerated the grievances suffered by his part of the county. In essence he felt that the West End, because of a small population and lack of political representation, received less funding for roads and other public projects. The West End contributed more to the county in tax revenues than it received in support. Moreover, West Enders had to pay for projects in Montrose that did not benefit them, and most of the county employees lived in Montrose. "The powers


\(^{11}\)Letter to the Editor, \textit{Forum}, 18 January 1968, p. 4.
that be in Montrose," wrote the editor, treated the West End like a "poor relative."\textsuperscript{12}

The perceived inequities in the county political system so incensed the editor that he advocated secession for the West End; he even held a "straw vote ballot," to determine the strength of public sentiment for his proposal. Only sixty-five people voted; twenty-two wanted to form a new county, and another forty-one felt the West End should join San Miguel County. The lack of response must have been disheartening, and the effort to place the secession question on the general election ballot apparently failed.\textsuperscript{13}

The West End secession movement of 1968 serves only as a footnote to the area’s history. One long-time resident and observer remarked that the effort "wasn’t too powerful, but it was noisy."\textsuperscript{14} Nevertheless, the secession movement demonstrates the West End’s economic isolation. Building projects that boosted the economy of Montrose--expanded airport, hospital, or junior college facilities, for example--had no direct impact on the economy of the West End. They realized the need to attract or develop some sort


\textsuperscript{14}The phrase is Betty Zatterstrom’s, communicated informally to the author.
of industry unique to their situation and independent of the rest of the county. The people of the West End also knew that they would benefit from cooperating with other communities in the San Miguel Basin. Strictly speaking, the San Miguel Basin is that geographic area drained by the San Miguel River; but, as generally used, the term designates the West End and all of San Miguel County.

Tourism represents a common alternative for communities in the western United States that face hard times because of a slump or bust in an extractive industry. As early as 1962 members of Naturita's chamber of commerce joined representatives from the towns of Norwood, Telluride, Ouray, and Ridgway (the latter two communities lie within the boundaries of Ouray County) to promote tourism in the area. Initially, the boosters' plans were not extraordinarily ambitious: "The group will erect signs in the vicinity of La Sal, Utah in an effort to route tourists through this area."  

In succeeding years there were similar efforts to "stress tourism," and "attract the tourist dollar." In 1970 residents of the San Miguel Basin formed an area-wide chamber of commerce, a group that worked toward the goal of attracting not only tourists, but also new businesses. The group's promotional efforts succeeded, at least for one community in the San Miguel Basin. The West End watched as

"opportunity knocked"—in Telluride. By the early 1970s Telluride, conveniently located in the mountains, had developed into a popular ski resort, complete with new chair lifts, condos, and "an accompanying real estate boom."16

The West End could not compete with Telluride for the tourist dollar. It is rarely a destination for travelers, except those who happen to live there. It lacks the spectacular mountains to which tourists traditionally flock in both winter and summer, and also the cozy alpine charm that resort developers, event organizers, restauranteurs, hoteliers, and store owners easily exploit. The West End's assets—the stark, serene, high desert landscape, pleasant weather during much of the year, and its location near the Uncompahgre National Forest—are less appreciated by tourists and more difficult to capitalize on. As ever, isolation presents a problem. Moab, Utah, once an unknown town with a history, climate, and geographical setting similar to the West End's, has grown into a tourist mecca. But Moab benefitted from its proximity to two major attractions, Arches National Park and Canyonlands National Park. Moab is also only thirty miles from an Interstate Highway. It is true that many would consider the landscape

surrounding Moab to be much more spectacular, and better suited and more accessible to bicyclists, hikers, four-wheel drive vehicle enthusiasts, and those who recreate on the rivers.

The West End's rivers have not attracted rafters or outfitters, perhaps because the rivers run too shallow during the summer. The area's mining legacy, though interesting to the history buff, lacks the romantic quality associated with Colorado's silver and gold mining communities, many of which use that mining history as a tourist attraction. A West End resident once asked, "Do you think people would like to tour a uranium mine? ... Do you think they would pay for it?" 17 Somehow, the prospect seems unlikely.

The people of the San Miguel Basin investigated other ways to augment their economy. In 1970 the San Miguel Basin Development Association promoted the area as the possible site for a paper mill, probably to have been located in Norwood. The efforts drew the interest of a firm that requested information about the area's resources. Then, in 1972 a group of farmers in the area investigated the possibility of establishing a "cooperative cheese factory"

17Stephen Singular, "Two Western Colorado Towns Want This Opportunity to Go to Waste--Nuclear Waste," Empire (Sunday supplement to the Denver Post), 23 October 1983, 30.
and dairy operation.¹⁸ Both of these ideas had promise, given the resources of the area; however, the plans never materialized.

In 1970 the Four Corners Regional Commission funded a study entitled Alternative Economic Development Programs for the San Miguel Basin, published in 1971.¹⁹ The authors designed the study "to provide an economic inventory of the San Miguel Basin," and "to develop a set of alternative growth approaches based upon an analysis of the Basin's strengths, weaknesses and potentials." As part of the "economic inventory," the authors found a population of 5,500 in the San Miguel Basin, a population density of 2.1 people per square mile. (The average number of people per square mile in the entire state was 21.2.) In 1970 Uravan had a population of 850; Nucla, 949; Naturita, 820; Norwood, 408; and the population of Telluride stood at 553.²⁰


¹⁹The Four Corners Regional Commission was created as part of the Public Works and Economic Development Act of 1965. Members of the commission made funds available "for planning, investigations, studies, demonstration projects, and training programs" that would help "to reverse rural unemployment and economic decline" in Arizona, Utah, Colorado, and New Mexico. Four Corners Regional Commission, informational pamphlet from the Four Corners Regional Commission, n.d., n.p.

The authors of the study found, not surprisingly, that the mining industry provided the primary source of jobs and income in the area. This held especially true for the West End; but there were uranium mines in western San Miguel County, and in the eastern part of that county there was occasional gold and silver mining activity. According to the study, mining sustained 661 jobs, or forty-two percent of the total, in the San Miguel Basin. The income from those jobs totaled $5.8 million, about forty-six percent of the basin’s total income. Those involved in the extraction and processing of ore earned, on average, substantially more than others in the San Miguel Basin. Jobs in the mining industry paid an average of $8,800 annually; government employees, second on this list, earned an average of $7,500 per year. The authors of the study further concluded that the mining industry accounted for seventy-five percent of the basin’s "basic support." They defined the term as "activity [that] brings money from 'outside' into the local economy."\(^{21}\)

The San Miguel Basin’s agricultural enterprises represented the second most important part of the economy. Ranching and farming contributed fifteen percent of the area’s "basic support." There were 180 agricultural jobs in 1970, each of which paid an average of $6,000 per year. Agriculture provided the "stabilizer that offset the 'boom

\(^{21}\)Ibid., 11, 10.
the 'boom or bust' cycles associated with mining activities in the area."\textsuperscript{22}

Farmers in the West End and the San Miguel Basin grew mostly grains and hay, which they sold to local ranchers. Coors Brewing Company provided the market for the only export crop, moravian barley. Although farmers experienced some difficulties raising the barley, it was said that Coors paid "premium" prices. The lack of rainfall and irrigation water prevented larger, more diverse farms in the West End and the rest of the San Miguel Basin.\textsuperscript{23}

Livestock operations produced the most lucrative agricultural export in the region. In 1969 there were 52,700 head of cattle in all of Montrose County. (Those who kept such statistics did not estimate the number of cattle raised in the West End alone.) San Miguel County ranchers owned eight thousand cattle in 1969. But because ranchers depended on outside markets and other factors that varied from year to year, their business was not always profitable. In the late 1970s, for example, the owner of a ranch near Naturita claimed that "all cattle producers have been losing money on their operations."\textsuperscript{24}

\textsuperscript{22}Ibid., 3, 11, 75.

\textsuperscript{23}Ibid., 75-76; "Water Shortages and Soil Conditions Limit Farming Here," \textit{San Miguel Basin Forum}, 17 August 1978, p. 28.

and the San Miguel Basin remained stable, but could not be described as vigorous or growing.

Thus, the authors of *Alternative Economic Development Programs for the San Miguel Basin* encountered a situation in which "prosperity has always depended on decisions made far away." During lean times, this situation led to a "feeling of helplessness and frustration." However, although they found "no strikingly identifiable, broad-based body of leadership to lift the economy," they did find individuals determined to solve the area's economic problems. The authors proposed seven "themes of development" for the basin, and stressed the need for cooperation between the various communities of the basin, area-wide planning, and political action. The study included the advantages and disadvantages that would result from each theme of development, and also the efforts that would be required to implement each of the themes. 25

The proposed themes of development stand as a testament to the difficulties encountered by those who would diversify the economy. To implement the "alternative economic development programs," residents of the San Miguel Basin would have needed a considerable investment from outside sources. Each theme of development depended upon the type

of interest and support, mostly from government agencies, that the West End and the San Miguel Basin had always found so difficult to attract. This irony was lost, apparently, even to the authors of the study.

For example, the authors proposed that residents promote "traditional" tourist activities, like camping, hunting, fishing, hiking, and off-road vehicle recreation. The owners of "wooded, scenic mountain land" (in San Miguel County) might establish resorts, or rent access to the land. However, this type of development necessitated "public investments" by the Forest Service and the state government to improve the area's highways, campgrounds, and game and fish areas. A second tourism related development proposal had to do with Telluride's potential as a ski resort.\(^26\) As noted, in the early 1970s this theme of development came to pass.

The potential for mineral extraction constituted a third economic development program. At various locations in the San Miguel Basin there were deposits of gold, silver, copper, tungsten, bog iron, potash, gypsum, salt, and natural gas. But it seemed unlikely that, with the exception of some gold and silver extraction at a mine near Telluride, any of these deposits would stimulate commercial interest. The authors of the study did forecast a favorable market for uranium, seemingly five to ten years in the

\(^{26}\)Ibid., 15-16, 19-20.
future, and suggested a possible resurgence in the uranium industry. But residents could do very little to promote uranium; the authors of the study could suggest only to "demonstrate interest, use political influence, [and] facilitate housing" to encourage this type of development. Any economic growth tied to uranium would come as a result of the nation's need for nuclear energy, and from the investments of big companies. The uranium industry, as those in the West End knew all to well, depended upon factors beyond their control. Besides, as the authors of the study pointed out, "mineral development alone cannot sustain a region's long term economic growth." 27

A fourth theme of development, admittedly "theoretical in concept," called for "'new city' type of urban development." The authors of Alternative Economic Development Programs for the San Miguel Basin saw a possibility for the "experimental development of new towns in rural areas which are prepared to plan and cooperate." New cities would develop because of an increase in the nation's population, and because of "public policy" efforts that would encourage people to settle in underpopulated areas. The idea would necessitate "government funding for rural renewal," government subsidies for "basic employment," and the "private development of lands now owned by the government." One envisions a massive, government-sponsored

and government-directed relocation program; to some, such an effort seemed "entirely possible" and appeared "worthwhile to consider." While there has been, in recent years, some migration from urban centers to rural areas, it has not been directly subsidized by the federal government and it has not tremendously affected the population or economic fortune of the West End.

The remaining themes of development correlated to massive federal spending of another sort: the construction of a big new dam and reservoir in San Miguel County. Such a project would stimulate the economy in three ways. First of all, the actual construction of the reservoir would last approximately ten years, create two hundred construction jobs, increase the area's population, and generate additional retail sales and taxes. Secondly, the dam project would facilitate a broad new range of tourist activities in the San Miguel Basin. Finally, the reservoir would allow for the irrigation of more arable land, attracting as many as "125 new family size farm units" to the San Miguel Basin. The types of development spurred by the San Miguel Reclamation Project would be of a reliable, although not spectacular, sort, and it could well have proved a "major attracting force for [other] sorts of economic development over the years to come." Also, it entailed few drawbacks that could not be mitigated with land

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Ibid., 32-33.
use plans and controls. The residents of Placerville, in San Miguel County, faced the most dire consequence; the reservoir would "inundate" that community.\textsuperscript{29}

The idea for some sort of irrigation project in this part of Colorado originated in the 1930s. Most of the "investigative work" on the project began in 1957, with the creation of the San Miguel Water Conservancy District. The board of the conservancy district worked with the Bureau of Reclamation to develop a feasibility report, which the Bureau of Reclamation produced in 1966. By that time, almost one million dollars of "state, local, and federal funds" had been spent on the study. As of 1966 the plan called for a dam on a creek between Norwood and Placerville; this would create a reservoir with seventy-two thousand acre feet of water. (Apparently, in this first version of the plan, the water in the reservoir would not inundate Placerville.) Tunnels constructed from the dam site would create the smaller Naturita Reservoir and Radium Reservoir, both of which would be in San Miguel County, near the Montrose County line. Tunnels from these smaller reservoirs would lead to various parts of the West End and San Miguel County for irrigation purposes.\textsuperscript{30}

\textsuperscript{29}Ibid., 21-28.

The San Miguel Project, estimated to cost about $68 million in 1966, seemed to have enough support in the late 1960s to insure completion. However, the federal legislature never gave final approval for the bill that would authorize the construction of the San Miguel Project and four other Colorado reclamation programs. In 1971 supporters of the project received more federal funding for more studies, but the project continued to languish, ultimately because of a lack of enthusiasm on the part of Congress. Also, by 1973 those who opposed the project for reasons related to its environmental impacts had made their views known; such opposition further delayed the project. Nearly ten years later, in 1982, the "dream of many" continued "to simmer on the back burners of the federal government as future food for thought." By then, the latest version of the plan called for the rerouting of a nearby highway; this added an enormous sum to the overall cost projections, and the available federal money was beginning to get scarce. The director of the Colorado Water Conservation Board noted that "before, it was one hundred percent federal money. Now, if we want these projects, we are going to have to negotiate with the federal government and provide some of the funding."31 Not surprisingly, the

dream of the San Miguel Reclamation Project never materialized. Like the effort to build the San Miguel Project, attempts to diversify and expand the economy of the San Miguel Basin, and especially of the West End, ended unhappily. Of course, it might be assumed that the West End's lack of growth did not disappoint all residents. One woman who has spent most of her life there remarked that "a lot of people feel like we're letting the world pass us by, but I would just as soon [let it]." \(^{32}\) So much the better, perhaps, that tourists do not flock to the West End. It leaves the roads uncongested, the countryside less littered. Residents of the West End appreciate their small town lifestyles and the area's rural atmosphere; otherwise, they would not live there. Fast food restaurants and big discount stores are signs of economic growth--or, the price a town pays for growth, some might say.

But for its isolation the West End has paid a price, as well. Funding for schools and public services sometimes falls short. High school graduates often cannot stay in the area, and college graduates cannot return, because of the lack of jobs. The area's small economy hinders efforts to

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\(^{32}\)Interview #4.
maintain health care services, or facilities for older citizens. These types of needs prompted West End community leaders constantly to look for new ways to lure money into the local economy. Lacking new jobs, new sources of revenue, most in the West End had no qualms with the uranium industry, if only it would revive itself and remain steady.

In the early 1970s a West End resident addressed the general topic of growth and the future of "Colorado West." In a wide-ranging jeremiad, a newcomer, recently moved from California, accused West Enders of taking for granted the beauty and solitude in which they lived. She reminded them that in some places--namely, California--people had no chance to breathe fresh air, or "to walk alone on a mountain top or valley without rude interruption from planes, cars, and motorcycles." She urged western Coloradans to prepare for the inevitable "onslaught" from the "disillusioned and desperate" throngs of people seeking refuge from overcrowded California. She warned that without "planning and zoning," words that "elicit expressions of horror," western Colorado would "become another disaster area akin to metropolitan Los Angeles where the magnificent orange groves were chewed up and spat out into masses of concrete and people."33

Lest her words be taken for hyperbole, the writer pointed out that the "destruction" of western Colorado had

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already begun. She lamented the neglect that allowed old buildings to crumble, and the apparent indifference to the establishment of junkyards in plain view. She disparaged those who left "derelict cars to rust and attract rats," unloaded refuse "in a remote cedar grove," or planted "trash around their homes instead of flowers and trees." And she attacked the uranium industry and its supporters:

I resent--for the pioneers who sought the beauty of this country--the disgorging of the bowels of the mountains by man and the effluent from his purging left in the open for all to see. . . . I resent--for the residents--the carelessness of the mills. The blackmail so evident--"Accept our pollution of water and air or go jobless." The terror of making waves lest the millowner pack up and leave. 34

The environmental aspects of mining and milling were not the primary concern of West End residents at the time, and these comments probably endeared the writer to few of her new neighbors. Answering the criticism that resulted from the letter cited above, another resident enjoined, "Give her a break! It takes a while for newcomers to understand us and we don't always welcome newcomers, especially newcomers with new ideas." 35

The uranium industry did revive, and the economic slump that hit the West End in the early 1970s began to abate in the mid-1970s. The purchase of uranium by power companies

34 Ibid.

caused the rebound. In 1975 and 1976 ten nuclear powerplants opened, and the nation's use of nuclear generated electricity jumped to 9.4 percent of the total in 1976, up from six percent in 1974. Long range forecasts called for an even greater demand for uranium from utility companies, in part because it cost much less than coal. In response to the new demand, uranium companies opened new mines, built new mills, expanded the production capabilities of old mills, and accelerated the exploration for new ore reserves. In 1976 the sixteen uranium mills in the United States "operated at the highest average rate per mill ever attained (1,500 tons of ore per day)." (The production of uranium did not increase as dramatically because the ores were generally of a lower grade.) The mills' product, yellowcake, fetched forty-three dollars per pound in 1978. This represents a tremendous increase from the eight dollar per pound rate in 1968; but, by 1978 the costs of exploration, mining, and processing had also risen dramatically.\(^{36}\)

The favorable market spurred a boom in the West End, and several companies competed for uranium. General

Electric Corporation constructed an ore buying station near Naturita, where the old VCA mill once stood. General Electric, "the world's largest manufacturer of nuclear boiling water reactors, nuclear cores and complete power plants," bought ore to ensure a constant supply of uranium for its own needs. The company shipped its ore to a mill owned by Energy Fuels Nuclear in Blanding, Utah. Cotter Corporation, a subsidiary of the power company Commonwealth Edison, entered the West End uranium industry. Cotter mined ore on land in the Uravan Mineral Belt and shipped it to a crushing plant at Whitewater, near Grand Junction; from there, the ore was sent to the company's mill in Canon City, Colorado. That arrangement proved impractical, however, and after only several weeks Cotter closed the facilities at Whitewater and shipped its ore to the Uravan mill. Ranchers Exploration and Development Corporation extracted uranium from mill tailings left by VCA near Naturita. The company moved 630,000 tons of tailings to the southeast end of the Paradox Valley; in less than two years, Ranchers Exploration had removed from the tailings 380,443 pounds of uranium oxide in concentrate, and 1,835,280 pounds of vanadium.37

Union Carbide continued its steadfast mining and milling activities in the West End. In the late 1970s the Uravan mill provided employment to 184, the highest total

since the late 1950s. Carbide also employed 471 people in its mining department. About one-half of the company's mining employees lived in the West End; the remainder of the mine employees, because of the location of the various mines, lived in Dolores County, San Miguel County, and in southeastern Utah.\textsuperscript{38}

The West End once again bustled with activity; ore trucks and drilling rigs appeared with greater frequency, and the roadways filled with vehicles carrying miners, engineers, and geologists to work. Wages rose as companies competed for mining, drilling, or trucking services. Business flourished at gas stations, grocery stores, restaurants, bars, and hotels, the rooms of which rarely went unoccupied. A businessman established a mobile home sales lot in Nucla, and a new trailer park opened in Naturita. New homes were built, but still there was not enough housing to meet the demand. The influx of new families and businesses strained the capacity of Nucla's water system.\textsuperscript{39} It must have seemed like old times.

