

# BEEHIVE HISTORY 28



weapons

# Weapons

In comparison to other parts of the world, Utah bears few fresh battle scars. Yet the development of weapons here has played an important role in the history of the state — and the world. Prehistoric peoples used atlatls, arrows and other weapons for hunting. Like almost all humans, they also sometimes used weapons to harm each other. Later indigenous peoples — along with trappers, explorers, traders, pioneers, soldiers and miners — had various weapons and used them for hunting, defense, and sometimes aggression. As technologies grew more complex, Utahns invented and produced weapons that had worldwide significance. Utah-invented machine guns killed thousands during the world wars. The crew that bombed Hiroshima trained here. Bombs, missiles and chemical weapons developed and tested here played large roles in other wars, including Vietnam and the Cold War.

As this issue goes to press, the United States is again building its military might. Gun-control and gun-rights advocates passionately defend their stances. The incineration of chemical weapons continues to arouse controversy. The President has mentioned the possibility of using nuclear weapons. There is no denying that weapons continue to loom large in our lives.



On the cover: The Pectol Shields, ancient buffalo hide shields found near Capitol Reef by Ephraim Pectol in 1926. Radiocarbon dating puts them at 1420-1640 A.D., making them the earliest leather shields ever found in North America. Navajos claim, based on oral tradition, that the shields are ceremonial objects that belong to their tribe. The Ute Mountain Ute Tribe also claims them, since they were found in Ute territory. Experts agree that the shields don't resemble Navajo shields from the period.

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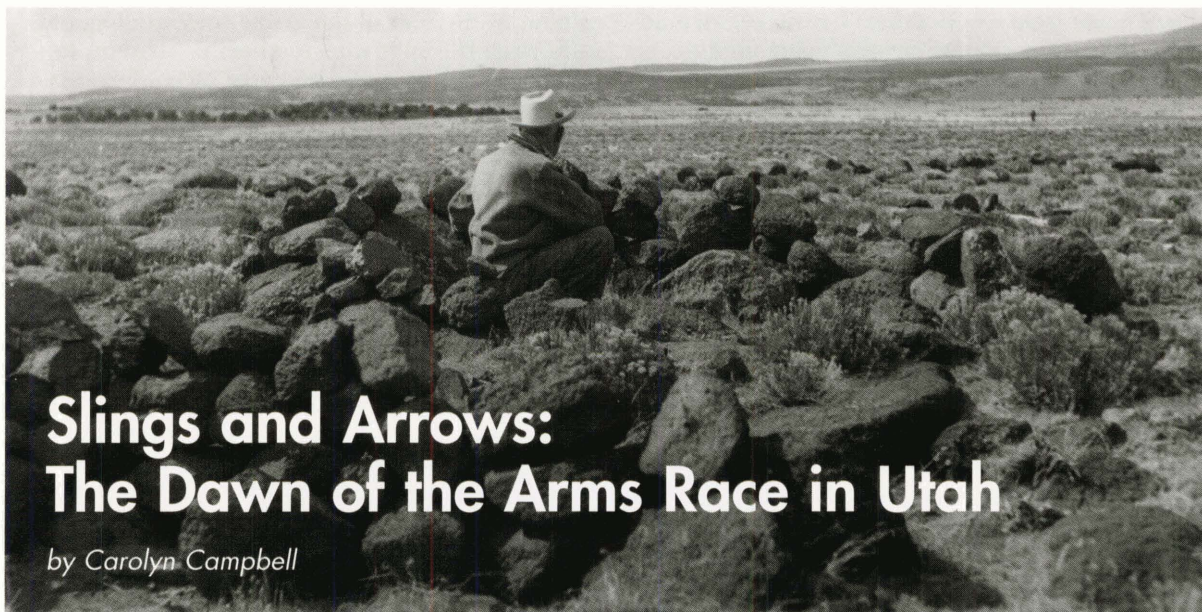
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# Slings and Arrows: The Dawn of the Arms Race in Utah

by Carolyn Campbell

**H**unting, defense, aggression, sport: Whether for survival or cultural activities, humans and their ancestors have been using weapons for thousands of years. Perhaps the earliest weapons used by humans were bone, teeth and nails — termed the osteodontokeratic tradition by some early anthropologists. Rocks, fire, and wooden clubs would have been natural early weapons; later, humans would learn to sharpen sticks and from there would continue to invent more complex weapons.