\textsuperscript{38}Uravan Mill: Employee Turnover 1968-1979, Turnover 1968-1979 file, drawer 34 UaZ, room 126, Umetco Records; Ted G. Early to Terry N. Washburn, 4 September 1980, Uravan Correspondence file, drawer F11172-F11197, room 126, Umetco Records.

Boom town rowdiness also revisited the West End. In Naturita alone there were seven "liquor outlets," and bar fights broke out often. In Nucla, the town board voted to suspend a bar owner's license because of the fighting that occurred every week in his establishment. And in 1978 a counselor employed by the Midwestern Colorado Mental Health Clinic in Norwood moved to the West End in response to an increased "alcohol treatment caseload."  

Reporters covering the West End during the late 1970s discovered among the residents a feeling of cautious optimism about the latest boom. Because of the nation's growing need for energy, many counted on a continued demand for uranium. Nevertheless, no one discounted the possibility of another bust. There also seems to have been some ambivalence about the state of affairs. The editor of Nucla's newspaper described "a sense of awkwardness and hesitancy among the local people." The real profits from uranium went to "outsiders," those with "the means and the money to extract what is largely inaccessible to local residents." Meanwhile, West Enders watched, feeling beguiled and exploited as "the fruits of their land" were taken away. "The outward gain of economics," according to

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this writer, "is somehow lessened by the inward loss of ownership." 41

Even among the "outsiders," the leaders of the uranium industry that determined the economic fortunes of the West End, there existed some ambivalence concerning the health of the industry. "The current status of the nuclear power and uranium industries in the U. S. is a paradoxical contrast between optimistic activity in exploration and mining . . . and continuing uncertainties at utilities." The optimism stemmed from the realization that nuclear power was "necessary, clean, safe, and cheap." However, the industry's future remained uncertain because of "a confusing array of government regulations, a small but vocal anti-nuclear block, a reassessment by utilities of future electrical growth rates, and crippling inflation." 42

As if on cue, the problems inherent in the nuclear power industry began to reveal themselves; the industry experienced setbacks from which, some say, it will never recover. The phrase "uncertain future," and the word "uncertainties" appeared often in descriptions of the


nuclear power industry. If perception is reality, then the beginning of the industry's problems began in March of 1979, with the infamous accident at the Three Mile Island nuclear power station. The accident focused unprecedented public attention on the industry. It transferred "the burden of proof from those who claim nuclear power is not safe to those who claim it is." The much more serious accident at the Chernobyl plant, in April of 1986, "may have marked the final breach of trust between nuclear leaders and their increasingly skeptical constituents."\textsuperscript{43}

But many observers have pointed out that the nuclear power industry suffered problems that predated Three Mile Island. In the 1970s industry leaders vastly overestimated the nation's future need for energy. They planned the construction of nuclear power plants to meet a need that would not exist. They also erred tremendously in estimating the cost of construction, which soared above the original projections. Worse, the builders of nuclear reactors overestimated their own capabilities. They built reactors with serious flaws, design and safety liabilities that either caused costly delays, or later proved extremely expensive to correct. The accident at Three Mile Island provided justification for even more stringent safety

measures, mandated by the Nuclear Regulatory Commission, adding more to the cost of nuclear power plants.\textsuperscript{44} The nuclear industry never resolved a method by which to dispose of its waste, highly radioactive spent fuel rods and other, less radioactive materials. This "most intractable problem" has added to the costs of nuclear power, and lessened any remaining public enthusiasm for it. The industry suffers from one final difficulty, that of decommissioning plants that either developed problems too expensive to repair, or that near the end of serviceability. Estimates for the cost of decommissioning are enormous; given the industry's previous record, those estimates may be too low. In a 1990 study researchers concluded that nearly five hundred billion dollars, at the dollar's 1990 value, had been spent in the nation's nuclear energy program since 1950. Through subsidies and grants the government had supplied approximately one-fifth of that amount. In the view of industry observers, the return never matched the investment. America's nuclear power program has been called "the largest managerial disaster in business history, a disaster on a monumental scale."\textsuperscript{45}


\textsuperscript{45}Greenberg, "Dreams Die Hard," 85; the opinion at the end of the paragraph comes from the February 1985 issue of Forbes magazine, quoted by Greenberg on page 102.
Beginning in 1975 orders for new reactors began to be canceled and withdrawn; in fact, between 1974 and 1987 all new orders for nuclear power plants were eventually canceled. As of 1987, the plans for 108 reactors had been scrapped. During that time the nation's output of electricity from nuclear reactors actually increased, because the power plants started before 1975 became operable in the 1980s.46

The arrest of the growth of the nuclear power industry directly impacted the nation's uranium industry, and the impact is seemingly traceable to 1979. In that year yellowcake sold for forty-three to forty-five dollars per pound. However, the uranium companies had been producing enormous amounts of yellowcake, far more uranium than the utilities could use. This excess supply caused the price to drop. By the early part of 1980 many companies had scaled back uranium exploration activities in anticipation of a reduced demand for uranium. By the end of 1980 the price for yellowcake had fallen to twenty-eight dollars, and by 1985 the price stood at fifteen dollars per pound. The production of one pound of yellowcake, from mine to mill, cost an average of thirty dollars. Employment figures corresponded to the price of uranium concentrate. In 1979 the uranium industry employed twenty-two thousand people. By 1981 only fourteen thousand people worked in the

industry, and by 1985 the number had been pared to two thousand.47

The bust in the uranium industry precipitated a crisis in the major uranium producing portion of Colorado: the West End of Montrose County, and the far western parts of San Miguel and Dolores Counties. Before the bust that area's population was estimated at 7,000, and the uranium industry provided jobs to 1,080 people. By March of 1981 sixty-four percent, or 695 people, had lost their jobs in the three counties combined. In the West End of Montrose County alone there were 3,963 residents in 1980, and approximately thirty-six percent of the paid workforce, or 690 people, worked in the uranium industry before the bust.48 Within a few years virtually no one worked in the mines, and Union Carbide employed fewer than one hundred at its mill. (For Union Carbide's employment figures, see Table 4 on the following page.)

The number of unemployed grew as the uranium companies--General Electric, Cotter Corporation, Atlas Minerals, and various others--scaled back their operations,


48Rocky Mountain Consulting Associates, Crises in the West End, 12-13, 18.
Table 4.--Union Carbide Employee Residences, Uravan Area, September 1980

<table>
<thead>
<tr>
<th>Location</th>
<th>Mill Employees</th>
<th>Mine Employees</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uravan</td>
<td>115</td>
<td>49</td>
<td>164</td>
</tr>
<tr>
<td>Dove Creek, CO</td>
<td>131</td>
<td>131</td>
<td></td>
</tr>
<tr>
<td>Nucla</td>
<td>35</td>
<td>63</td>
<td>98</td>
</tr>
<tr>
<td>Moab, UT</td>
<td>58</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>La Sal, UT</td>
<td>36</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Naturita</td>
<td>16</td>
<td>17</td>
<td>33</td>
</tr>
<tr>
<td>Norwood, CO</td>
<td>5</td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>Monticello, UT</td>
<td>19</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Cortez, CO</td>
<td>17</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Redvale, CO</td>
<td>7</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Slick Rock, CO</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Cahone, CO</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Egnar, CO</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Paradox</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Grand Junction</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Bedrock, CO</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Dolores, CO</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Gateway, CO</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Shiprock, NM</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Pleasant View, CO</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Montrose</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Delta, CO</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>184</strong></td>
<td><strong>471</strong></td>
<td><strong>655</strong></td>
</tr>
</tbody>
</table>

The category "mine employees" includes support personnel, mine office and shop employees, and exploration personnel, as well as miners.

Source: Jack Frost, Umetco Minerals
and then eventually quit the uranium business altogether. The independent miners and small companies lost their livelihood because they could not sell their ore. The incomes lost from the uranium bust multiplied, because retail business in the West End fell, perhaps as much as fifty to sixty percent. Many of the unemployed left, reducing the population of the West End by about twenty-five percent; as the 1980s progressed, the population would dwindle even further. Many of those who stayed applied for food stamps, unemployment insurance, or other types of government assistance.⁴⁹

The social consequences of the uranium bust were documented in a study entitled Crises in the West End: Social and Economic Impacts of the Uranium Market Bust. The researchers compiled information from the West End of Montrose County, and the uranium dependent western parts of San Miguel and Dolores Counties. Doctors and nurses reported that, because of financial difficulties, many delayed or forsook medical and dental care for themselves and their children. At the same time, however, mental health officials reported an increase in their alcohol abuse caseload, a development "directly associated with the anxiety and insecurity connected with loss of jobs." A counselor with the Midwestern Colorado Mental Health Clinic

⁴⁹Ibid., 3, 8, 41-42, 47-48; "Naturita's World Hasn't Much Joy This Christmas," Denver Post, 21 December 1981, p. 5B.
noted that the facility's caseload increased even as the area's population decreased. But there was an even more dramatic indication of anxiety, insecurity, worry, and depression; in a ten-month period of 1980 and 1981 ten men in the three uranium-producing counties committed suicide.\(^5\)

More than one person pointed out that the West End had been through hard times before. But the situation in 1981 induced an unusual feeling of hopelessness. According to one woman, it was "the worst I've seen things in the 27 years I’ve been here." The reason for the "hysteria," as another resident termed it, was that even Union Carbide, the West End's largest employer, found itself enervated by the uranium bust. As the locals recalled, "even when other operations around here shut down, we always had Carbide." And, "we've seen some bad times before, but Carbide never shut down."\(^5\)

Indeed, it must have seemed impossible; in nearly fifty years of operation Union Carbide was a West End institution, it represented a way of life. Yet, inexorably, as the uranium market vanished the company reduced the scope of its

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operations, and then shut down completely. Near the end of 1980 Carbide laid off seventy-three miners. In March of 1981 the company reduced the workforce at the Uravan mill from 180 to 90. Carbide actually closed the mill for six months in 1981, but still kept about ninety employees to maintain the mill. From 1982 to 1984 Union Carbide continued to produce yellowcake from stockpiled ore to meet its long term contract commitments. However, the mill operated only about six months each year, and with a greatly reduced workforce. Meanwhile, the company let go more and more of its miners; by 1983 all of the company’s mines had been closed.52

Union Carbide never intended to abandon Uravan and its interest in uranium. Not only did company spokesmen say that, they also indicated through their actions that they intended to hold out until it became profitable once again to process uranium. For several years, until the mid-1980s, the company kept a small crew employed to maintain the mill in standby condition. Company officials predicted that the price of uranium would rise after the existing stockpiles of yellowcake were depleted. In the early 1980s, however, no one expected the price of uranium to rebound for a long

time, at least five years. Eventually, toward the end of 1984, Union Carbide closed the Uravan mill for the last time. Even then, the company maintained the belief "that market conditions will eventually improve and allow a return to normal operations." But the market never returned to "normal" and the Uravan mill never started up again.

With the West End in a depression there may have been a few people who resented Union Carbide. "It eats at me that I had loyalty to Carbide--took a lot--and now they don't care about me. I feel betrayed and angry, like I’ve been used until I’m not of any use to anybody." Another man was more sympathetic to the company’s situation: "You can’t punch Union Carbide for closing down, but a lot of us would like to." Probably most residents of the West End withheld blame from the company. A Uravan man whom the company laid off felt no bitterness. "It isn’t Union Carbide’s fault. They warned us about the layoff and helped out."  

Company officials assisted when they could. Some workers transferred to Union Carbide operations in other states. To others, those closer to the retirement age specified in the company pension plan, the company granted a

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few years credit, allowing them to retire early. In some cases Union Carbide waived the rent for unemployed former workers. Company officials filed a petition with the Department of Labor to obtain "trade adjustment assistance" for their former employees. This assistance helped unemployed workers obtain relocation allowances, job training, placement services, counseling, and other such services. And, the company helped the newly formed West End Economic Adjustment Committee secure a $25,000 federal grant, to be used "for a study on the effects of the recession and ways to combat them."

In 1985, just after the Uravan mill closed, the people of the West End staged an appreciation to honor the company that had employed West Enders for nearly fifty years. The towns of Nucla and Naturita proclaimed 30 March 1985 "Umetco Day" (Union Carbide became Umetco Minerals in 1983). Approximately one hundred people turned out, and civic leaders presented Umetco officials with a plaque commemorating "49 years of social and economic support of the West End." As various participants explained, the company had contributed not only jobs to the area, but also considerable good will in the form of financial and material donations for community projects. Independent miners,

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contract miners, and others who worked in the West End uranium industry appreciated the company for its fair, honorable, and generous business practices. Said one resident, "If Carbide hadn't come in here, I suppose some other company would have; but whether they would have been as generous as Carbide, I don't know."\(^{56}\)

On 30 September 1997 a truck laden with twenty-five tons of uranium ore keeled over on Interstate 25 near Colorado Springs, Colorado. The accident scattered several tons of ore across the highway, causing a traffic jam as workers removed the debris. The driver of the truck escaped with only minor injuries and the incident was, as accidents involving big trucks go, not exceptional. However, the reaction of local residents and passing motorists was extraordinary; many of them checked into a local hospital for treatment for radiation exposure. In fact, an emergency room nurse used the expression "mass hysteria"; "we had people come in for basically just panic," she reported. A spokesman for the Colorado Springs Fire Department advised that "anyone who may have come into contact with the dust should be checked by their [sic] medical provider as a precaution." Exposure to the dust from the ore, he explained, is hazardous: "uranium miners all ended up getting cancer." 


The panicked reaction is understandable; few words are as capable of causing hysteria as "radiation," which itself is inextricably linked with cancer in the public perception. But it is noteworthy that in the late twentieth century uranium ore might be perceived as such a threat. In the early part of this century many people eagerly used various remedies made with radioactive elements. They drank or bathed in radioactive water, applied or ingested various radioactive ointments and potions, and sought cures in all manner of devices manufactured with radioactive elements. Thus, within the span of less than a century the popular understanding of radiation has changed dramatically. This irony was not lost to the people of the West End, where so much uranium had been mined and milled. A woman who had lived in the West End "through boom and bust" remembered the days when people paid "for the privilege of sitting in a uranium mine to expose themselves to radio-activity to cure their ailments." "Now," she observed, "they think it would wreck you." 

Generally speaking, West Enders do not share the popular anxiety over radiation. They grew up with radiation, some would say, or worked in the uranium industry

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all of their lives. Indeed, in the early 1980s the residents of Naturita courted a company that sought to establish a low-level radioactive waste dump. They wanted the company to build the facility in the West End as a way to replace some of the jobs lost to the bust of the uranium market. The people of most communities would shudder at the thought of living close to a nuclear waste dump.

Many in the West End discern an insidious element in the public distrust of radiation. The fear of nuclear power plants, they maintain, led to the ruin of the uranium industry. And the fear of radioactive contamination, many believe, caused the end of Uravan and brought upheaval to the communities of the West End. Yet, because of the widespread concern about radiation, a new industry arose in the West End. One might call it the remediation industry, and it has helped the West End come through the collapse of the uranium industry.

Although Union Carbide shut down its West End mines and mill in the mid-1980s, the company would maintain its presence in the area for years to come. Through nearly fifty years of operation the company had accumulated a liability that it could not abandon. By 1984 Union Carbide had amassed approximately ten million tons of mill tailings and contaminates that resulted from decades of uranium and

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vanadium production. This waste material, a source of low-level radiation, had attracted considerable attention from the state government, the federal government, environmental groups, scientists, lawyers, and the general public. For Union Carbide and other uranium companies the tailings and other waste have proven to be the scourge of the industry, at best a nuisance and at worst a considerable threat to human health.