When the earliest humans arrived in the Intermountain West about 12,000 years ago, they traveled in nomadic groups, gathering plant foods and catching small animals such as rabbits, lizards, and birds. But they also hunted the great Ice Age mammals such as mammoths and now-extinct bison using spears tipped with stone points (spearheads) and atlatls.

Some have speculated that the atlatl — an efficient weapon that had also been developed in Europe by the Cro-Magnon peoples — contributed to the extinction of the Ice Age mammals. This weapon, a combination of throwing stick and projectile, enabled a hunter to throw a spear much farther and more powerfully than he could by hand alone. In fact, it increased the spear's velocity sevenfold.

A hunter using an atlatl would hold the throwing stick in one hand and, with the other hand, would stabilize a spear or dart cradled in the throwing stick. Then with a powerful hurling motion he or she would release the spear.

The Anasazi and Fremont cultures arose around 2,000 years ago, the Anasazi in the Four Corners area and the Fremont in central and northern Utah. These cultures also used atlatls. In addition, they used spears, nets, rock-fall traps, and throwing sticks for hunting. They made

snare traps from plant fibers such as yucca and from human hair. Their throwing sticks, similar to boomerangs but with a greater angle at the bend, were used for hunting small animals. Using the resources at hand, they also made weapons from bone and rock.

In about 500 A.D. the Fremont began to use the bow and arrow. According to Don Burge, director of the Prehistoric Museum in Price, the bow and arrow has been the most widely used weapon in recorded history. And no wonder. This weapon provided more accuracy than the atlatl, and it was easier to carry and use. So it increased the efficiency of hunters in obtaining both food and raw materials such as bone, sinew and hide.

It took a fairly complex process to make a bow. In one method, the bow-maker cut a 6-foot-by-8-inch section of wood from a tree and pried it loose with antler and stone wedges. The wood would season for six months. Alternately, the bow-maker might cut the section of wood but leave it in the tree to dry for some months, a method that kept the wood from warping. After the wood had seasoned, the bow-maker would carve it into a 3- or 4-foot-long bow using stone tools.

Chokecherry and mountain mahogany worked best for bows. Juniper (cedar) and serviceberry also worked, but because juniper wood gets brittle quickly, it needs replacing after a year or two. The horns of mountain sheep could also serve as bows. The maker heated the horn, split it, then spliced the two pieces into a single curve with sinew wrappings.

About 1,000 years ago, hunters began using sinew-backed bows, which were stronger than

**ABOVE: A prehistoric hunting blind, helpful for hunters in making effective use of their weapons.**

those made from wood alone. The makers would "tease the animal sinew strands apart until it resembled dental floss," says Peter Ainsworth, a BLM archaeologist. "Then they would lay thousands of strands on the back of the bow, smearing it all the while with glue made from deer hide." This glue was made by scraping flakes from the hide and then boiling them.

Sinew-backed bows used the same principles inherent in human bodies, according to Don Burge. Like human bone, the wood in a bow is rigid and tough. But the sinews, like sinews in the body, give the wood greater power and flexibility.

Arrow shafts were often made from phragmites, or arrowcane, a fluffy-headed cane that grows, for instance, around the Great Salt Lake. To fashion an arrow, the maker would heat soapstone or another kind of rock in a fire, then use the hot rock to warm the shaft to make it more pliable. After using another stone tool — a shaft wrench — to help straighten the shaft, the maker would use a grooved stone to polish and smooth it.

An arrow might be made from a single shaft or it might be composite, with a main shaft made from cane and a fore-shaft from hardwood. "Native Americans used grease rendered from bear or deer fat on the joints of the arrow," says Ainsworth. "They used pine pitch or asphaltum to bind the arrowhead onto the fore-shaft, or the front piece; then they wrapped it with sinew."

Arrow or spear points were usually made from obsidian or flint. The Utah peoples actually had quarries where they collected these rocks, breaking them into portable sizes. To make a point, they would shape the flint by striking it with another stone, flaking off small pieces at a time. Finally, they might polish their points by rubbing them with an abrasive stone. After the arrival of Euro-Americans, Native Americans sometimes used the iron from barrel hoops to make points.

To bind the arrowhead onto the foreshaft, the arrow-makers used pine pitch as an adhesive, then wrapped the point and shaft together with

sinew. At the rear of the arrow they would glue and wrap the split wing feathers of large birds such as magpie, eagle, hawk, or owl.

A hunter would use a quiver — made perhaps from the skin of coyote, fox, bobcat, deer, mountain lion, antelope, or bear — to carry his arrows and perhaps a fire-starting kit as well.

Not all bows shot arrows, however. Some, used somewhat like a slingshot, shot rocks. A bow with a double string and a piece of leather between the strings could hurl a rock with sufficient speed to kill an animal.

According to Burge, the bow- and arrow-making technology of Utah shows a connecting

link with other cultures. "All of the scientific evidence indicates that these early weapons came from other parts of the world to the American continent," he says.

Egyptians had used bows as early as 3500 B.C., and in 1500 B.C. the Assyrians developed the shorter

recurved bow. Burge believes that groups from Asia and other areas brought their weapons technology with them when they migrated to the Americas. In fact, he says, some weapons found in Utah strongly resemble prehistoric weapons from Asia. "Seeing this evidence of connection tells us that the world was not as isolated as we once thought," Burge says.

However the early peoples of Utah originally developed their weapons, the bow and arrow remained the most important weapon for them — until contact with Europeans and Americans. By the 1800s the gun had replaced the bow and arrow among indigenous tribes. At the same time, the tribes were losing their freedom to hunt (and fight) as they had

traditionally.

Today, enthusiasts of traditional weapons still make stone points, bows, arrows, spears, throwing sticks and atlatls. However, these weapons have lost the central role they once played in the lives of uncounted individuals who depended on them for survival.



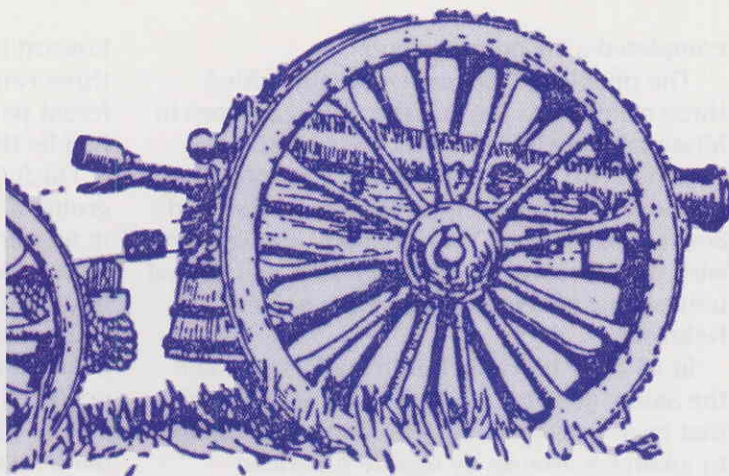
CAROLYN CAMPBELL IS A FREELANCE WRITER.



**TOP: A man demonstrates how to throw an atlatl. BOTTOM: Jade Enright holds a Rose Spring arrowpoint, dating from about 1,000 years ago.**

# The Old Sow and Her Pigs: Utah's Infant Artillery

by D. Robert Carter



Small arms played an important role in the settlement of Utah and other frontier regions. How these arms were used is fairly well documented. Many emigrants told in their journals, diaries or reminiscences how a well-placed shot from a smooth-bore musket or a rifle provided supplementary food for grateful families, or how settlers occasionally used their small arms to stave off attacks from ne'er-do-wells or bands of Indians.

On the other hand, the story of early Utah's big guns has remained, for the most part, shrouded in smoke, even though cannons also left a perceptible impression in the history of the Great Basin. Utah pioneers used them both while crossing the plains and after they established their initial settlements. During the first 10 years in the Great Basin, the territorial militia collected an impressive array of artillery.

However, it was not the Mormon pioneers who brought the first cannons into the Great Basin. General William H. Ashley transported a small cannon to the Bear Lake Rendezvous in 1827. This field piece shot a four-pound ball; hence, it was called a four-pounder. Then, in 1843, Captain John C. Fremont lugged a French-designed twelve-pound mountain howitzer through the basin and almost to the Pacific Coast before it bogged down in the snows of the Sierra Nevada.

The story of Utah's artillery actually began in Missouri and Illinois. During their expulsion from Missouri in 1838, the Mormons possessed no artillery, but their antagonists did. This placed the beleaguered people at a distinct disadvantage.