A mill operation creates enormous amounts of the sand-like waste material; virtually all of the ore processed at a mill comes out as waste, because uranium constitutes only a tiny fraction of the original ore. Some mills also removed vanadium from the ore; still, removing the vanadium hardly reduced the total amount of leftover tailings. For each ton of ore that passed through the Uravan mill, for example, at least 1,950 pounds of tailings remained. Thus, in any place that a mill operated, there will be found tailings, in amounts that correspond to the size of the mill and the length of time it functioned. At various locations in the western United States there were in 1985 perhaps 191 million tons of uranium mill tailings.5

Uranium mill tailings contain about eighty-five percent of the ore’s original radioactivity. The milling process removed virtually all of the uranium, ninety-two to ninety-eight percent. But the waste contains all of the uranium

5Crawford, "Mill Tailings," 537.
decay products, elements that occur with the decay of uranium. One of these elements is thorium-230, which has a half life of 77,000 years. Thorium decays through alpha particle emission to radium, an element with a sixteen hundred year half life. Radium is the parent of radon, a radioactive gas with a half life of about four days. Due to the long half life of thorium, uranium mill tailings constitute an all but inexhaustible source of low-level radiation. The tailings also contain a number of non-radioactive elements leached from the ore, and the reagents used in the milling process.

Mill tailings are remarkably transient. The owners of many mills deposited their waste near rivers, and it was thus "very susceptible to soil erosion processes and downstream transport in the watershed." It has been shown that mill tailings are the source for dissolved radium in rivers, and this raises the concern that drinking water sources have been, or may be contaminated. Further, "the uptake by algae of radium-226 entering surface waters can eventually also lead to incorporation into the human food chain." The most serious water pollution occurred when

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there were relatively few controls on the discharge of mill effluent and tailings. Over time, state and federal agencies began to regulate the discharges more strictly.

Tailings may also be blown about by the wind; scientific investigation has revealed increased levels of radiation, due to the wind transport of tailings, as far as one mile from some tailings piles. At a mill site in New Mexico, nearby residents reported that winds carried tailings in visible clouds up to six miles away. Tailings deposited in such a manner increases the risk for human exposure to radiation. It also raises the concern that plants might become contaminated "as a result of either root uptake and translocation or surficial contamination of foliage by airborne particulates." The cattle and wildlife that eat such plants represent a theoretical pathway through which humans ingest radiation.⁸

Mill waste may contaminate the soil and groundwater that lies beneath it. In some cases, radium leached into the soil beneath tailings piles to depths of two to nine feet. The groundwater beneath tailings piles may contain uranium, which is more readily transported to the groundwater than is thorium or radium. Although the mills were designed to remove as much uranium as possible, some

uranium remained in the waste. Tailings also contaminate soils and groundwater with selenium and other non-radioactive elements that originated in the uranium ore.\textsuperscript{9}

When deposited, uranium mill tailings have the consistency of thin mud; the tailings emerge in a "slurry," mixed with the liquid effluent from the mill. The liquid drains rapidly from the surface of the pile, but the inner portions of the pile remain wet for long periods of time. And, if new tailings are constantly added, at least some portion of the pile remains wet. The waste in the "tailings ponds" must be retained with a dam, generally constructed of tailings materials. At Church Rock, New Mexico, in 1979 a dam retaining mill wastes broke. The break released ninety-four million gallons of liquid waste and 1,100 tons of tailings. This accident has been called "the largest release of radioactive waste" in American history.\textsuperscript{10}

However, there occurred in Grand Junction an even greater release of radioactive waste. Between 1952 and 1966 mill tailings were used in that city for construction purposes. Very little thought was given to the control of tailings at this time; in fact, there were no federal regulations concerning tailings until the 1970s. The use of tailings as fill material was considered an efficient way to


\textsuperscript{10}Hinchman, "Rebottling the Nuclear Genie," 1.
dispose of accumulated waste. Building contractors and home
owners hauled off approximately 300,000 tons of it. About
fifty thousand tons were used under and around homes,
businesses, and schools as fill material for foundations and
for water and sewer lines. (Apparently, the remainder was
used in the construction of highways, streets, and
sidewalks.) The presence of tailings beneath an enclosed,
occupied structure presents a health risk, because radon gas
permeates concrete slabs and accumulates in the confined
space of the building.

As noted, thorium decays to radium, and radium is the
"parent" element of radon gas. Radon emits alpha particles,
and thus is radioactive; but the odorless, colorless, inert
gas presents little concern, because a person exhales the
gas before the alpha radiation causes significant harm. But
as the radon itself decays, it forms the radioactive
isotopes of bismuth, polonium, and lead. These decay
products, sometimes called "radon daughters," are highly
charged, atomic sized, solid particles with half lives
ranging from less than a second to about twenty years. The
radon decay products attach easily to lung tissue when
inhaled. The alpha radiation emitted by these particles may
cause cellular damage that may result, after a latent period
of five to twenty years, in a cancerous growth. If uranium
mill tailings are deposited beneath houses and other
buildings, as occurred in Grand Junction, the occupants will
inhale extraordinarily high levels of radon decay products.\textsuperscript{11}

This problem received widespread attention in the late 1960s and early 1970s. In 1972 Congress appropriated money to help the state of Colorado, which was to pay one quarter of the cost, remove the tailings that had been installed under and around buildings in Grand Junction. The most widespread use of tailings for construction purposes occurred in Grand Junction, but it became evident that buildings in many other towns and cities had been similarly contaminated. It also became clear that millions of tons of tailings at various mill sites warranted attention.\textsuperscript{12}

In 1978 Congress passed the Uranium Mill Tailings Radiation Control Act. The legislation authorized the Uranium Mill Tailings Remedial Action Project, or UMTRA Project. The Department of Energy (DOE) administers the project, "designed to provide for the stabilization, disposal and control of uranium mill tailings located at designated inactive uranium mill sites in a safe and environmentally sound manner." Legislators defined inactive sites as those mills that produced uranium for the AEC


before 1971; legislators appropriated no funding for active mills, those that continued to produce uranium after the AEC discontinued its purchases. Under the UMTRA Project the DOE also directs the removal of radioactive fill material under "vicinity properties," those buildings constructed with mill tailings as fill. As of 1995, the DOE had completed much of the "remedial action" at fifteen of the original twenty-four designated tailings piles. The DOE had identified 5,275 vicinity properties, 5,121 of which had been "cleaned up." Of the total number of vicinity properties, 4,266 were located in Grand Junction.\(^{13}\)

Grand Junction received a high dose of publicity for a time; one writer dubbed it "America's Most Radioactive City." Another reported that Grand Junction suffered an abnormally high rate of cancer and birth defects, and suggested that future cancer rates would be higher in Grand Junction than elsewhere. But the concern about radon gas in buildings gradually escalated to include the entire nation. Because radioactive elements are ubiquitous in the earth's surface, buildings in any state may be found to have accumulations of radon gas that some consider a threat to human health. In fact, the Environmental Protection Agency

(EPA) has placed radon very high on its list of health risks; the agency figures that radon causes five thousand to thirty thousand lung cancer deaths per year. The concern about radon has been well publicized, and has resulted in a vast number of scientific and medical studies.

It has been well established that radon daughters are carcinogens. The risk occurs with long-term, continuous exposure to high levels of the decay products. But there exist differences of opinion concerning the level at which radon constitutes a health risk. Radon is often measured in the unit "picoCurie per liter" (pCi/l) of air. The EPA established the "action level" for radon at four pCi/l. Homes and buildings that exceed the "action level" should be "mitigated," often a very expensive process. But many critics contend that the EPA's level is much too low. One of them, Doctor Geno Saccomanno, is a well known research pathologist from Grand Junction who has spent much of his career studying the consequences of long term exposure to radon decay products. Since the early 1970s he has assured Grand Junction residents that the levels of radon gas in their homes pose no extraordinary health risk. Saccomanno maintains that there is no increased risk in buildings that have radon levels as high one hundred pCi/l. However, he

14Wood, "America's Most Radioactive City," 46; Metzger, "'Dear Sir,'" 59; Cassandra Chrones Moore, Haunted Housing: How Toxic Scare Stories are Spooking the Public out of House and Home (Washington, DC: Cato Institute, 1997), 27.
would settle for the twenty pCi/l level that other
countries, including Canada, have adopted as a standard.
Saccomanno is certain that indoor radon, even in Grand
Junction, is not a health hazard. Of the widespread concern
about mill tailings installed under houses, Saccomanno said,
"I think the public is being misled . . . there isn't a
single documented case of a non-smoker exposed to [indoor]
radon who developed cancer." Moreover, cancer rates in
Grand Junction are no higher than anywhere else.15

There are other critics of the EPA's radon policy. For
a variety of reasons, according to their viewpoint, the
evidence upon which the EPA bases its policy is faulty.
Researchers in the United States and other countries have
conducted studies that fail to establish a link between
indoor radon and cancer. In fact, some studies have shown
that the states with the highest levels of indoor radon have
fewer cases of lung cancer than those states with the lowest
levels of indoor radon. Such findings, one author sharply
commented, "would give pause to anyone but an EPA

15 "Extremely Low Radiation Levels Emphasized at Radon
Study Meet," Daily Sentinel, 21 January 1971, p. 7; "Doctor
Disputes Cancer, Mill Tailings Connection," Denver Post, 7
September 1987, p. 2C; Bob Silbernagel, "Saccomanno Stance
1A; Kit Miniclier, "Uranium Cleanup Grows into West Slope
Boom," Denver Post, 16 April 1989, p. 1B; "Researcher
Questions Tailings-Cancer Link," Rocky Mountain News, 6
September 1987, p. 31.
administrator. In the critics' opinion, the EPA's adherence to an unrealistic "action level" causes undue worry and unnecessary expense on radon testing and mitigation.

As with indoor radon, outdoor radon, specifically that which emanates from tailings piles, has been the subject of considerable attention and debate. Many scientists, some with the EPA and other government agencies, hold the view that the exposure to any amount of radiation causes negative health effects: there is no safe level of radiation. The radon decay products released from tailings piles around the western United States contribute to the doses received by everyone in the nation. Scientists have devised formulas designed to estimate the number of cancers caused by radon decay products that come from tailings piles. As explained by the chairman of the Nuclear Regulatory Commission, "the health effects of the radon production [from uranium mill tailings] are tiny as applied to any one generation, but the sum of these exposures can be made large by counting far into the future, large enough in fact to be the dominant radiation exposure from the nuclear fuel cycle."17


17U. S. Congress, House, Committee on Interior and Insular Affairs, Uranium Mill Tailings Control: Hearings before the Subcommittee on Energy and the Environment, 95th Congress, 2nd session, 26-27 June, 10 July, and 17 July
If it is true that "the radon released by a pile in New Mexico may eventually harm a stockbroker in New York," then the effects to local populations must be some degree greater. One must also consider the localized radioactive contamination resulting from wind and water erosion, and from the misuse of tailings. Many have authored articles and books that explain the assumed and potential tragic health effects caused by the exposure to the radiation from mill tailings.\textsuperscript{18}

Contrarily, other scientists discount the health risks beget by mill tailings. The amount of radon exhaled by tailings constitutes but a tiny fraction—far less than one percent—of the total amount of radon that comes from the entire earth’s surface. The atmosphere so dilutes the radon from tailings piles that it cannot be measured beyond the distance of one-half mile, and one-quarter mile in some cases. For these and other reasons, many experts maintain that uranium mill tailings cause no adverse health effects, not only to distant populations, but also to local populations. Some would say that the "perceived effects,"

\begin{footnotesize}
\begin{enumerate}
\end{enumerate}
\end{footnotesize}
an individual's concern about radiation from mill tailings, warrants more attention than the actual radiation.\textsuperscript{19}

A study panel convened by the National Research Council trod the middle ground. That group concluded that most people will suffer no adverse health effects from the release of radiation from uncontrolled tailings piles. Those living in very close proximity to such a pile, less than a kilometer away, could have an increased level of risk. The panel also believed that while "tailings may pose health risks through a variety of secondary pathways--such as via the food chain--in general, it does not appear that such risks are significant."\textsuperscript{20}

While there are various risk assessments, no one questions the need to contain and stabilize uranium mill tailings. (Although the experts do argue the methods by which and the extent to which the tailings should be controlled.) It suffices to consider the fact that the wastes will be radioactive for many thousands of years, and no one can predict the future migration of people or tailings. Even a person with the most sanguine view of the


threat posed by uranium mill tailings will admit that "there's a hell of a lot we don't know about radiation at low levels." For that reason most people are uneasy with the idea of tailings "just blowing around New Mexico," as one politician put it.\(^{21}\)

The elements found in uranium mill tailings also emit gamma radiation. The gamma radiation from mill tailings is considered less a threat to human health than the internally deposited alpha radiation. However, when tailings are spread about the environment, the gamma radiation contributes to the overall level of potentially harmful radioactivity.

The history of mill tailings disposal in the West End extends to the 1910s, when the Standard Chemical Company built a concentrating mill at the future site of Uravan. That operation left only a small amount of tailings, as measured against the amount left in the 1950s and later. Standard Chemical processed about thirty thousand tons of ore from 1914 to 1922, although the estimates vary. It is also possible that as much as "100,000 tons of sands could have resulted from this earliest operation."\(^{22}\)


\(^{22}\)Landa, "Buried Treasure," 18; U. S. Department of Energy, Grand Junction Area Office, and Bendix Field Engineering Corporation, Commingled Uranium Tailings Study,
In 1936 the United States Vanadium Corporation built Uravan and a mill at the same site. From 1936 to 1944 the company produced vanadium; the amount of tailings left by this operation is not known, but one might guess that there were several hundred thousand tons. The West End's other mill, belonging to the Vanadium Corporation of America, produced vanadium from 1939 to 1944 and left an indeterminate amount of tailings at the site. The accumulated tailings from these two operations were then milled for their uranium content for the Manhattan Project.

Beginning in the late 1940s both VCA and USVC (the company later became Union Carbide) processed ore for the AEC uranium procurement program. The VCA mill near Naturita remained in operation for about ten years; then, from 1961 to 1963 the company operated an upgrader on the site. The waste from these activities remained until the late 1970s, when Ranchers Exploration acquired it. That company moved 630,000 tons of waste to a site near the old coke ovens in the Paradox Valley. Ranchers Exploration leached the tailings to remove the remaining uranium and vanadium; the company then "covered and stabilized the reprocessed tailings in accordance with Colorado Department of Health regulations."

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23Albrethsen and McGinley, Summary History, A-27.
Union Carbide’s Uravan mill operated continuously for about thirty-five years. Until 1956 the tailings were deposited on the valley floor near the town and along the banks of the San Miguel River. In 1956 the company expanded the mill and changed the milling process; thereafter, the company stored the tailings on the top of Club Mesa, about four hundred feet above Uravan.

In the West End, like in many other cities and towns in the American West, tailings ended up beneath houses and other buildings. The use of tailings as fill material was not widespread and systematic, as in Grand Junction. The communities were much smaller, and construction occurred on a much smaller scale in the West End. Nevertheless, the waste was generally available to anyone determined to get it. As of 1997 the DOE had identified forty-eight vicinity properties in the Naturita area (including Nucla). The list consisted of three vacant lots, a school, eight commercial structures, twenty-eight homes, and eight other properties, including churches and car washes. Twenty-five of the sites had been remediated. Many other properties have been examined and excluded from the DOE’s UMTRA Project, presumably because the levels of radiation at those structures did not warrant the excavation of soil from around the structures. As of 1997 the DOE had yet to
determine the status of fifty-two additional properties in the Naturita area.24

The remediation of vicinity properties is sometimes costly because it involves the removal of tailings from beneath the structures. Such was the case at some West End buildings, including a school in Nucla. In other cases, however, remediation means the simple removal of soil from a driveway or parking lot; this radioactive dirt from the mine sites had been transported through the years via the miners' vehicles. A shop in Naturita, to which miners took their vehicles for repair and maintenance, required this type of remediation. In other cases, the DOE found tailings beneath the room additions of houses in Nucla or Naturita. Some people salvaged bricks, found to be radioactive, from the old VCA mill.

Uravan encountered similar problems. Late in 1969 Union Carbide officials detected high levels of radon gas in a house on D Block; this prompted the company to move the family into another house. Eventually all of the houses and bunk houses on D Block were demolished, and other houses in Uravan required remediation. Uravan received its own small measure of attention in the early 1970s. A correspondent for McCall’s magazine publicized the evacuation of the

24Walt Migdal, Jacobs Engineering Group, Inc., Albuquerque, NM, to author, no date. Jacobs Engineering is one of the government contractors in the UMTRA Project.
family from the house on D Block, and the situation was mentioned on a nationwide evening news telecast.\textsuperscript{25}

No one can say for certain how tailings ended up beneath some of Uravan’s houses and other buildings. Officially, Union Carbide allowed no use of its tailings for any purpose, and that policy existed at least since the 1950s. However, the company’s official concern may not have extended throughout the workforce. There probably were individuals who allowed tailings to be carried off; eventually, it was discovered that sewer, water, and gas lines in Uravan had been buried in mill tailings. There were tailings used in a septic system leach field. And, some residents used the sandy waste material in gardens, to soften and improve the drainage of the hard soil.\textsuperscript{26} Former Uravan residents claim that gardens laced with tailings produced more beautiful plants; the ammonium salts found in the waste makes an excellent fertilizer.

But the origin of mill tailings scattered about Uravan is "unknowable." No one knows what happened to the waste left from the Standard Chemical operations of the 1910s. The exact disposition of tailings left from the 1930s and 1940s has not been established, although one pile left from

\textsuperscript{25}Metzger, "Dear Sir," 62; Wood, "America’s Most Radioactive City," 50.

\textsuperscript{26}Jack Frost, former manager of plateau operations, Union Carbide Corporation, interview by author, 20 February 1995, Grand Junction, Colorado, tape recording, private collection.
the 1940s remained near Uravan throughout its history. The company stabilized this old pile with a dirt cover. When Union Carbide demolished the house on D Block, the one that had attracted so much attention, it is said that workers found not tailings beneath the house, but high grade ore. That ore was probably left from the Standard Chemical operations of the 1910s. In the 1930s the houses were built in Uravan "without any real concern with what was under them." Through the years the tailings from earlier operations were buried, covered up, or scattered in various ways throughout Uravan.²⁷

Mill tailings were deposited in Uravan by natural means, as well. During the 1940s the wind blew across the tailings with enough velocity to create "sand storms" that circulated about Uravan. At the time, no one thought of the dust as a radiation hazard, although it was clearly a nuisance. In the early 1950s the tailings were still deposited near the town. However, an active tailings pile contains more moisture than the dry tailings piles that stood in Uravan during the 1940s. The piles that accumulated during the early 1950s were probably less susceptible to wind erosion.