Mother Nature stretched forth a soggy hand to help remedy this deficiency when a group of Missouri militiamen took the field against some ragtag Mormon troops one cold, rainy day in Caldwell County, Mo. When the state-owned

cannon apparently hindered the militia's mobility on the wet roads, the citizen soldiers decided to cache the big gun and return for it later.

The militiamen dug a shallow depression in the roadway, took the cannon barrel from its carriage, placed it in the hole and covered it with sippy soil. They hoped that driving wagons over the cannon's hiding place would help conceal it from their enemies.

Not long after the Missourians left, Mormon horsemen arrived at the scene. After some time, they noticed an old sow wandering about.

"She went to the middle of the road and went to digging hog fashion," Daniel McArthur wrote later. "Lo and behold, there lay the old barrel. Of course the boys had some little shouting over it when they found it." After closer search, the men also found hidden cannon balls and a keg of powder.

The Mormons had their first field piece, a six-pounder they named the "Old Sow" in honor of the prying porker. When they left Missouri, they took it to Nauvoo, Ill., with them.

While in Illinois, the Mormons added to their artillery after the Nauvoo Charter permitted them to establish their own militia. Dr. John C. Bennett used his position as quartermaster general of the Illinois militia to secure arms, including three cannons, for the Nauvoo Legion. However, when troubles between the Mormons and their neighbors escalated in 1844, the state forced the Legion to return those cannons.

Church leaders made an effort to replace the state-owned cannons. Lorenzo Snow purchased a cannon with tithing money in 1845. Local artisans even tried to manufacture cannons. It appears that John Kay, working in the secrecy of the Nauvoo Temple, may have successfully

*ABOVE: A cast iron six-pound cannon.*

completed a six-pound cannon.

The people of Nauvoo eventually added three cannons to the gun they had captured in Missouri. They now owned one twelve-pounder, two six-pounders, and a four- or five-pounder — collectively described as the “Old Sow and Little Pigs.” The cannons left Nauvoo with the Mormons in February 1846 and stayed until spring in Winter Quarters in eastern Nebraska.

In 1845, as harried church leaders planned the Saints’ journey west, they recommended that each wagon train take along a few cannons to minimize attacks by hostile American Indians — a precaution that had proven useful to other emigrants. It was fairly common knowledge that, in the eyes of the Indians, the possession of a cannon marked the settlers as military superiors. The artillery often traveled at the front or the rear of the company it escorted, making it distinctly visible. As a precaution, then, Brigham Young took a cannon — likely the smallest field piece in the Mormons’ possession — with him in the first company.

The Pioneer Company spotted Indians on May 3. At 9 p.m. that night and again at 4 a.m. the next morning the artillerymen fired the cannon as a show of power. After that, Brigham Young ordered the men to keep the cannon ready for action.

In what is now western Nebraska, the Pioneer Company met a group of Sioux. For the benefit of these Indians, the cannoneers went through a drill of loading and firing the field piece several times. Other pioneers demonstrated their six-shooter pistols and fifteen-shooter rifles. Whether or not such displays were a factor, the travelers encountered no problems from Indians.

In the Salt Lake Valley, the cannon was first put to a peaceful use. On the morning of July 25, the pioneers gathered around the cannon wagon to hold a meeting. George A. Smith climbed aboard the vehicle and preached what may have been the first sermon in the valley.

Other cannons came with subsequent emigrating companies in 1847. On April 20, shortly after the first company started west, Brigham Young wrote a letter to his wife Mary Ann Angell Young: “If this letter reaches there before the next company starts they had better fetch the three cannon that are there.” Two weeks later he wrote to the Saints at Winter Quarters: “Organize, & keep up strict discipline, bring all the cannon and take care of yourselves.” George Whitaker, a member of

Edward Hunter’s company, recalled, “We had three cannon with us, which we placed in different parts of the train, and appointed men to handle them if they were wanted.”

On July 22 and for the next two days, as a group of pioneers camped near the Platte River in western Nebraska, they acquainted themselves with several hundred friendly Sioux. The first night, about 100 Sioux men came into camp. The emigrants fed them, put on a strong guard, and fired the cannon. No problems occurred.