In 1956 Union Carbide began pumping its waste to the top of Club Mesa, about four hundred feet above Uravan. This new location further reduced the amount of windborne

²⁷Ibid.
radionuclides that accumulated in and around the population center of Uravan; Union Carbide's managers apparently believed they had no problem, because they did little to further control the wastes. A thorough study of the Uravan area by the consulting firm of Dames and Moore found that "windborne particulates from tailing and ore stockpiles contribute little to the ambient environment at Uravan." At any given time, thirty to forty percent of the tailings were wet, because the sands emerged from the mill in a slurry. The moisture mitigated against the dispersal of tailings in the wind. The remaining dry portions of the pile developed a "dry hard crust-like" surface that held firm.

Another firm, ERI Logan, Inc., prepared a report that summarized the many past studies of the Uravan area. The authors of this particular report reached a different conclusion: "Inhalation of direct and resuspended radioactive particulates is considered to be a principal exposure pathway for humans in the vicinity of the Uravan mill." The authors concluded that windborne particulates from the tailings, and from certain areas of the mill itself contributed to elevated levels of radiation in and around Uravan. Even the "haul traffic," the trucks bearing loads of ore, provided a source for "fugitive dust."

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vegetation in and around Uravan showed that plants had absorbed radionuclides from the mill site. Garden vegetables grown in Uravan contained levels of radiation that exceeded standards, set by the EPA, that took effect on 1 December 1980.\textsuperscript{29}

The new EPA regulations applied to doses of radiation from exposures to materials produced in the uranium fuel industry; however, the EPA specifically omitted radon decay products from its new regulations. When the EPA announced the new regulations, in the late 1970s, several sites measured in Uravan exceeded the new EPA standards. The town of Uravan had met the previous EPA standards, in effect before 1 December 1980. And Union Carbide officials believed they could meet the revised standard through remediation work in the town, and by installing a new, two million dollar system to the mill.\textsuperscript{30} Presumably, this would have reduced the release of radioactive particulates from the mill.

\textsuperscript{29}ERI Logan, Inc., Final Report: Winter Baseline Investigation of Surface Media in the Vicinity of the Uravan Uranium Mill, Uravan, Colorado, volume 2, Summary of Historical Information, 11 August 1986, 3-15, 2-18, 3-16 - 3-20, 4-16 - 4-19.

Setting a standard for levels of radon gas fell to the state of Colorado, which granted Union Carbide's operating license. The company may have been able to meet the state's standard, set at three pCi/l, through remediation work at various sites. According to the company, four of ten sites measured in Uravan met the standard, although at least one site measured seven pCi/l. However, the Colorado Department of Health (CDH) and various environmental groups wanted to lower the standard to one pCi/l. Some claimed that the lower level was necessary to prevent lung cancer caused by radon daughter products. Union Carbide officials believed the proposed standard was "unrealistic," and would "impose unnecessary hardship" on both the company and the residents of Uravan. They considered the three pCi/l standard safe.31

Had Union Carbide been unable to meet the radon standards set by the state, the company probably would have closed the town, and arranged for housing in Nucla or Naturita. Ultimately, however, the bust in the uranium market rendered the point irrelevant; the population of Uravan dwindled through the early 1980s, and by the middle of the decade no one lived there. At any rate, the CDH

never enforced its standard for radon gas by forcing Union Carbide to close Uravan.

In fact, the state of Colorado allowed Union Carbide to operate its Uravan mill with an outdated license for ten years, from 1975 to 1984. Through that period the old license was amended several times. This unusual situation was blamed on "uncertainty over changing regulations, understaffing at the health department, events at other mills and company delays in supplying adequate information." Colorado Department of Health personnel had concerns about Union Carbide’s waste disposal practices and radiation levels in Uravan. Carbide’s managers worked to satisfy those concerns, but found themselves unable to meet a set of constantly changing state and federal regulations. Meanwhile, the representatives of various environmental groups weighed in on the matter, and demanded that Union Carbide meet certain criteria for waste disposal in order to continue operating. The result was a massive pile of documents—estimated to have grown to a stack eleven feet tall by 1984—produced by Union Carbide and various consulting firms. The documents contained the plans through which the company intended to comply with state and federal regulations. One of Union Carbide’s managers remembers that the company spent nearly six million dollars on various studies and reclamation plans. But the state of Colorado
did not issue a new license until 1987, well after the company had closed the mill.32

Of great and ever growing concern to the CDH was the mountain of waste amassed on the mesa behind Uravan. Representatives from the state of Colorado, the EPA, and environmental groups viewed the tailings as a perpetual source of contamination to the surrounding environment. But the tailings posed another threat: some feared a break in the tailings dam, caused by flooding, an earthquake, or human error. A failure in the dam, it was generally agreed, would overwhelm the town of Uravan. Union Carbide deemed the tailings retention structure safe. The consulting firm of Dames and Moore elaborated on the likelihood of a catastrophe. The consultants believed it "unlikely" that the dam would fail because of a flood. A dam break because of an earthquake they believed "highly improbable." And, the release of waste material because of structural failure was "considered remote."33

But others were not so sure. An inspection by a representative of the Nuclear Regulatory Commission, late in 1979, "revealed significant retention dam instability." The director of the Radiation Control Division of the Colorado


33Lange, "Tailings, Pollution," 4-5; Dames and Moore, Environmental Report, 7-2, 7-3.
Department of Health believed that "shallow sloughing failures could occur which could lead to a major overall failure" of the dam. The CDH forced Union Carbide to close the mill. It remained closed only four days, during which time the company stabilized the dam and arranged to have new tailings pumped to a location further from the edge of the mesa.34

Other waste disposal practices caused problems for Union Carbide. Since the early 1960s the company had used the Club Ranch ponds to dispose of raffinate, liquid mill effluent containing reagents and elements dissolved from the ore. Straight from the mill the liquid contained radium; but company engineers devised a treatment system by which most of the radium was removed. The effluent was then pumped to the six unlined ponds on the banks of the San Miguel River just downstream of Uravan. The water evaporated and the solids remained in the form of crystals; periodically, the solids were removed to a different location. The ponds were designed without a lining, to take advantage of both evaporation and percolation. The small amount of radium and uranium remaining in the effluent

collected on the solids in the bottom of the ponds, and the soil beneath the ponds neutralized the acidic wastes.  

To dispose of liquids Union Carbide also used an area on top of Club Mesa, because the Club Ranch ponds were not big enough to accomplish the goal. At the mesa site the liquid was sprayed into the air, to promote more rapid evaporation. As the water from the effluent evaporated, mounds of raffinate crystals formed. The company used the Atkinson Creek disposal area, located near the river and downstream of the Club Ranch ponds, to store raffinate crystals from Club Mesa and the Club Ranch ponds. To treat additional mill effluent, the company designed a neutralization plant. The effluent was neutralized with limestone and treated for radium removal; after the solids settled the liquid was discharged to the river. The neutralized sludge from this operation was removed to a disposal site on Club Mesa. The company also had in place a system that recirculated a portion of the tailings pond liquids.  


At one time, Union Carbide’s waste disposal facilities represented significant progress in the reduction of pollution. Just a few years previous to the construction of the Club Ranch ponds, for example, mill owners commonly discharged waste directly to the rivers. Union Carbide was the first mill to begin removing radium from the liquid effluent, in 1958, and that process was regarded as "state of the art." In those years, the primary concern was the radium contained in the waste, but the Club Ranch ponds also reduced the amount of salts and other contaminants released to the river. In an earlier day, "the general philosophy of the people running things was that they stayed one step ahead of the regulators." Union Carbide’s "technical people" took pride in not only meeting the regulations, but also in working to formulate new regulations. For example, during the 1960s the company cooperated with the state of Colorado to set new standards for the disposal of uranium mill wastes.\(^{37}\)

By the late 1970s, however, the company’s waste disposal practices were deemed ineffective. Inevitably, the tailings pile and other waste disposal sites bled contaminates to surrounding areas. The groundwater beneath

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\(^{37}\)Beverly interview; Frost interview; Robert G. Beverly, "Statement by R. G. Beverly, Union Carbide Corporation, for Panel on Past, Present, and Future Controls of Water Pollution by the Colorado Uranium Industry," paper presented at the National Western Mining Conference, Denver, 4 February 1966, 3-4.
the Club Ranch ponds and the tailings piles contained salts, such as aluminum sulfate, calcium sulfate, and sodium chloride that resulted from the acid used in the mill. The groundwater also contained some uranium, that five percent or so that had not been extracted from the ore. Through the years various metals, including aluminum, arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, vanadium, and zinc, also leached into the soil and groundwater beneath the tailings and the Club Ranch ponds. Runoff from the ponds, crystal disposal area, and the tailings pile polluted the adjacent soils; runoff from these areas and subsurface seepage from the groundwater charged the San Miguel River with contaminants. In addition, windborne pollutants from the tailings pile and from the mill operation contaminated the soils in the vicinity of Uravan. Soil tests revealed "significant inverse relationships between distance from the Uravan mill site and soil contaminant concentrations" of several metals. 38

Most of these metals, however, were not considered a threat to the human population. The authors of a health risk assessment of Uravan regarded only cadmium and lead, present in relatively high concentrations only in the Club Ranch ponds, to be health threats. Several other metals,

including mercury, posed "no serious health threat because of low concentrations or no known health effects." Other metals were discounted as health threats "due to either minimal toxic effects, lack of accumulation within the body, or the lack of specific conditions required for toxicity." And, though Union Carbide's operation resulted in the contamination of groundwater in the vicinity, it did not affect the either the residents' drinking water, which originated from another source, or any irrigation water.39

Union Carbide came under heavy pressure in the late 1970s and early 1980s to clean up its site and to halt the further release of pollution. State and federal agencies applied this pressure, as did environmental groups like the National Wildlife Federation, Environmental Defense Fund, Friends of the Earth, and local groups. The company's image took a beating. An EPA agent was quoted as saying that the company could not "invest enough money in that site to make it acceptable by today's standards." Representatives of Colorado's Department of Health termed Uravan a "bad operation," and a "disaster area." A spokesman for the Environmental Defense Fund asserted that "if you live in Uravan and don't smoke, you have double the risk of a smoker of getting lung cancer." A wag suggested that, should the tailings dam at Uravan give way, the town and its residents

would become "a nuclear Pompeii," buried beneath "tons of hot effluent.""^40

Accidents at the Uravan mill contributed to the perception of Union Carbide as corporate polluter. In October of 1980 a worker broke a pipe that carried raffinate; the resulting spill released nine thousand gallons of raffinate to the San Miguel River, and constituted the third such spill in a six-week period. ERI Logan, Inc. counted forty-one spills and discharge violations at the Uravan mill from 1968 to 1983.^41

The pressure on Union Carbide culminated in 1983, when the state of Colorado sued Union Carbide for damages the company had done to the environment. The lawsuit was filed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, the so-called Superfund legislation. The state of Colorado filed seven such claims against various manufacturing, mining, and milling companies.^42

The claim against Union Carbide proceeded slowly. A company representative who participated in the proceedings


described the situation: "We would have technical meetings with fifty people in the room, ten lawyers, and forty technical people. You try to get something done, and it would turn to chaos. Nothing was happening." The company proposed a review committee, composed of three people from each side, responsible for reaching some sort of resolution. The state agreed, and the committee "met essentially full-time for a year in Denver." By February of 1987 the committee had formulated a consent decree, a sort of agreement that, by court order, was legally binding on both parties. A remedial action plan for the Uravan site constituted part of the consent decree.\textsuperscript{43}

The Colorado Attorney General's office held tremendous power in this situation. The state required Union Carbide to produce its own documents in the case against the company. It seemed as though the company was being held liable for practices that, in the past, had been licensed by the state's regulatory agencies. The state required the company to pay for studies that were commissioned by the state. And, as part of the settlement Union Carbide paid 2.75 million dollars to the state for the cost of pursuing the case and as a payment for damages to the environment.\textsuperscript{44}

\textsuperscript{43}Frost interview.

Union Carbide's managers believed the legal action more of a political gimmick and a money grab than an attempt to rectify any harm to the environment. The state had ample power without the superfund law to compel the company to remediate its site. More importantly, Union Carbide had fully intended to clean the Uravan site, and to implement new waste disposal facilities for its anticipated future operations. The company had commissioned numerous studies of the site and had presented the state a remediation plan similar to the one detailed in the consent decree of 1987. The company had even established a surety of nearly twenty-eight million dollars that guaranteed its good intentions.45

It seems certain that Union Carbide would have had to close Uravan, primarily because of the radiation levels in the town. Before signing the consent decree with the state of Colorado, Union Carbide had agreed to evacuate the town in 1988 if the town did not meet the applicable standards. As part of the consent decree, however, the state insisted that the town be closed by 31 December 1986.46 Had uranium prices remained high enough, Union Carbide would have


remained in the business; the company had bought interest in a mill in Blanding, Utah to continue its operations. But even with high uranium prices, Uravan likely would have closed.

Under the remedial action plan that resulted from the state’s lawsuit, the cleanup of Uravan was predicted to cost some forty-four million dollars. At the completion of the project, no sooner than 2003, the cost will probably be at least twice that amount. The mill tailings will be covered, in place, on top of Club Mesa. From the town site the company has excavated contaminated soil, as in a strip mining operation, and moved it to the top of Club Mesa. The Club Ranch ponds still exist; now, however, they are lined, and the company pumps the polluted groundwater into the ponds. As the water evaporates the solids remain, and these contaminates will eventually be moved to the waste repositories atop Club Mesa. Likewise, raffinate crystals and neutralized sludge that had been stored in various locations have been moved to a waste disposal facility on the mesa.

The mill and other buildings have been dismantled, and disposed of according to predetermined regulations. Union Carbide sold many of Uravan’s houses in the mid-1980s; the buyers moved the houses to various towns in southwestern Colorado, where they are still in use. The company measured the radioactivity of each house before it left Uravan, and
certified each as safe according to radiation standards. Gradually, the remaining structures in Uravan were dismantled or demolished. When the company completes the reclamation, no trace of the town or the mill will be left. In its reclamation work at Uravan, Umetco Minerals has employed an average of forty people since the mid-1980s.47

Meanwhile, at the former VCA mill site located about two miles from Naturita, the DOE has conducted an on-going reclamation project. Although the tailings had been moved from the site in the late 1970s, radioactive and non-radioactive contaminants remained as a result of seepage, run-off, and erosion. There is also groundwater contamination, but the DOE will allow natural processes to flush the groundwater clean. It does not provide local consumption water.

The Naturita UMTRA Project was started only in 1994; the site was low on the DOE’s list of priorities because of its location in a sparsely populated area. Initially, project engineers planned to remove 400,000 cubic yards of soil, but they eventually removed nearly twice that much. The DOE bought from Umetco Minerals a disposal pit that Umetco had excavated on Club Mesa; DOE contractors have used that site to dump the contaminated soil from the VCA site.

The remedial action has proceeded intermittently, and is scheduled to be completed in 1998.48

The DOE's contractors provided some economic activity and local employment. In 1996 those contractors employed about forty West Enders, with more hiring anticipated; more workers participated in the project, but many of them lived out of the area.49

The West End reclamation projects have provided jobs and economic activity to the area. Local residents appreciate that, but the environmental cause did not play very well. For the most part, former and current residents believed that the reports of Uravan's contamination were overstated. They describe the state-mandated cleanup of Uravan as "hogwash," "a crock," "a joke," and "overkill." Some West Enders consider environmentalists to be overzealous, seeking to fix problems, with other people's money, that did not exist. In 1980 a Montrose County commissioner noted that "nobody on this current board of commissioners is inclined to go along with some of the extreme attitudes of the environmental type." Others view the remediation of Uravan as an example of outsiders getting involved in local affairs, of which they had little


understanding and about which they reached false conclusions. According to this view, the order to clean up Uravan had more to do with Uravan town’s closure than the fall of uranium prices. Said a former mill worker, "We felt more or less the government’s the one that put us out of the jobs." A Naturita resident summarized the local attitude during Uravan’s final days: "I suspect that if you were an environmentalist, it would not be wise to walk into the Naturita bar on Saturday night and say 'Uravan has to be closed.'"

Few of Uravan’s residents, apparently, worried about a collapse of the tailings retention dam above the town. In some cases, perhaps, familiarity bred a sense of security. "I don’t see what the holler is about on that tailings pile. I saw that pile grow. I was there when there was nothing up there on that mesa but pinyons and juniper." This mill worker also felt reassured by Union Carbide’s health and safety policies. Another Uravan resident recalled reports that theorized only an earthquake of magnitude 6.0 could damage the tailings dam. Incredulous, she wondered "when are we going to have a 6.0 earthquake?"

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50 The opinions and quotes in this paragraph come from several interviews by the author. See also Lange, "Tailings, Pollution Haunt Uranium Company Town," 4, and Marti, "Western Colorado Uranium Town," 11.

51 Lange, "Tailings, Pollution," 4; Interview #2.
The notoriety that Uravan achieved during the late 1970s and early 1980s annoyed the residents of the town. "The tailings don’t bother people here," reported one. "The stories about how dangerous the radioactivity is makes people here pretty mad."\textsuperscript{52} Residents grew weary of visitors asking them whether the radiation scared them, and they heard the popular fable, about Uravanites "glowing in the dark," too many times. They take a nonchalant attitude about radiation. Some still maintain that the company tore down the house on D Block not because of high levels of radon gas, but because the company wanted to process in the mill the valuable ore located beneath the house.