The next day, the emigrants tested their big-bang theory. Nathan Tanner Porter wrote:

the Women & children then came forward, and — with the men were permitted to come within our lines. The Wagon baring the Cannon was drawn out to which their attention was directed. they gathered around to see the curious Wagon it was placed in position and on motioning to them they stepped back. the torch was applied & off she went, causing a ginal stampede on the part of the Indians: men and Women, were struck with consternation for a few minutes. & We learned that the impression went out among the Indians — that all our wagons would Shoot. no one wished to correct the impression as it answered well; to deter them from molesting us by day or night.

The loud report of the cannon did more than unnerve the Indians. Franklin Wheeler Young had ridden his mule into the river to let the mule drink.

the bank was steep, the mule’s front feet were in the water up to it’s Knees, when — bang went the old Sow — the mule jumped backward, and I went forward head first into the river, and it over my head, but I hung to the halter rope and “Peggy” pulled me out! Is it any wonder I have always had a Kindly feeling for a mule ever since Seeing this one saved me from floating down the river to become food for fishes?

Several emigration companies arrived in Salt Lake Valley in late September through early October, and Utah’s infant artillery now numbered four cannons.

In 1848 some Mormon Battalion boys brought into the Great Basin two more cannons — a four-pounder and a six-pounder — giving the Great Basin gunnery a total of six big guns. They had bought these in California from John Sutter, paying him with gold dust they had panned. These two cannons added an international flair to the Utah artillery. Russians had captured the guns from the French when Napoleon retreated from Moscow in 1812. The Russians transported the cannons to Fort

Ross, their trading outpost on the northern California coast, where Sutter acquired them.

At least two more cannons made the trip to Utah before Johnston's Army entered the territory in 1857-58. In 1851 territorial judge Perry E. Brocchus brought a small brass mountain howitzer nicknamed the "Little Sow." Another cannon of unknown poundage traveled to the Great Basin in 1852 with the Allen Weeks Company.

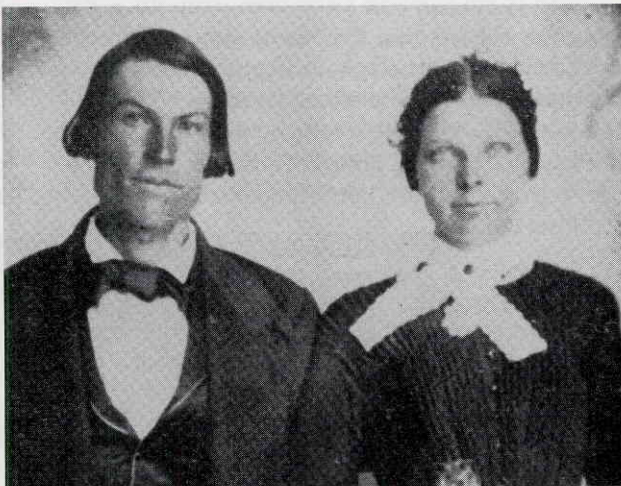
During the Saints' first two years in the valley, the sound of cannon shots nearly paralyzed some of the neighboring Indians with fear. In March 1849, on the day after the announcement that a provisional government had been formed, the citizens celebrated with a 13-gun salute. Soon afterward, Dimick Huntington went to Chief Wanship's village on business. As he neared the encampment, Huntington could see not one Indian. He walked through the ghostly stillness to the chief's wickiup and peered inside. Some tell-tale lumps under the bearskin on the floor suggested the location of the household, and the chief peeked from under the edge of the covering. When he saw Huntington, Wanship said, "What have you come for, what have I done now?" Huntington explained why the salute had been fired, and the relieved chief replied, "I heard the great gun, I thought the white men were going to war, and was dreadfully scared, we all lay down here and dared not look out. I lay and shook with fear."

When the pioneers settled Fort Utah in April 1849, one of the six-pounders was sent to the new settlement to work its magic on the Timpanogots Utes. In late August workmen finished a ten- or twelve-foot-high log bastion in the middle of the fort and hoisted their cannon to the top of it.

Oddly enough, the cannon's first casualties were not Utes but colonists. In the late summer and fall of 1849, hundreds of gold seekers rendezvoused in Utah Valley before taking the southern route to California. Longing for something to break the monotony of camp life, they convinced Fort Utah's fledgling gunners to fire the cannon for amusement, then scrounged enough powder for at least two charges for the big gun.