The calm reaction might be seen as a defense of their town, company, and way of life, but it is also true that some Uravan residents were well informed about radiation. For example, one former resident cited a lack of certainty among experts regarding "what is a high level of radiation." He acknowledged a "breaking point" at which the radiation levels become a health risk, but doubted that levels in Uravan had reached that point. Another pointed out that everybody is exposed to naturally occurring radiation from a variety of sources; she doubted that living in Uravan contributed significantly to a person’s overall exposure level. One woman looked at the matter pragmatically; the

pollution in a big city like Denver seemed much more harmful to a person's health than anything found in Uravan.\textsuperscript{53}

Often, those who lived and worked in Uravan allude to their own health, and that of their neighbors, as evidence that their exposures to radiation were inconsequential. If the radiation exposure levels in Uravan were so high, they ask, why have there not been more cases of cancer of the type caused by alpha or gamma radiation? While such anecdotal evidence is not conclusive, an epidemiological study provided additional confirmation. The study was commissioned by Union Carbide and completed in 1987. The author of the study compiled data on 812 families consisting of 3,202 people who either lived and worked in Uravan, or who only lived in Uravan for at least one year between 1935 to 1984. The author found no evidence "to suggest that Uravan residents experienced significantly higher rates of cancer than either the U. S. population or the population of the State of Colorado." In fact, Uravan residents, both male and female, have enjoyed "significantly lower mortality rates" than the national population, principally because they suffer far less from circulatory diseases than the general population.\textsuperscript{54}

\textsuperscript{53}Interview #34; Interview #17; Interview #2.

Nevertheless, one might assume that those who worked in the Uravan mill--some for thirty years or more--faced health hazards that went beyond the call of duty. After all, those employees handled uranium, in various stages of refinement, every working day. While their family members express little or no concern about the health hazards of living in Uravan, one might expect that the mill workers themselves harbor some doubt. Perhaps some do harbor doubt, but there are many former mill workers who display a confident attitude toward the supposed radiation threat. Likely, many would agree with the long-time mill worker and Uravan resident who said, "If I thought my health was really endangered, I wouldn't have worked there." Also typical is the statement of another former mill worker: "I have no concern about the uranium industry being a health hazard here." A few mill workers took extreme measures to express their attitude towards the supposed radiation threat; they actually ate yellowcake, not only to demonstrate their own fearlessness, but also to declare their belief that the widespread concern about radiation was exaggerated.55

However, various health threats existed in the mill environments, especially in the late 1940s and the 1950s. Inspections of uranium mills at that time revealed high

levels of silica dust in some areas, and high concentrations of airborne vanadium at some mills that processed vanadium as well as uranium. Surveys also showed that mill workers were exposed to radon gas, radioactive dust from the ore, and airborne uranium concentrate (yellowcake). Some mills achieved special notoriety because of the lack of dust control measures and other problems. An observer of the VCA mill near Naturita, for example, reported that "an estimated 20 tons of yellowcake had been lost via air emissions, imparting a yellow hue to the countryside for 'a half a mile or so.'" In 1949, just two years after the VCA mill opened, health inspectors found high levels of silica, carbon monoxide gas, and hydrochloric acid fumes so noxious that the inspectors became ill. A former employee at the VCA plant, confirming the inspectors' report, remembered "terrible" fumes and dust in the mill.\textsuperscript{56}

Some former uranium mill workers have complained of odd, debilitating health problems. And, studies of mill workers have shown "small excesses of deaths" from certain types of cancer, kidney disease, and respiratory disease not caused by smoking. These diseases may be the result of exposure to various forms of radiation and dust in the mills. However, the "health risks to uranium mill workers,"

according to an author who looked into the matter, "have received relatively little attention." He has called for more thorough examinations of uranium mill workers and their environments. 57

The unhealthy conditions at uranium mills were easily eliminated. One group of inspectors believed that "there are no health hazards in the mills which cannot be controlled by accepted industrial hygiene methods." 58 The Uravan mill serves as an example of the industry’s response. Built in the late 1940s, its design was probably similar to other mills that operated in the 1950s. The control of health hazards, or lack thereof, was likely similar to that of other mills. Moreover, within the entire uranium industry during the 1950s there was little concern about worker exposure to radiation. By the end of that decade there existed a more heightened awareness about the possible dangers. It seems that Union Carbide, as well as other mill operators, began to implement most of its "industrial hygiene methods" in the latter part of the 1950s. In 1960 Union Carbide’s director of environmental control spoke on the subject of radiation in the uranium mills. His


presentation reflected the "progress" made not only by Union Carbide, but by other mills, as well: "The measurement and control of airborne uranium dust and airborne [uranium] concentrate has been the biggest problem and the one in which we have seen the greatest advancement over the past two years." 59

Some former Uravan mill employees acknowledge the hazards that existed in that particular mill, but it does not seem to bother them. One man mentioned the dust in the mill and the presence of various chemicals. Despite any concerns, he spent a long career at Uravan. Another long-time mill worker also remembered dusty conditions: "It got to where you had to wear respirators in certain areas, especially in areas where there was radioactive dust." He also recalled that workers inhaled vanadium fume on the job: "Most everybody got a dose of it sometime." The exposure to vanadium caused severe congestion--"that vanadium would plug you up something terrible"--and it caused a person's tongue to turn black, although some describe it as more of a green color. 60 It has generally been believed that the afflictions caused by vanadium were temporary.


60 Interview #24; Interview #7; Interview #15.
Eventually, Union Carbide mandated the use of respirators in certain areas of the mill. While some former mill workers remember a time when respirators were optional, others, who started at a later date, remember that a respirator was required equipment. But health experts emphasized that respirators represented only a secondary precaution, not designed to supplant "permanent and adequate preventative and control measures required for successful suppression of radioactive dust." Toward this end, Union Carbide installed sprayers, scrubbers, collectors, and other dust control devices. In fact, as early as 1953 some dust collectors had been installed at the Uravan mill. Company managers deemed dust control not only a matter of health and safety, but also one of simple economics. They wanted to save as much product as possible.61

To assure the effectiveness of these controls, the company periodically sampled the plant for dust, silica, and radiation levels. The company provided film badges, which measured the amount of radioactivity in the work place. Employees also received a regular health screening; a urinalysis, for example, would detect the presence of some radioactive substances in the body. The company provided employees with information about radiation and taught

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employees industrial hygiene methods. For example, to keep dust from accumulating, mill workers were instructed to use water or vacuum pressure and to avoid sweeping or using compressed air. Mill workers were also advised to wash their hands before eating, smoking, and at the end of their shift; to "change clothes and bathe regularly"; and to eat their lunches "in an area which is as dust free as possible."  

Two areas of the mill caused concern for dust and airborne radioactivity. The initial stages of the process, the ore handling and crushing, promoted potentially high levels of dust and radon decay products. In this area Union Carbide installed its dust control systems. In well ventilated areas, it was assumed, radon decay products present no hazard, and most of the work areas in the mill were ventilated. After the crushing, the ore was put into solution, and it remained in liquid form until the end of the process. The wet solution not only eliminated the dust, but also suppressed the emission of radon decay products. In the final stage of the process Union Carbide's safety engineers again took precautions to minimize the workers' exposure to the end product, yellowcake. Fresh yellowcake

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gives off no radon gas, because it contains no radium, the parent element of radon.63

The awareness of potential radiation hazards grew simultaneous with the development of the uranium milling industry. At the beginning of the 1950s only a few people recognized the various health threats that existed in the mills. Doctors and industrial hygienists from federal agencies like the AEC and the United States Public Health Service (PHS) warned of the problems in the late 1940s and early 1950s. However, it took several years for mill owners to see the need for the control of radiation in the work environment. An inspector from the PHS remembered that, once the hazard had been recognized, "most of the mills did a beautiful job" of implementing radiation and dust control systems. Regulations issued in 1957 by the AEC also guided the uranium milling companies in this direction.64

Within the uranium industry there existed a far larger group of workers who were exposed to radiation: uranium miners. While the mills employed, at most, three thousand workers during the peak of uranium production, from five to six thousand miners worked during the same period. And, while the conditions in some of the mills were decidedly

63Beverly interview.

unhealthy, the atmosphere in the mines might be considered primitive. As it turns out, the radiation exposures to uranium miners probably constituted the dominant occupational radiation hazard in the uranium fuel cycle.

Many of the mines on the Colorado Plateau were small operations in which two to four men dug and hauled out ore. However, there were a few larger mines, in which as many as twenty, thirty, or up to fifty miners might have worked. The mines were often dusty, due simply to the nature of the work and the enclosed atmosphere of the work place. The dust in those mines has caused pulmonary fibrosis and other lung problems. Miners also received exposure to a certain amount of external gamma radiation, usually not in dangerous amounts, and airborne radium and uranium. Other hazards came from the gases created by blasting and the fumes from diesel powered mining equipment; such equipment was rare during the 1950s, but became more common during the 1960s.65

The greatest radiation hazard resulted from the radon gas that escaped from the ore bodies and accumulated in the enclosed space of the mines. The amount of radon gas and its decay products in uranium mines reached levels far greater than normally found in houses, even in houses built upon tailings. To measure radon decay products the health

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experts of the 1950s devised a measurement called the working level (WL). Simply stated, the working level represents a measurement of the amount of radon decay products in the air, and when the unit was formulated, one working level was assumed to be safe. Health experts also created a measurement known as the working level month (WLM), used to calculate a miner's cumulative exposure. A miner exposed to one working level for 170 hours, the hours worked in a month, would have accumulated one working level month. If he worked for a year in a mine in which the level of radon decay products measured one WL, he would have accumulated twelve working level months of exposure. If the mine in which he worked measured ten working levels, through the course of a year he would have accumulated 120 working level months.

Through the 1950s miners labored in atmospheres in which the level of radon decay products measured several hundred or more working levels. Consequently, many miners accumulated hundreds, and often thousands, of working level months of exposure. The exposures to which American uranium

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66 The definition of a working level is "any combination of radon daughters in one liter of air that will result in the ultimate emission of $1.3 \times 10^5$ million electron volts of alpha particle energy." This is the same amount of energy released by the decay of radon daughters at radioactive equilibrium with one hundred picoCuries of radon per liter of air. Bernard L. Cohen, "Radon: Characteristics, Natural Occurrence, Technological Enhancement, and Health Effects," Progress in Nuclear Energy 4 (1979): 5.
miners were subjected provided the evidence of the harmful effects of radon decay products. Years after their exposure to this form of radiation in the mines, many who mined during the 1950s and 1960s died of lung cancer, at a rate that some would call epidemic. The evidence showed a correlation between the amount and length of exposure and the incidence of lung cancer.

Unfortunately, the possible risks associated with the exposure to radon decay products did not receive widespread attention until about 1960, after which year the industry took steps to correct the problem. The uranium miners' calamity is all the more troubling in light of the simple solution to the problem: forced ventilation. By pushing fresh air through the mines, engineers greatly reduced the concentration of radon decay products in that environment; ventilation also removed the dust from the mines. However, the uranium industry adopted mine ventilation practices only gradually and reluctantly.

At the inception of the AEC uranium procurement program, in the late 1940s, sanitary engineers and radiation experts suspected a health threat from radon decay products in uranium mines. In general, the effects of radiation on human tissue had been well established by that time. Moreover, studies of European miners who worked in mines with high levels of radon gas corroborated a link between the exposure to radon decay products and lung cancer. As
early as 1948 doctors from the AEC’s Medical Division visited the Colorado Plateau uranium operations. Those doctors recommended improved dust control systems in the mines, and they recommended that levels of radon gas in mines should not exceed one hundred picoCuries of radon per liter of air.67

Because of a "dearth of available information on the health hazards associated with this industry," the PHS initiated a health study of uranium miners and millers in 1950. These examinations revealed "no clear-cut etiologic or pathologic patterns," a finding that came as no surprise in light of short work history of most of the miners in the study. But field investigations conducted at the same time revealed high levels of radon and its decay products in the mines on the Colorado Plateau. In a 1952 "Interim Report," the PHS warned that "sufficient information has been derived to conclude that certain acute conditions are present in the industry which, if not rectified, may seriously affect the health of the worker." The PHS investigators issued recommendations designed to improve the health conditions in uranium mines. They recommended a maximum level of one hundred picoCuries of radon decay products per liter of air.

in the mines, a concentration equal to what would eventually be called one working level.68

Throughout the 1950s health experts from the PHS continued their field investigations and health surveys of uranium miners. By 1960 the PHS had collected extensive medical data on 3,415 underground uranium miners. In 1951 the PHS initiated "training courses" designed to disseminate information concerning radon to mining companies, federal and state mining agencies, and government health agencies. By 1955, it was later reported, "most of the personnel concerned with the problem had attended one or more of these sessions."69 If this statement accurately reflects the attendance to the PHS training sessions, most of the initiates remained unconvinced. Although some mines were ventilated in the middle to late 1950s, such attempts were few and not thorough enough. By one estimate, mines in southwestern Colorado averaged from fifty to seventy-five working levels from 1950 to 1957, thirty to fifty WL in


1958, and twenty to thirty WL in 1959.\textsuperscript{70} (Other estimates are lower than these.) Naturally, the concentration of radon daughters in some mines was much higher.

It took approximately ten years for most mining companies to implement ventilation systems, and for state agencies to establish and enforce regulations concerning the level of radon gas in the mines. In that decade, 1950 to 1960, uranium miners absorbed the heaviest doses of radiation. The delay between the recognition of the radon problem and the implementation of effective ventilation systems in the mines has been investigated by several authors.

The AEC set radiation limits in all nuclear fuel facilities except the uranium mines. Even for uranium mills the AEC adopted radiation standards. But the agency never took the steps necessary to assume regulatory control over the mines. Howard Ball, a public policy expert and the author of Cancer Factories: America's Tragic Quest for Uranium Self-Sufficiency, harshly criticizes the AEC. In the name of "national security," he writes, the AEC pursued an "undemocratic" and irresponsible uranium procurement

\textsuperscript{70}"Estimated Radiation Levels in Uranium Mines, in the Salt Wash Sandstone, Uravan Area, Southwestern Colorado." According to a footnote to the document, "these estimates were made by knowledgeable individuals in Grand Junction who are very familiar with the mining and ventilation practices in the mines in the Uravan area. The range of our estimates reflects the differences in company operated mines and the small mines operated by independent miners."
policy by means of "deception and falsehood." AEC bureaucrats, with full knowledge of the consequences, chose to allow miners to work in unhealthy conditions in order to ensure the supply of uranium, and to keep the price of uranium as low as possible. No one told the miners during the 1950s of the possible risks, and AEC officials, despite sufficient evidence to the contrary, "argued that little was known about the relationship between cancer and exposure to radon daughters." Had the miners been informed, the thinking goes, they would have chosen not to work in the mines. And, had mining companies been forced to install ventilation systems, the cost of such systems would have infringed too greatly on the profits (or, presumably, forced the AEC to pay more for the uranium.) Thus, the AEC consciously developed a "strategy" that involved deception and the deliberate use of the miners as "guinea pigs" in order to establish a sure supply of American uranium. 71

The journalist Peter H. Eichstaedt, in If You Poison Us: Uranium and Native Americans, describes a negligent attitude held by AEC officials. They ignored the known dangers faced by miners, fearing that any negative publicity "might slow or, worse yet, derail the AEC's plans to develop U. S. uranium." Eichstaedt points out that other federal agencies, the Bureau of Mines and the Labor Department, for

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71 Howard Ball, Cancer Factories: America's Tragic Quest for Uranium Self-Sufficiency (Westport, CT: Greenwood Press, 1993), 10-11, 13-14, 36-37, 109-112.
example, could have established radiation standards for the mines. That the officials of these agencies chose not to regulate the mines is "one of the greatest examples of bureaucratic buck-passing in American history." Those in the AEC and other agencies believed the matter should be left to the states.  

The AEC, according to Eichstaedt, knew very well that the miners were at risk, but sought to suppress any information concerning the levels of radioactivity in the mines. He documents "misinformation" and "misleading" statements the AEC used to indicate that the problem of radon in the mines was either not serious, or that, contrary to the facts, the solutions to the problem "were being implemented."  

The activities of the PHS investigators during the 1950s have been well documented. Howard Ball, in Cancer Factories, reserves a measure of blame for these health professionals who, in complicity with the AEC, entered "a pact with the devil." He questions the doctors' ethics, because they agreed to keep the miners ignorant of the radiation hazard in the mines. PHS investigators were allowed to continue their mine inspections and miner health surveys, Ball writes, only on the condition that they not

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72 Peter H. Eichstaedt, If You Poison Us: Uranium and Native Americans (Santa Fe, NM: Red Crane Books, 1994), 54-58, 69, 75.