On Sept. 1, Lieutenant William Dayton and 18-year-old George Washington Bean mounted the ladder leading to the top of the bastion, rammed a charge down the cannon barrel and fired it, to the joy of the watchers. But then the citizen artillerymen became careless and began

tamping the second powder cartridge into the cannon without first cleaning the barrel with a damp swab to douse any sparks left from the first cloth cartridge. They were in the act of forcing the powder charge down the barrel with a heavy hickory ramrod when sparks ignited the second cartridge. A deafening roar rent the stillness of the evening. The blast threw Dayton and Bean some 30 feet off the bastion, and they fell 12 feet to the ground.



**George W. and Elizabeth Baum Bean, 1853. From *Flora Diana Bean Horne, comp., Autobiography of George W. Bean.***

Dayton was killed almost instantly when a large splinter from the ramrod severed his jugular vein. Bean's left forearm, severed by the blast, landed in Celia Hunt's dooryard with Bean's ring still on the little finger. The young man's clothing was partially burned off, and his eyes and face were so horribly powder-burned and filled with splinters that he was blinded. The right side of his neck, chest, and thigh were also terribly burned and full of splinters, and his right arm and hand were seriously lacerated.

Dr. James Blake from Captain Howard Stansbury's Topographical Engineers amputated several inches of Bean's forearm and removed about 200 splinters from his body. During his long convalescence, Bean learned the Ute language. He eventually regained his sight and became an Indian interpreter, schoolteacher, clerk, and judge.

During February 1850, when hostilities flared between the Timpanogots Utes and the settlers of Fort Utah, the territorial militia received its first chance to use artillery in battle against hostile Indians. The results were less than sterling.

Through chill air and crusted snow, Captains

George D. Grant and Andrew Lytle led about 100 men from the Salt Lake Valley into Utah Valley to aid Fort Utah's 50-man militia against a smaller number of Utes camped in a fortified position, protected by brush and the steep bank of an old channel of the Provo River. The officers planned to surround the camp, fire into it with artillery and small arms, flush the Indians to open land, and finish them off with a cavalry charge.

With them the Salt Lake men brought a six-pounder they called the "Long Range." On the first day of battle, Captain Grant called the "Long Range" into service. Thomas J. Orr said the men charged the cannon "with black powder and loaded [it] almost to the muzzle with scrap iron, bits of chain, rocks etc."

However, the Utes stood their ground. George Mayer wrote, "The Indens Returnd the fire with Rifils and the boolets wised among us like hale." The officers ordered the

men to pull the cannon back out of the range of small-arms fire. From this position, it continued to barrage the Ute camp.

Most of the shots apparently went over the camp and caused little damage. The Utes found protection under a six-foot-high riverbank and also hid behind log fortifications and in the dense trees and underbrush. "The firing of the cannon was kept up all day, the balls cutting large limbs from trees but availed nothing and the Indians laughed heartily at the 'harmless gun,'" William H. Walker lamented.

Historian Edward Tullidge related a story the old settlers told him about the use of the cannon on the first day of battle. Jacob Hoffeins, a "Dutchman" from Salt Lake Valley, commanded the artillery piece. After being told that his shots were going over the camp, he replied with the order, "By Got, poys, elevate it

a little lower!" Supposedly, at this point Riley G. Clark, a resident of Fort Utah, succeeded in putting a shot into the camp.

During the second day of the battle, the militia used a cavalry charge and moveable log batteries manned by infantry to demoralize the Utes. That night, the Indians left their fortifications under cover of darkness and fled. The next morning the militia explored the deserted camp and found an Indian woman in a wickiup with her legs severed. Although the militia had deemed its artillery ineffective, the cannon apparently had caused some casualties.

Settlers continued to use cannons to deter Indian attack. Parley P. Pratt and his men took one of the brass cannons when they explored the southern Great Basin and beyond. They



**Fort Utah, from Howard Stansbury, *Exploration of the Valley of the Great Salt Lake*. The cannon can be seen on the wall.**

never used the piece against Indians, but they fired the cumbersome toy to announce their arrival at the new colony in Sanpete Valley, to guide in absent members of the camp, and to celebrate special occasions.

During the first 10 years in Utah Territory, the artillery was used more for celebration than for defense. Isaac C. Haight recorded Utah's first Thanksgiving celebration. On August 10, 1848, he wrote in his journal, "Met to celebrate the first Harvest raised in the Valley with songs of praise, thanksgiving. Musick and Dancing, the firing of Cannon and the Shout of Hosannah to God and the Lamb forever and ever — Amen."

On July 24, 1855, Provo's six-pound cannon met its demise, killing another citizen in the process. The village's holiday celebration began at daybreak with the militia firing the cannon. All went well until the fourth firing of the big gun. For this shot, the men loaded the cannon with a wad of potter's clay, 2 pounds, 3 ounces of rifle powder (about twice the usual charge), some hay, and another wad of clay. They packed the load in tightly by pounding the ramrod with a sledgehammer. Although at least one man remonstrated that the piece was bound to burst, the officer in charge appeared confident that there was no danger. Twenty-four-year-old William Nixon stepped forward and applied the match. A terrific explosion burst the gun, tearing up the gun carriage and throwing pieces more than 500 feet. The affable, English-born Nixon was killed instantly.

When United States Army troops came to the territory in 1857-58, they brought many cannons, and the significance of the territorial militia's small artillery waned. However, in recent years, one item from Utah Territory's infant artillery has regained importance. A local official in Missouri asked the LDS Museum of Church History and Art to return the Missouri State Militia's hijacked cast-iron cannon.

Unfortunately, the museum most likely will be unable to honor that request. It appears that the gun that exploded in 1855, killing William Nixon, was the legendary "Old Sow."

In 1850 there were only three six-pound cannons in Utah Territory — two cast iron and one brass. Both of the cannons used against the Utes in the Utah Valley campaign were iron. Since the Salt Lake Valley militia brought the cannon named "Long Range" to Utah Valley, the gun already on the bastion at Fort Utah, which Thomas Bullock had referred to as "the old pioneer gun," was almost certainly the Old Sow.

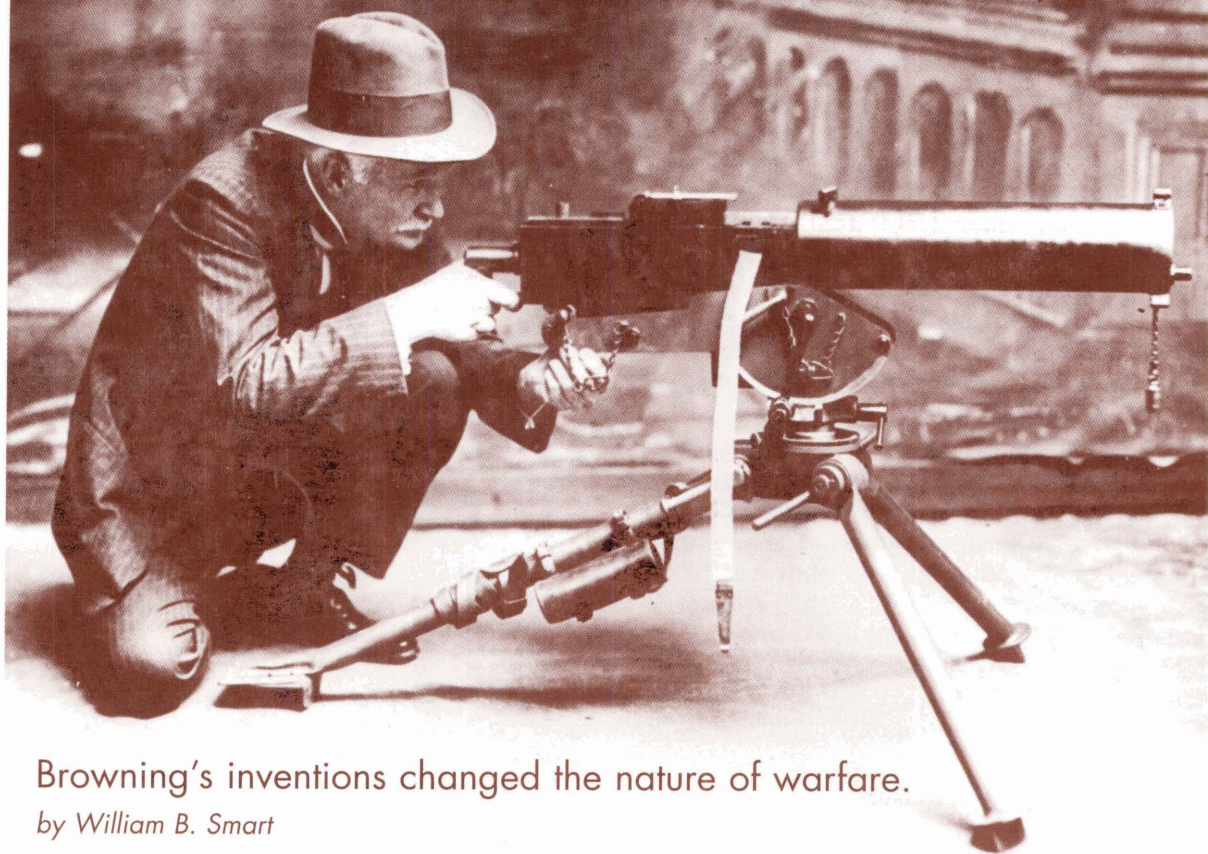
A *Deseret News* article covering the death of William Nixon in 1855 called the burst Provo cannon "a six pounder from Nauvoo . . . [that] presented the appearance of being a most perfect piece of workmanship, made of very fine, soft iron." Historian Andrew Jenson's account of the explosion identified the cannon as the Old Sow. It appears, then, that the Old Sow, the brood mother of Utah's infant artillery, went to the figurative slaughterhouse in Provo on the 24th of July 1855, and Utah no longer has a cannon to return to Missouri.