73 Ibid., 54, 69.
tell the miners of the danger. This condition was placed upon them by the AEC and by mining companies, again because of the fear that miners would quit their jobs if they knew of the dangers. Ball further questions the principles of those in the PHS who, he believes, did not do enough to make themselves heard. They should have sounded an alarm that could not have been ignored. 74

Others take a more sympathetic view of the PHS. Peter Eichstaedt, in If You Poison Us, writes that the PHS investigators were "tenacious," doing "their best" to alert government officials and mining company officials to the problem of radon in the mines. Raye C. Ringholz, in Uranium Frenzy: Boom and Bust on the Colorado Plateau, quotes the PHS approach: "implore, exhort and attempt to educate," techniques that had been sufficient to achieve other goals. She portrays the Occupational Health Field Station, the division within the PHS that conducted the uranium miner health surveys, as an underfunded agency without the clout to persuade or regulate. Ringholz points out that the PHS went to great lengths to obtain its information through mine inspections and medical surveys. In the early 1950s no one could prove that the radon decay products in American

74Ball, Cancer Factories, 46, 53-54, 110. A journalist who investigated the uranium miners' story draws the same conclusion: "public health researchers struck a Faustian bargain with mining companies." Tony Davis, "Experts Knew Miners Were at Great Risk," High Country News 22 (18 June 1990): 11-12.
uranium mines would eventually cause cancer, because the disease would not appear until many years after the exposure. (The conclusion that European miners had developed lung cancer due to the exposure to radon daughters was not universally accepted. Skeptics pointed out that the European miners were exposed to other suspected carcinogens, including arsenic, and that social, ethnic, or other environmental factors may have contributed to the disease in the European miners.) The PHS accepted certain restrictions in order to compile a substantial database, and without that data, it would have been all the more difficult to convince everyone that the mines needed ventilation. 75

The state agency most involved with the PHS miner studies was the Colorado Department of Health. In 1949 the director of that state agency convened an advisory board to examine the possible hazards in the newly activated uranium industry. At the request of this committee the PHS initiated what was to become a series of uranium miner studies and mine surveys. In fact, the CDH worked closely with the PHS in developing the uranium miner studies during the early 1950s, and CDH officials demonstrated a great deal of concern. 76 Why then did not the Colorado Department of Health, or perhaps the Colorado Bureau of Mines, implement

75 Eichstaedt, If You Poison Us, 63, 65; Ringholz, Uranium Frenzy, 47, 85, 166-178, 205, 284.

76 Holaday, David, and Doyle, "Interim Report," 1-2; Ringholz, Uranium Frenzy, 37-51, 166-171.
and enforce radiation standards in the mines? Colorado's Governor Stephen McNichols and the governors of other uranium mining states passed the buck back to the federal government. The states claimed no authority over uranium mining, which they viewed as a federally controlled enterprise. McNichols also protested that the states could not afford to staff the necessary mine inspectors; he thought the AEC should give money to the states for such purposes. The governor further declared that had the AEC not been so "miserly," that had the AEC paid more for uranium, then the mining companies, especially the smaller ones, would have had the money needed to install and operate ventilation systems."

The uranium mining states did very little before 1960 to enforce radiation standards. The chairman of the Utah State Industrial Commission noted that the states had adopted radiation standards, or at least had recommended limits for radon in the mines, set at one working level. However, he passed the buck in the opposite direction, indicating that "the burden of these measures falls to the mine operators." The chairman also realized the importance of the uranium industry to Utah, saying that his commission "will strongly oppose arbitrary or unreasonable safety

The state mining agencies had to balance the mission to promote uranium mining with the obligation to regulate the industry. The enforcement of strict radiation standards entailed the installation of ventilation systems in the mines. Most people at the time agreed that ventilation was an expensive proposition, one that could potentially have slowed the uranium industry.

The big uranium mining companies have been accused of a callous, single-minded pursuit of the bottom line. According to Eichstaedt, in *If You Poison Us*, "by 1955 mining companies were well aware of the radon problems in the mines and the fact that ventilation could be used to reduce those and other dangers." Mining company officials also believed that miners would quit their jobs if they knew of the dangers. "Profits were at stake," writes Eichstaedt, implying that mining companies did not want to spend the money on ventilation. The mining companies went to great lengths "to keep from being forced to spend the money needed to make the mines safe for humans." Ball, in *Cancer Factories*, echoes that opinion: "Mining companies, almost without exception, were reluctant to spend any funds on mine safety unless demanded by the federal government, their only customer."  

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79 Eichstaedt, *If You Poison Us*, 64, 91; Ball, *Cancer Factories*, 38.
The evidence collected by the authors named in the foregoing paragraphs is persuasive. Nevertheless, one might hesitate to accept the idea that a confederation of government officials and mining company managers, a fairly large group of people, deliberately and with full knowledge of the consequences, put miners in harm's way. Of course, many would have no trouble accepting that idea. But it is possible to see in this large group of people an inability to take seriously and to comprehend the gravity of the problem. One might imagine that during the 1950s the word "radiation" simply did not carry the psychological impact that it does today. In an era that lacked the massive government regulations that we have today, mine owners and government administrators failed to protect the miners. That failure was tragic in its consequences, but resulted perhaps more from the operation of "a bumbling bureaucracy" than from malice. A statement by Willard Wirtz, Secretary of Labor during the 1960s, describes the inefficiency and ineptitude with which the bureaucracy functioned in this case:

The record reflects continuing attention by a variety of State and Federal agencies (including the Department of Labor) to both the standards and the inspection problems in connection with uranium mining. It is a record, nevertheless, of literally hundreds of efforts, studies, meetings, conferences, and telephone calls--each of them

leading only to another--most of them containing a sufficient reason for not doing anything then--but adding up over a period of years to [a] totally unjustifiable "lack of needed consummative action."\(^{81}\)

Although he issued the statement in 1967, the words apply equally well to the situation as it existed at the end of the 1950s. The record at the end of the 1950s is also fraught with ambiguities, inconsistencies, and oddities.

Perhaps the biggest barrier to implementing ventilation in the uranium mines was the firm belief, held by many in government and industry, that radon decay products posed no threat. The director of the Colorado Mining Association wrote that, during the 1950s and early 1960s, "the minority view was that radiation exposure was not at all harmful." His belief that only a minority held that view may be understating the case. A PHS medical doctor noted that "the concept that radiation exposure in uranium mines can cause lung cancer . . . would have been challenged" in the 1950s and early 1960s.\(^{82}\) An AEC representative testified that within the agency there was little awareness of the problem: "I don't think anyone felt the urgency in protection against radiation [and] radon gas." An official with the AEC

\(^{81}\)Statement of Willard Wirtz, in U. S. Congress, Joint Committee on Atomic Energy, Radiation Exposure of Uranium Miners: Hearings before the Subcommittee on Research, Development, and Radiation, 90th Congress, 1st session, 9-10, 23 May, 6-9 June, 26-27 July, 8, 10, August 1967, 90.

\(^{82}\)Statements by George Vranesh and Victor E. Archer, in U. S. Congress, Radiation Exposure of Uranium Miners, 1136, 1208.
Division of Biology and Medicine believed that the concentration of radon daughters in American uranium mines would be insignificant, because the ore in American uranium mines contained relatively small amounts of radium. And as late as 1961 two Union Carbide engineers wrote: "Recent publicity has focused attention on the hazard of lung cancer among uranium miners. Many mining people feel the danger has been exaggerated." These statements were not necessarily attempts to minimize or obfuscate the problem; it may be that well-intentioned people were simply wrong.

Those who doubted the connection between radon daughters and lung cancer may have formed their belief because of a lack of "positive evidence at that time that radon gas was or could be harmful." This attitude may have been more prevalent in the mining industry, but at least some doctors were also skeptical. In 1961 a Grand Junction doctor disputed the prediction that uranium miners would develop lung cancer at rates higher than the rest of the population. He believed a certain amount of "hysteria" had begun to surround the issue. An editorialist for Grand Junction's Daily Sentinel summed up the skeptics' attitude. He wrote on behalf of the small miner, who, many claimed,

could not afford to ventilate the mines. He asserted that those who wished to compel mine owners to install ventilation based their efforts on "scare-head contentions," "sketchy information," and "unproven, inconclusive reports which do not represent actual health problems." The editorialist was probably no health or radiation expert; but his viewpoint may well reflect the majority opinion of the time.

Mining company managers may have been mollified by reports from health professionals. At an industrial health conference in 1955, Colorado Department of Health representatives announced: "We do not anticipate a duplication of the European experience because we have a more complete understanding of the problems and of the steps that are necessary to reduce the exposure." They undoubtedly referred to the efforts to inform the mining industry, and to the early, though inadequate, efforts to ventilate the mines. A sanitary engineer for the Public Health Service gave the impression in 1954 that "research thus far indicates hazards are not excessive, with less danger apparent from radon (radioactive gases) than from

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dust inhalation."\(^{85}\) One might view such statements as calculated attempts to mislead the mining industry, to leave the miners unprotected; conversely, such pronouncements may simply indicate that even health professionals underestimated the dangers.

It took many years to convince many different people that the mines needed ventilation, and miners needed as much persuasion as anyone else. Some miners will say that, if they had been told of the health hazards, they would never have worked in the mines; but many other miners continued to work underground after they had been told. The record is replete with stories of miners who, like mine owners and government officials, lacked the wisdom, foresight, and prudence to take the threat seriously.

It proved difficult to convince them of a threat from an invisible, tasteless, odorless gas. Colorado Bureau of Mines personnel experienced "no end of difficulty in trying to convince the operators and miners that an excessive amount of ventilation at no small cost was needed to correct this intangible hazard." In addition to the cost, there were other reasons for this resistance. One miner commented "that he did not believe radiation and radon can cause harm as he knows plenty of old-time Uravan miners . . . who are

hale and hardy after spending many years in uranium mines."
The notion that radiation held curative powers proved persistent; some miners could not believe that the opposite was true. And many miners possessed that odd, irrational, and common human characteristic that allows many of us to continue risky habits or destructive behaviors, despite the sound advice of others. When told that "you have a good possibility of getting lung cancer . . . the miner said, 'oh, that won't happen for fifteen years or so.'" The miners, too, were in it for the money, and they made good wages. As Ringholz points out, miners already knew their occupation was physically demanding and inherently hazardous. This new threat from radiation seemed insignificant to many of them. With the money they could make, "they were willing to take the risks."86

There seems to have been a point during the mid-1950s at which miners, at least some of them, became aware of the concept of radiation. In 1955 meetings were convened in Salt Lake City and Grand Junction, both of them called the Seven State Uranium Mining Conference on Health Hazards. The conferences were attended by PHS officials, representatives from state mining bureaus, mining companies, and mine operators. The representative of one mining

company reported that "it is difficult to get a miner on the Plateau to realize that ventilation helps him." He indicated that while most miners were "unaware of the dangers," there were attempts to educate them as early as 1955.

Earlier, in 1952, the AEC established the position of "Mining Engineer, Ventilation" at the Grand Junction Operations Office. That office conducted "safety, ventilation, and radiation surveys as a public service for uranium mines being operated on Government lease ground." However, an engineer with the AEC described a "lack of conviction" among miners and mine operators "that constant attention to ventilation practice is important." He found improperly installed equipment, unused equipment, and fuel-powered fans that remained idle simply because they had run out of fuel. He also found that miners left the fans idle in the winter time because the introduction of fresh, cold outside air made the mines frigid.

This theme repeats itself often; miners worried not about the possibility of developing cancer at some point in

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the distant future, but rather about the immediate prospect of catching pneumonia. In fact, ventilating the mines in the winter caused "all manner of freezing problems." Many of the mines were wet to begin with, because of water that naturally seeped from the rock. In addition, miners used a wet drilling technique. In particularly cold weather the water from these sources froze, on the floors and walls of the mine and on the miner. The cold air also froze the lines that fed water to the drills. Eventually, some ventilation systems included propane burners to heat the fresh air.\(^8\)\(^9\)

The costs of ventilation ran from fifty cents to $1.50 per ton of ore produced in 1969. This equates to 2.5 percent to fifteen percent of the total cost of producing one ton of ore. These were Union Carbide's costs; the cost of ventilation, as a percentage of the total mining costs, may have been greater for the small producers. The small mine operators always argued that they could not afford to install effective ventilation systems. This may have been true for some of them, and through the years the various costs of mining did increase. At the same time, however, many small miners continued to operate their businesses, even after investing in the necessary ventilation equipment.\(^9\)\(^0\)

\(^8\)Beverly, "Radon Daughters and Their Control," 6.

\(^9\)\(^0\)Ibid., 8; Interview #12.
Respirators represented another effective method of mitigating the radon problem. However, many miners did not like to wear them, because the respirators were cumbersome and inhibited breathing. Even a big mining company like Union Carbide did not expect the miners to wear such devices. According to a company manager, it seemed impractical "to require a physically active miner to wear a respirator eight hours a day."³¹

In the late 1950s and early 1960s miners began to die of lung cancer in significant numbers (fifteen from 1956 to 1959 and fifteen from 1961 to 1962). This represented the evidence that correlated the exposure to radon decay products and lung cancer. A heightened sense of urgency became manifest in the effort to persuade everyone of the need for ventilation. In December of 1960 the Secretary of Health, Education, and Welfare convened in Denver a conference attended by the governors and other representatives of several western states. A doctor with the PHS told the conferees that miners were suffering very high rates of lung cancer. The ongoing PHS medical surveys indicated, through the use of an early diagnostic technique called a "sputum cytology," that many more miners showed indications of developing lung cancer. And, in sixty-seven percent of the mines sampled by the PHS, the concentration

of radon decay products measured more than the recommended one working level.  

Soon after this "Governors' Conference" the Deputy Commissioner of the Colorado Bureau of Mines called a meeting for mine operators that was held in Grand Junction. He announced that the state agency would implement a "Radon Daughter Control Program," effective 1 June 1961. The state agency hired and trained six new employees to implement the program, increased its mine inspections, and established a field office in Naturita. At this field office the Bureau of Mines kept records of mine inspections, and kept the exposure records of individual miners. The state began to apply pressure on the mining companies. According to a mine safety engineer who attended the Grand Junction meeting, "they came down here and they ripped us mining people over the coals."  

Other states made commitments similar to Colorado's, and as a result, the efforts to ventilate the mines increased and the concentrations of radon daughters in the mines began to fall. Most of the states already had standards in effect. For example, Colorado had adopted the

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92 Ringholz, Uranium Frenzy, 203-204.

one working level standard in 1954, but had simply never enforced it. In 1961, however, the state began to look at that level as a long or intermediate-term goal. The Colorado Bureau of Mines focused immediately on mines with the highest concentrations. Mine inspectors threatened to shut down those mines with more than ten working levels. If the radon daughters measured three to ten working levels, the Bureau required corrective action to reduce the concentrations. Gradually, the Colorado Bureau of Mines lowered the shut down level and the level at which corrective action was needed. By 1967 the state closed down mines that measured more than three working levels, and required corrective action in mines with one to three working levels, and by 1969 the Colorado Bureau of Mines issued "closure orders" for mines with two or more working levels.94

In addition and in response to these state efforts, mining companies worked more aggressively at solving the problem. Union Carbide serves as an example of the industry response. "In the early days of uranium mining," a piece of company literature reads, "little was known about the possible adverse health effects from exposure to mine

radiation." However, once it became known, Union Carbide addressed the hazard in its usual thorough fashion. Union Carbide was proud of its mine safety record, and has pointed out that certain safety requirements "were often built into federal and state regulations after adoption by Union Carbide." 95 In light of its record, few people would question Carbide's commitment to the health and safety of its miners, or its reluctance to spend money on mine safety.

Union Carbide hired Vernon Bishop in 1956. He began as a mine safety inspector, then assumed the titles of mine safety engineer, mine safety director, and safety coordinator for all of Union Carbide's uranium mining operations. Under his guidance Union Carbide achieved a remarkable mine safety record. Through the years both Bishop and his company earned an impressive number and wide variety of mine safety awards. Union Carbide, according to Bishop, allowed him to do whatever was needed to improve mine safety. He and his immediate supervisor refused to accept "second best" in health and safety. 96

In 1956 Bishop knew virtually nothing about radiation. However, he immediately began to implement ventilation to clear the mines of blasting gasses and dust, and to

95 "The Uranium Miner at Union Carbide," undated manuscript, and "Mining at Union Carbide," undated pamphlet (both documents probably from the late 1970s); Historical Data file, drawer 511 UbZ, room 119, Umetco Records.

96 Bishop interview.
eliminate "dead air," stagnant pockets of air with very little oxygen. It was not long, however, before doctors from the PHS contacted Union Carbide to request its cooperation with the ongoing radiation studies. Bishop received instructions to "cooperate to the fullest extent." The PHS investigators taught Bishop how to conduct radon tests, and Bishop arranged for Union Carbide miners and the company's contract miners to take part in the PHS medical surveys. The company paid the miners for the time they spent at the Uravan clinic for medical examinations. As part of the medical studies, Union Carbide agreed to put four dogs in the mines on two different occasions; after about six months of continuous exposure to the radiation, the dogs were sent back to the PHS. Subsequent examinations of the dogs yielded little information about the effects of the mine radiation on dogs or, presumably, humans.97

During this time, the late 1950s, Vern Bishop still knew virtually nothing about the effects of radiation, because the PHS health officials were not telling him specifically of the dangers. When asked whether his superiors at Union Carbide knew of the health risks, Bishop asked, "why should they" have known? He believes that the PHS personnel operated "under orders" from the AEC not to

raise too much alarm. However, Bishop began to have "suspicions" and "concerns," especially when miners he knew began to develop lung cancer in the late 1950s. His recollections may seem disingenuous, but others who worked in the field also knew nothing about radiation during the late 1950s. William L. Chenoweth spent a lot of time in the mines as an AEC geologist, and he remembers exactly when he learned of the possible hazards from radiation; it was 1961, when he received a reply to a memorandum he wrote to his superiors in the AEC.98

During the late 1950s Union Carbide owned about three hundred mines, and most of the mining was done by contractors. Under this arrangement the contractor paid for his mining equipment and labor, but Union Carbide paid for everything of a permanent nature installed in the mines, including ventilation equipment when it became more widely used. Vern Bishop became well known for his strict safety rules, and the company acquired a reputation for thoroughness in the upkeep of its mines. One contractor who worked in Union Carbide mines during the 1960s said that "everything they did, they did first class." In fact, he compared the company to a government operation, because the company seemingly spent too much money in its zeal.99

98 Bishop interview; William L. Chenoweth, personal communication with the author; R. A. Laverty, memorandum to William L. Chenoweth, 28 November 1961.

99 Bishop interview; Interview #33.
Other miners agree that Union Carbide maintained strict safety policies, and they remember Vern Bishop's rigorous enforcement of the rules.

By 1959 Union Carbide had hired a full-time ventilation engineer, and the company continued to improve ventilation and radon sampling techniques, which were not exact sciences. Bishop and his staff also began keeping records of exposure levels for the company and contract miners. In 1959 inspectors took 225 radon samples, and the radon daughter concentrations averaged 24.2 working levels. In 1960 the company achieved a dramatic reduction, lowering the radon decay product concentrations in its mines to an average of 8.4 WL. In that year the company had "imposed upon itself" a policy under which a mine was shut down if it exceeded ten working levels. In 1964 the company reduced the "shutdown level" to 7.5 WL, then to five WL in 1966, then to three WL in 1967. The average working level in those mines fell from 4.1 in 1961 to .85 in 1967.100

Other mines in Colorado had higher radon daughter concentrations than Union Carbide's mines. A survey of 124

100 Statement of Burton R. Buck, President, Mining and Metals Division, Union Carbide Corporation, in U. S. Congress, Radiation Exposure of Uranium Miners, 533; Annual Summary of All Radon Daughter Samples Taken in Union Carbide Uranium Mines (1980), Umetco Records. Vernon Bishop wrote that the company established a shutdown level of 7.5 WL in 1960, five WL in 1964, three WL in 1965, and two WL in 1967. He pointed out that Union Carbide took these actions independent of and prior to the state's regulations. Bishop, "Control of Radon Daughters," 4.
mines in 1965 revealed that thirty-nine percent of the mines measured less than one working level; forty-two percent measured 1.0 to 2.9 WL; twelve percent had 3.0 to 4.9 WL; six percent had five to ten WL, and one percent of the mines had more than ten WL. A 1966 survey of 148 Colorado mines showed slightly improved figures. According to another source, Colorado uranium mines averaged ten to twenty WL in 1960, 7.5 WL from 1961 to 1963, and five WL from 1964 to 1966.  

The gradual lowering of radon decay product levels in the mines came too late for the miners of the 1950s, many of whom had accumulated many thousands of working level months of exposure. As working levels in the mines fell during the 1960s, the number of miners who died of lung cancer increased. From 1960 to 1966 no fewer than six and as many as sixteen miners died each year; by the latter year the total stood at ninety-eight, according to the PHS studies. These alarming statistics resulted in the first widespread coverage of the miners’ story. The statistics also resulted in the first decisive federal action. The Joint Committee on Atomic Energy called hearings in June of 1967 to evaluate the problem of uranium miners’ exposure to radiation. Shortly before the hearings convened, Secretary of Labor Willard Wirtz decreed, under

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the authority of the Walsh-Healy Public Contracts Act passed in 1936, a strict three-tenths working level standard for uranium mines. Various studies and expert opinion justified his mandate. According to the Surgeon General, if the concentration of radon daughters averaged 2.1 working levels, "287 lung cancer deaths could be expected as a result of exposure incurred during the next 20 years."

Among the same number of non-miners, he would expect only 41 lung cancer deaths during that time period. Even if the level were set at one WL, significant excess deaths would occur.\textsuperscript{102} The three-tenths level was deemed safe for miners, putting them at a risk no greater than the general population.

Other experts, including members of the Federal Radiation Council, believed a one working level standard safe. Mining companies agreed that one WL presented no excess risks; the consensus opinion held that Wirtz's three-tenths WL standard was "unwarranted," "arbitrary," and would "do nothing but close up the industry." In the face of what observers called an "onslaught," Wirtz retreated to a one working level standard. That standard took effect, enforced by the U. S. Bureau of Mines. By 1971 the government no longer purchased uranium, so the standard could not be enforced under the Walsh-Healy Act. In that year, with the

\textsuperscript{102} Statement of Surgeon General Leo J. Gehrig, in U. S. Congress, \textit{Radiation Exposure of Uranium Miners}, 143.
eventual recommendation of the Federal Radiation Council, the standard was set at .3 WL; this translates to an exposure of 3.6 working level months over the course of a year. During a twenty-year career at such an exposure, a miner would accumulate less than eighty WLM. The standards set in 1971 remain in effect, and the Mine Safety and Health Administration enforces them.¹⁰³

The heaviest occupational exposures occurred during the 1950s, and in some cases, the 1960s. Many would maintain that until 1971, when the three-tenths WL standard took effect, all miners received doses of radiation that could lead to lung cancer. One of the pioneers of the PHS's uranium miner studies contended that, even with a three-tenths WL radon daughter concentration, miners encounter "some increased risk." He estimated that risk to be "somewhat less than the excess risk" of smoking cigarettes. An industrial hygienist for the Oil, Chemical, and Atomic Workers Union claimed that even with mine levels at three-tenths WL, there would be "a continuous epidemic of lung cancer among uranium miners." Uranium miners, he wrote, are exposed to higher doses of radiation than "any other worker

in the nuclear fuel cycle." He advocated standards much lower than the current three-tenths WL.\textsuperscript{104}

By 1974 a reported 144 uranium miners had died of lung cancer; by the 1980s the number had increased to approximately four hundred. In 1990 the United States Congress passed the Radiation Exposure Compensation Act. The act provides for monetary compensation to be paid to an underground uranium miner or his relatives if the miner developed lung cancer, worked in the mines between 1947 and 1971, and accumulated a certain level of exposure as measured in working level months. The amount of the compensation may be as much as $100,000. The act also provides for compensation for miners who develop certain noncancerous lung diseases, such as pulmonary fibrosis, silicosis, and pneumoconiosis, which stem from the exposure to dust in the mines. The Department of Justice administers the compensation program. As of 1998 1,341 claims had been approved, 1,287 claims had been denied, and $130 million had been paid.\textsuperscript{105}


\textsuperscript{105} Gerard W. Fischer, United States Department of Justice, to author, 3 February 1998. For details concerning the efforts to obtain compensation, see Eichstaedt, \textit{If You Poison Us}, 95-126; Ringholz, \textit{Uranium Frenzy}, 223-253; Ball, \textit{Cancer Factories}, 65-93.
Of the 1,341 claims thus far approved, 550 were for cases of lung cancer. Seven hundred forty-seven claims had been approved for miners with pulmonary fibrosis. The remaining 44 approved claims had been filed by miners with silicosis, fibrosis of the lung, cor pulmonale relative to fibrosis, and pneumoconiosis. The Justice Department has sent compensation to 474 miners (or their families) in Colorado, 328 to New Mexico, 199 to Arizona, and 184 to Utah. It may well be that more miners who worked in Colorado fell victim to lung cancer and fibrosis. But miners moved often, so it is not clear that a miner’s current place of residence (or his family’s) is in the same state in which he mined. The Justice Department has sent compensation to twenty-eight states, most of which were not uranium mining states.¹⁰⁶

Pulmonary fibrosis results from the inhalation of dust, which injures the lung tissue; the scars left from the healing of these injuries define the disease. It has often been assumed that dust in the mines was not a major problem because many of the mines were wet; that is, water seeped into the mines from underground sources, and the miners used a wet drilling technique. The water helped to keep dust levels down. However, it is clear from the statistics compiled by the Justice Department that many miners worked in dusty conditions that led to pulmonary fibrosis. As

¹⁰⁶Fischer to author, 3 February 1998.
noted, ventilation solved the problem of radiation and dust, although in some cases, at least, the ventilation actually stirred up the dust. At any rate, observers and commentators, from health experts to historians, have concentrated only on the radiation in the mines. This is probably due to the fact that lung cancer among uranium miners became apparent much earlier than the incidence of pulmonary fibrosis; moreover, lung cancer is far more lethal.

In assessing the human cost of uranium mining, one factor clouds the picture: cigarette smoking. While the uranium miners' experience has demonstrated the carcinogenic effect of radon decay products, there is debate concerning the role of cigarette smoke in the development of the uranium miners' cancer. Grand Junction's Doctor Geno Saccomanno has been at the forefront of the debate.

In the late 1950s Saccomanno began developing the "sputum cytology," a procedure used by pathologists to detect lung cancer in an early stage, before it appears on an x-ray. He did so at the request of the Public Health Service doctors, and the AEC and the PHS funded his research. He first published his methods in 1963; since then, the so-called "Saccomanno Technique" has become widely used. Many people in the Grand Junction area, including miners, have benefitted from the early diagnostic technique. Saccomanno has not counted the number of miners in which he
spotted a lung tumor in its early stages, but he says that there have been many. For example, in 1966 a thirty-six-year-old miner found out through a sputum cytology that he had lung cancer. Doctors removed part of his lung, and he was still living ten years later. Lung cancer is among the most deadly forms of the disease. Only about fifteen percent of those patients whose cancer first appears on an x-ray survive five years or more. Saccomanno’s technique can greatly improve the survival rate. Saccomanno’s work on the sputum cytology, his interest in diseases of the lung, and the fact that he lived in Grand Junction led him to collect extensive medical data on uranium miners. His database is reported to be "the world’s largest accumulation of data for this high-risk population."107

In the early 1960s Saccomanno became concerned about the smoking habits of uranium miners. Along with Vern Bishop of Union Carbide, the doctor toured the mines; he advised the miners to quit smoking, and gave them graphic demonstrations of the effects of smoking on the human lungs. According to Union Carbide, as many as seventy percent of the miners smoked in the late 1950s and early 1960s. By the end of the 1960s, through education and encouragement, the figure had dropped to thirty percent. As Saccomanno

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remembers it, half of the miners quit smoking upon hearing his lectures, but all of them eventually returned to the habit.\textsuperscript{108}

By 1967 Saccomanno was convinced that the miners' lung cancer was caused primarily by smoking. In that year the PHS studies indicated that seventy-four percent of all uranium miners smoked cigarettes. Ninety-four of the ninety-eight miners who had died by 1967 were smokers. Saccomanno asserted that the miners he had been following were "heavy smokers, not 10 cigarettes a day, 20 or 30, but some of them up to three packs a day." He believed this factor "has to get some accounting somewhere."\textsuperscript{109} That is one of Saccomanno's least provocative statements.

To Saccomanno the evidence showed a "synergistic effect," which resulted from the exposure to both radon decay products and cigarette smoke. That is, the two carcinogens combined to assault the lung tissue to a degree greater than the simple addition of one with the other. The cigarette smoke greatly exacerbated the damage caused by the radiation; or, to look at it another way, the damage caused by radiation accelerated the assault on the lungs from the

\textsuperscript{108} "Radiation and Uranium Mining," undated manuscript, Historical Data file, drawer 511 UbZ, room 119, Umetco Records; Geno Saccomanno, interview by author, 3 November 1997, Grand Junction, Colorado, tape recording, private collection.

cigarette smoke. But Saccomanno has never doubted the main culprit. "In the absence of cigarette smoke," wrote the pathologist in 1968, "I do believe that cancer of the lung would be nearly non-existent on the Colorado Plateau."

Eleven years later Saccomanno insisted that "if there is an epidemic of lung cancer among uranium miners, 'it's an epidemic from smoking.'" 110

By 1988 Saccomanno had collected medical information and had analyzed the sputum cytologies of 16,720 uranium miners. At any given time there were, at most, five to six thousand miners. But Saccomanno’s list includes anyone who mined uranium underground, some who mined only a short time and some who mined for many years. His database is far from a complete list of Colorado Plateau uranium miners.

Seventy-six percent of the miners in Saccomanno’s 1988 database smoked cigarettes. Of all the miners, including the non-smokers, 383 had died of lung cancer. Three hundred fifty-six of the victims were smokers, twenty-five were not, and two had unknown smoking histories. Radiation was assumed to be responsible for virtually all of the lung cancers in the non-smokers. The average age at which the cancers were diagnosed in the non-smokers was about fifty-

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six. The non-smoking miners all had accumulated at least three hundred working level months of exposure, and most had one thousand or more WLM.\(^{111}\)

Among the smokers Saccomanno found a correlation between the amount of exposure and the incidence of lung cancer. Most of the individuals in this group had exposures of three hundred or more WLM, and more than half had one thousand or more WLM. Saccomanno believed that smoking caused the cancer for all victims with less than three hundred WLM, 35 out of the total of 383. To him, the evidence is a clear indication of the synergistic effects of smoking and exposure to radon decay products. But he is firm in his belief that, although radon daughters in high, prolonged doses contributed to the lung tumors, "smoking caused most of the cancers." (He does acknowledge that the very high levels of radiation absorbed by some miners during the 1950s were capable of causing a tumor.) Since 1988 Saccomanno’s database has grown to a total of 17,792 miners. Five hundred thirty-seven of them developed lung cancer, forty-four of whom were non-smokers, and his conclusions about the data remain the same.\(^{112}\)


\(^{112}\)Ibid.; Saccomanno interview.
Saccomanno is widely respected but his findings are not universally accepted. In epidemiological studies there are many different variables, statistics, models, and methods by which to evaluate the data. One doctor pointed out that Saccomanno had not studied the full caseload, had not seen evidence from miners who had left. Other experts simply do not interpret the data the way Saccomanno does. Most would agree that smoking and radiation produce a synergistic, multiplicative, or additive effect. But most believe that the role of radiation in the development of cancer is much greater. Those who study the problem often point out, for example, that a only a small percentage of Navajo miners smoked cigarettes; yet, the Navajo uranium mining population has suffered greatly increased rates of lung cancer. Two doctors who studied the incidence of cancer among Navajos reached a conclusion far different than Saccomanno’s: "Our data indicate that cigarettes act as a promoting agent, and that radiation is the major cancer initiating agent."  

The small mining communities on the Colorado Plateau have been hit hard by the deaths of miners. It has been reported that in Marysville, Utah, where nearby mines had notoriously high concentrations of radon decay products, fifty percent of the miners had died of lung cancer by 1981.

Similar devastation has been reported from communities on the Navajo Reservation, and from the survivors of two small mining camps in Colorado. The people in the small towns of the West End of Montrose County have seen their share of cancer and other lung ailments among uranium miners.

It is difficult to estimate the number of miners from the West End who have developed lung diseases. A high percentage of West End miners came to the area only for the work; most of them eventually left. Others, who may have called the West End home, moved after the mining activity ceased. William L. Chenoweth helps the Justice Department determine the work histories of miners, or those miners' relatives, who have filed for compensation through the Radiation Exposure Compensation Act. As of 1994, 854 claims had been approved by the Justice Department. Chenoweth figures that eighty percent of those miners had spent some time in the Uravan area. An estimated 102 of those miners "had spent their entire mining employment in the Uravan area."115

In researching the history of the West End, it is odd to find very little mention in the area's newspaper of the

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114 Ball, Cancer Factories, 51; Molly Ivins, "Death by Radon Daughter," Westworld (Sunday supplement to the Daily Sentinel, 10 June 1979, 6-7; Godfrey, "Mining the Colorado Plateau," 94.

115 Information provided to the author by William L. Chenoweth, consultant to the Radiation Unit, Department of Justice.
suspected or confirmed hazard of radiation in the mines. In 1958 one of the first West End miners to develop lung cancer died. Nucla’s Forum cited his death as due to “silicosis and lung cancer.” Shortly thereafter the director of the Colorado Department of Health wrote to point out that the man had died of lung cancer, not silicosis. The director urged for a “concerted effort in assisting mine operators in reducing radiation exposure levels.” In response the editor of the Nucla newspaper called for better performance from “Colorado’s undermanned and far-from-harsh mine inspection program.” During this time the paper also carried a story and some letters concerning the inadequacy of Colorado’s workman’s compensation coverage. (In 1961 the widow of the miner who died in 1958 did receive compensation from the Colorado Industrial Commission.)

Thereafter, there was, apparently, no mention of the radiation problem until the late 1960s, when Willard Wirtz threatened to impose a three-tenths working level standard for uranium mines. Nucla’s newspaper carried two stories concerning the financial impact to mining of Wirtz’s standard. West End mine operators agreed that the financial burden of installing more effective ventilation systems

would be too great. According to the local reporter, "if the .3 ruling goes into effect, it could seriously curtail local uranium mining and sound the death knell to our local economy as far as it is based on mining." The newspaper editor wrote a column in 1969 about Geno Saccomanno's efforts to encourage miners to give up smoking.  

Certainly, there must have been much discussion of radiation in the West End during the 1960s. But it is interesting and perhaps noteworthy that very little of it appeared in the newspapers.

A reporter with the Wall Street Journal visited the West End in 1967. He found that, despite the warnings of health experts, West End miners had "withdrawn into an Alice-in-Wonderland existence." None of the miners he interviewed took seriously the threat posed by radiation in the mines. Some were fatalistic: "If I'm going to get cancer, I'm going to get it, and that's all there is to it." Others simply believed the threat was overstated. The reporter framed his article on the premise that miners "gambled" their lives "for a good salary, low taxes and cheap housing."  

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Another reporter covering the West End found a more cautious attitude among some miners. About the radiation two miners claimed never to "give it a thought." One of them explained: "If a guy's going to have it, he's going to have it. This is not the only thing that causes cancer." However, a nineteen-year-old miner expressed concern, saying, "I don't like it." He declined to elaborate, except to say that his wife "[didn't] like it either." Other miners voiced concern about the radiation, but seemed to believe that conditions had improved to safe levels. One man pointed out that ventilation techniques were improving constantly. However, too much ventilation caused other problems; it made the mines too cold, and the swiftly moving air tended to stir up dust. He also noted that Union Carbide’s "safety rules are always a little bit stricter than the state's." None of these miners wore respirators, but all agreed that they would if a more comfortable respirator were available.¹¹⁹

Thirty years later the people of the West End do not doubt that the radiation in the mines contributed to the deaths of miners. Even those who never feared working at the Uravan mill, or living near the mill tailings in Uravan, will acknowledge that uranium miners were subjected to excessive levels of radiation. "Now people that worked in

the mines, and especially those that smoked cigarettes, there's no argument about how the uranium and the smoking cigarettes together caused a lot of cancer. Those that worked in the early days, most of them are gone, so you can't argue about it.\textsuperscript{120}

Indeed, the people of the West End know Geno Saccomanno and his research very well, and many of them agree that, in most cases, smoking played a significant role in miners' lung cancers and other respiratory problems. One long-time uranium miner claimed that he knew of only two miners who developed lung cancer without ever having smoked. Another guessed that maybe "three or four" non-smoking miners whom he knew had died of lung cancer.\textsuperscript{121} They realize that when a man who smoked and mined uranium for several decades dies of lung cancer, there is some reasonable doubt as to the genesis of his disease. There is even less doubt for those who smoked cigarettes but mined only a relatively short period of time. Cigarette smoking also compounds the effects of the pulmonary fibrosis that miners developed from the exposure to dust in the mines.

Nevertheless, many miners who smoked died prematurely because the additional damage done by radiation reduced the average age of death. Moreover, at least five percent of all lung cancer cases among miners were non-smokers who died

\textsuperscript{120}Interview #15.

\textsuperscript{121}Interview #12; Interview #33.
at relatively young ages (according to Saccomanno's research). Many others, regardless of their smoking habits, developed pulmonary fibrosis from work in the mines. One can imagine the pain and frustration caused by the disease or early deaths of these miners.

There also seems to be a widespread belief in the West End that the government knew all along that the miners were being exposed to dangerous levels of radiation. One man likened the AEC's uranium program to the nuclear testing program of the 1950s; in both cases the government knew that people would be exposed to harmful doses of radiation from either radon daughters or the fallout from the testing. He added that, when he mined, he simply thought it was safe; otherwise, he believed, the government would have done something to protect the miners. There also is anger that the AEC would encourage the miners to dig out the ore, but refuse to set standards for the regulations. Concerning the AEC's role in the uranium procurement program, a West End resident said, "The government knew they were killing all these guys."122

One might assume that miners and their families are angry or bitter, and perhaps many are. But from those who have thus far survived one gets a sense of a certain stoicism among the miners. They knew that theirs was a

122 Interview #39; Interview #33; Interview #6; Interview #12.
hazardous occupation, even without the radiation. Some believe that the exhaust from underground diesel equipment was the worst health hazard of all. The physically demanding nature of the work has exacted a toll on the miners' health, and some suffer from pulmonary fibrosis developed over years of working underground. But those who stayed in the mines for many years clearly liked their occupation; they accepted these hazards and demands to work underground. And there is among them a rugged philosophy they developed through the years of mining. One miner elaborated on this philosophy. Most blue collar professions have risks, and when he was mining he did not think the risks, including radiation, were much greater than those of other jobs. He worried more about driving back and forth to work than he did about mining or radiation. In any case, "people do what they have to do" to make their living.\textsuperscript{123}

One former miner asserted that the mining community abides little "resentment." "Uranium mining for so many years was their livelihood, which profited them very well. Their children had opportunities that they never would have had if they had stayed on the ranch or the farm. . . . Uranium mining was very good to these people, and they don't outright resent" what has happened to them.\textsuperscript{124} Nevertheless, this opinion might seem blithe. Relatively

\textsuperscript{123}Interview #33.

\textsuperscript{124}Interview #13.
few of us know what it is like to learn that we have lung cancer or pulmonary fibrosis, especially when the stricken knows that the cause could have been eliminated, or knows that he was put deliberately in harm's way. If those people and their families harbor resentment, it is understandable.

"There's a lot of widows around here."¹²⁵ That simple and direct statement from a uranium miner's widow gives as much interpretation to uranium mining's legacy in the West End as any story can. At the town park in Nucla stands a small monument, erected to the memory of the area's miners. The stone has seventy-four names inscribed upon it, although the list includes miners who died of causes unrelated to mining. The monument reads, also simply and directly, "In Memory of These Miners and the Lives They Gave for the Families They Loved."

¹²⁵ Interview #6.
CHAPTER 8

WHO IS RESPONSIBLE FOR THE ECONOMY HERE?¹

The West End of Montrose County does not give up its history easily. For many years eight or ten houses sat on a grassy bluff overlooking the Dolores River on the highway about ten miles north of Uravan. The houses had been moved from Uravan in the mid-1980s, but the mover abandoned his project and left the houses to the vicissitudes of nature, passersby, and vandals. There the houses sat, broken and forsaken, resembling only vaguely the houses in which Uravan residents once lived. The houses might have remained there, slowly deteriorating for many decades to come, but early in 1998 arsonists set them ablaze.

A few miles further down the road toward Uravan, one can stop and look at the remnants of the hanging flume, attached to the high walls of the Dolores River canyon. It seems amazing that any part of the flume remains, and more amazing that it was built in the first place. The hanging flume survives as a tribute to the perseverance, optimism, and ingenuity of those who seek precious metals.

Closer to Uravan, at the site of the old Club Ranch, lie several huge ponds lined in black. The water in the ponds is a deep emerald green, and one knows immediately that he is upon a reclamation site of some kind. Near the

ponds is a collection of office buildings marked "Umetco Minerals Corporation." The entire Uravan site is fenced, and on the fence hang signs warning of radioactivity. By the side of the road a historical marker tells a short history of Uravan. A stranger could not imagine a town situated by the San Miguel River in the narrow canyon. Even a former resident of Uravan would hardly recognize the place, because everything, the buildings, houses, plants, and the earth upon which the town stood has been scrapped away. The goals for this remediation are high, "a cleanup standard so stringent that a preschool child could eat an aspirin-sized dirt clod of Uravan soil 350 days a year for six years--without getting cancer." It is difficult to imagine a person formulating such a standard. Exactly what it means is anybody's guess.

Nothing from the Uravan mill remains except some concrete supports on the side of the mesa. At the far end of town, two buildings remain: the Boarding House, built in the early 1910s, and the Recreation Hall, dating from the 1930s. The buildings stand incongruently on a barren site and amidst big trucks and other heavy equipment. West End residents hope someday to save those buildings, but no one quite knows what to do with them.

Just southeast of Uravan next to the highway is the old baseball field. It is covered with weeds and vegetation, but the light posts still exist. The place must hold memories for many people, and former residents still meet here once a year for a picnic.

About thirteen miles past Uravan on the road to Naturita looms the old VCA mill site. It, too, is a strange sight. Over a year-long period workers removed nearly 800,000 cubic yards of dirt from eighty-five acres of land. Truckers hauled the dirt in 45,848 trips to the disposal site at Uravan. Then, DOE officials encountered financial trouble and found themselves without the funds to refill the site. The late spring rains formed large ponds on the site, which the locals named "Lake DOE." DOE officials never said they would not finish the project; the agency simply had no money with which to do it. Entreaties from state legislators and congressional representatives, however, will likely result in the eventual completion of the reclamation. The site will be filled with clean soil and restored to its original condition. Many local residents would like to convert the site into a golf course.

Naturita sits just a mile or two beyond the VCA site. The residents of this village have suffered slights through

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the years. In the 1930s it was dubbed "Gnats-will-eat you," a pun on the local pronunciation of the name, and a reference to the pesky nature of the prolific insects of the area. By the 1970s it was said that "if it wasn't for bars and gas stations, there wouldn't be a town of Naturita." A visitor once called it a "remote, unkempt little town," although rustic might be a more appropriate word. In the San Miguel Canyon, on the banks of the river, Naturita can be quite picturesque. In the residential section one finds tidy houses with pleasant lawns, gardens, and shade trees.

Vestiges of uranium mining are everywhere. People decorate their yards with old mining equipment, and the names of business establishments reflect the former influence of mining: Yellowrock Cafe, Miner's Inn, and Incline Lounge. Just outside of Naturita, on the road to Nucla, stands the most poignant reminder of the uranium industry: the forlorn sign for the "Uranium Drive-In" theater. The theater closed long ago, and the sign is decorated with real estate advertisements, political endorsements, stickers, and spray paint.

Nucla sits about five hundred feet and five miles north of Naturita. Here, above the San Miguel Canyon, the view

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broadens in every direction so that one can see the San Juan Mountains to the southeast. The buildings and houses in Nucla resemble those in Naturita, but the town is more expansive. In Nucla, especially driving along the country roads outside of town, one gets more of a sense of the agricultural side of the West End.

The grandeur of the West End becomes apparent on the road from Naturita to Paradox, through the spectacular Paradox Valley. There are no signs of life in the first twenty miles of this immense broad valley. Bedrock, in the middle of the Paradox Valley, is but an old store at which food, drinks, and gasoline are available to the traveler on lonely Highway 90. Paradox, at the northeast end of the valley, survives, the home to a collection of ranching and farming families. A drive to the rim of the Paradox Valley reveals the extent of the agriculture in the northeast end of the valley. Paradox has no businesses; the once busy Paradox Merc (mercantile) is boarded shut.

The West End survived the fall of the uranium industry of the early 1980s. Many people had to move and many businesses closed, but the area has rebounded. In 1980 Naturita had 810 residents, Nucla 1,026, and Uravan 510. After the fall of the uranium market Naturita may have lost as much as one-half of its population, and Nucla’s population decreased about forty percent. Now, Naturita is home to as many as five hundred, and Nucla has a population
of about nine hundred. Of course, Uravan ceased to exist as a town, though it still appears on maps. Although no single industry supports the West End, there are a number of smaller employers that prevented a collapse. (The population of the West End is difficult to estimate on a year-to-year basis. One indication of the area's population is the enrollment in local schools, presented in Table 5 on the following page.)

Nucla's power station has been an important part of the economy since it was built in 1959. It was operated as a rural electric cooperative by Colorado-Ute Electric Association until 1984. In that year it was shut down, at the same time, coincidentally, that the uranium industry came to a halt. The power plant was recommissioned in 1987 with a new technology: "circulating fluidized-bed combustion." This new method of coal burning reduces pollution and leaves as a by-product gypsum, which may be used for construction and agricultural purposes. The Nucla power station is said to have been the first to incorporate this technology in the United States. The power plant, owned by Tri-State Generation and Transmission Association, employs about fifty-six West Enders. The nearby New Horizon mine supplies coal to the power plant; it is also owned by Tri-State, and employs about twenty-five. Tri-State is also important because of the local taxes it pays, and because it
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Naturita's middle school consisted of grades one through eight.

The Paradox Elementary School was closed from 1990 until 1993, and again in 1997, because of a lack of students. Children from Paradox ride a school bus to other West End schools. The Uravan school closed in 1984.

Source: West End Public Schools, District RE-2
"stimulates significant amounts of local purchases to support the operations of the plant."  

Umetco Minerals, formally Union Carbide, has also provided jobs and economic stimulation. In its on-going reclamation project the company has employed about forty since the mid-1980s, and that employment will continue for at least several more years. Umetco has occasionally hired locals to reclaim old mines, filling the entrances to the mines with the waste left from long ago. Umetco has also made a significant gift to the West End. The company sold to the DOE a waste repository on Club Mesa, which the DOE has used to deposit contaminated soil from the old VCA mill site. Umetco gave five percent (slightly more than $100,000) of the sale of the pit to the West End. The West End Advisory Committee has used the money for various projects and to address various needs in the area.  

The DOE's reclamation project at the old Naturita mill site has also provided some jobs to the West End. But those jobs have not been steady and long term. Moreover, when the reclamation projects at Uravan and Naturita are finally finished, a significant job source will end, as well.  

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5"Nucla Station: From Demonstration Project to Commercial Success--It Was Quite a Trip," Update (Winter 1995): 1-9. Update is "a newsletter for customers and friends about advanced energy technology from Ahlstrom Pyropower."

The school district is one of the larger employers in the West End. In addition, the public service companies that serve the area provide employment, and some employees of Montrose County live and work in the West End. There are also many privately owned businesses of the type that serve most communities, restaurants, gas stations, a variety of stores, repair shops, and other service-oriented enterprises. There are businesses common to rural and agricultural areas, such as feed and supply stores. And, there are some construction companies, a small concrete plant, a trucking company, and a gravel pit, businesses that serve the West End and San Miguel County.

One of the more successful entrepreneurs in the West End is the owner of Reams Construction. This company performs heavy construction projects around western Colorado and in nearby states. The owner of the company is the son of a former Uravan mill worker; he could have located his business anywhere, but he chose to stay in Naturita, and his business employs about twenty-five people. Another successful West End businessman operates Nucla’s pharmacy and drug store. He, too, is the son of a former Uravan mill worker, and he wanted to stay in the West End and raise his family there. This is typical of those who live there. Many will admit that they could find better business opportunities elsewhere, or simply choose to live and pursue
their livelihoods elsewhere; but they prefer to live in the
West End.

Ranching and associated agriculture play an important role in the West End economy. There are several big ranches in the area, but, as ever, there are many families who simply raise a few cattle to supplement their income. Others use family land to raise hay and grains. Thus, agriculture in the West End remains what it always has been: a solid and stable, but not spectacular, part of the economy.

The towns of the West End have also become what are known as "bedroom communities." These are towns in which people live because the cost of living remains relatively low; but workers from these towns find employment in the resort communities that have high costs of living. Thus, some people living in Nucla and Naturita commute to Telluride to work in the service industry and in other capacities there. It is not easy, because the drive takes an hour to an hour and a half. But people of modest means simply cannot afford to live in Telluride. Employers in Telluride have arranged for shuttle busses to transport some of these workers.

In the West End also live many retired uranium industry employees. When the mill and the mines shut down, many people close to retirement age moved to bigger towns, such as Grand Junction, Montrose, and other communities in
southwestern Colorado. But others chose to retire in the West End, where they had spent their careers and raised their children. They wanted to stay in the place they had always called home, or had adopted as their home.

It is often said that the West End is home to many recipients of government aid. They live in the area because of a generally low cost of living, and receive their income from various government sources.

In 1996 the price of uranium rebounded slightly. Early in 1997 a uranium mine opened in the eastern part of Colorado; later in the year a mine operated by the International Uranium Corporation opened in San Miguel County. The mine runs two shifts and employs about forty people. The company ships its ore to a mill in Blanding, Utah. Many people are skeptical that the operation will succeed, because the price of uranium simply is not that high. The carnotite ores of southwestern Colorado also contain vanadium, and it is from that product that the International Uranium Corporation hopes to make its profit. But the price of vanadium fluctuates a great deal, and there would seem to be no guarantee for a continued lucrative market.  

The opening of the "Sunday Mine," as it is known, created a few jobs for the people of the West End. And, the

company has announced that it will buy uranium ore. But regardless of the success of this particular operation, most people there think the uranium industry will never approach its former intensity. The demand from utility companies simply is not great enough, and the supply from foreign countries is cheaper. The old-time miners say that it takes too much capital to get started; government regulations have "driven mining costs to unnecessarily high levels." Also, they say that the ore most easily mined is gone; it would take a much bigger investment to extract the uranium that is left. No one in the West End expects to see mining ever approach its one-time influence.

The West End economy is relatively stable, but its lack of vitality and growth has sometimes made it difficult for local leaders to provide and maintain certain services. For example, in 1997 the West End School Board found a budget shortfall of $38,000. The superintendent pointed out that the district’s slim budget made it difficult to give raises, hire new staff, and institute new school programs. Later in the year the school board decided to close the Paradox Elementary School, because enrollment there had dropped below ten students. Funding for the area’s health clinic has also fallen short; moreover, the small West End towns sometimes find it difficult to find good doctors who want to

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live in the area. Many would say that the West End lacks facilities for its youth; for example, the area has had no swimming pool since Uravan closed. And, without a strong industrial base, many young people must leave the West End for employment opportunities.

At the same time, however, local leaders have been resourceful in their use of tax revenues, and in securing government grants and other types of financial assistance. These funds have helped the towns provide the health clinic, emergency medical service, law enforcement, water systems, and city equipment, and to improve town parks and buildings.

Nevertheless, virtually everyone would agree that the West End needs more economic diversity. Since the early 1980s community leaders in the West End have searched for ways to replace the then faltering uranium industry. They looked into several options, which included the construction of a women’s prison in the West End, the establishment of a horse track, and the building of a retirement community. There were also some more controversial suggestions. In 1980 community leaders negotiated with Chem-Nuclear Systems, a company that intended to establish a low-level nuclear dump near Naturita. The vast majority of West Enders were

in favor of the waste disposal facility, which would have created about one hundred new jobs. Eventually, however, Chem-Nuclear decided the Naturita site did not fit its purposes. Another controversial plan involved the establishment of casino gambling in the West End. However, the plan hinged on the passage of an amendment to the state constitution that would allow residents of any town to vote for legalized gambling. The resolution to amend the constitution failed in the Colorado House of Representatives.  

The debate on how best to diversify the West End economy continues. Some still believe that the area can attract more tourists. A member of the Nucla-Naturita Chamber of Commerce hopes to take advantage of the "small town safety, security and coziness in a location that is between crowded and expensive vacation lands." He would build hiking, bicycling, and horse trails, and more access to the area's rivers. He talked of creating a "tourist friendly" atmosphere by beautifying the towns and by building bike shops, horse stables, and four-wheel drive vehicle and snowmobile shops. However, until there are

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government." He urged locals to write to politicians for federal help in finding a replacement to the uranium industry. "Let's be the communities who demanded assistance to replace what government took away."13

The editor echoed the words of a Naturita man who wrote that the uranium industry collapsed not only because of the withdrawal of the government's market for uranium, but also because of "New Federal Environmental Protection Policies" under which the Uravan mill could no longer operate. To this writer, "it seems only right that a community of towns that have played such a vital role in supplying the nation with a valuable national security commodity during World War II and beyond, now be given Federal assistance to help them rebuild their local economies."14

Of the West End's future, no one seems sure. Although it has increased somewhat in size since the mid-1980s, some still are not optimistic that the area has a secure future. David Lavender once wrote that "there had been a day when the town of Nucla had been content to sit on its hands, waiting. Why bother? What would tomorrow bring that was worth going out to meet?" That attitude changed with the coming of the uranium industry, which created, according to


Lavender, "a new stir." Now that the "stir" generated by uranium has ceased, would Lavender regard Nucla and the West End as an area "content to sit on its hands?"

Lavender's observations, usually so keen, seem unfitting as applied to the West End. The area never would have survived had people simply sat on their hands. Those who pioneered the West End worked hard to fulfill the dream of settling a harsh and beautiful land. In retrospect it seems not that they sat on their hands, but struggled and succeeded in building a life in a place they loved. When new opportunities came, such as the uranium industry, West Enders took advantage of them. However, few people made an easy dollar, whether from agriculture or from uranium. Those who now live in the area approach life the same way that the early pioneers did. They find ways to succeed in a place they prefer to live, but a place that can be demanding, as well. And, they take advantage of any opportunities afforded them.

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15Lavender, "One Man's West," 301.
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