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# Master at Arms



Browning's inventions changed the nature of warfare.

by William B. Smart

As the 20th century ended, the question came: What Utahns had the most profound, widespread influence in that century? There was, of course, Philo Farnsworth, father of television. And David C. Evans, whose pioneering work in computer animation opened the huge and growing field of virtual reality. And Marriner Eccles, whose Depression-era economic theories led directly to the New Deal and have profoundly influenced government policy ever since.

The results of their genius changed lives nationally, if not worldwide. That is also most emphatically true of the work of the fourth member of that most-influential quartet, John Moses Browning, the world's greatest inventor and designer of firearms. During 47 inventive years, from a rough-slab-lumber Ogden machine shop and its successors, poured an astonishing 128 patents on some 80 different firearms, many of them complete innovations. His inventions revolutionized and popularized sporting arms, put guns of deadly efficiency in the hands of criminals as well as law enforcement, changed the nature of warfare, and added immeasurably to its horror.

John Browning was born in 1855, the son of Jonathan Browning, a talented gunsmith whose shop in Nauvoo, Ill., provided many of the rifles carried by Mormons in their exodus west. Jonathan reached Utah in 1852, took a second wife — who became John's mother — and set up shop in Ogden. In that shop, at his father's side, John began as early as age 6 the education that shaped his career and changed the world.

At age 10 he made his first gun, a muzzle loader. Rooting through a pile of scrap metal in a corner of the shop, he found a ruined gun barrel and sawed off the bad end. Working hastily in his father's absence, he hacked out a gunstock with a hatchet, wired it to the barrel, and screwed on a flashpan he made from a scrap of tin. With a single load of powder and birdshot filched from his father's supply, he and 6-year-old brother Matt set out in search of game. John took aim at a cluster of prairie chickens, Matt touched a flame to the primer in the flashpan, three prairie chickens ended up on the breakfast table, and the two

**ABOVE: John M. Browning and his recoil-operated machine gun.**

brothers were confirmed hunters for life.

John had barely turned 13 when he acquired a ruined single-barrel shotgun that his father had bought for parts. He took it apart, heated and straightened some parts, replaced others with pieces retrieved from the junkpile and filed to fit, and made others from scratch. When he was finished he had his own shotgun — and the confidence that he was a gunsmith. Later that year he cemented that confidence by making a gun for 9-year-old Matt.

By the time John was 23, in 1878, he was 6'3" tall, slim, straight, balding, and recently married. He had learned much by then, especially the importance of keeping things simple, and that most problems could be solved by dogged effort coupled with creative ability. But he was still basically a repairman of guns, still working in his father's shop, fashioning needed parts by hand with forge and anvil, foot-powered lathe, breast drill, file, and chisel. Then, that year, his life and work changed forever.

The instrument of that change was a revolutionary single-shot rifle he invented, one that ejected the spent cartridge with the flip of a lever and inserted a new cartridge into the chamber with another flip.

Knowing nothing about mass production or national marketing, he and his four brothers hand-made 25 guns and sold them out of their little shop for \$25 each.

Then came the breakthrough. Winchester Arms of New Haven, Conn., heard about the gun. In 1883 its president, T. G. Bennett, made the week-long trip to Ogden and bought manufacturing rights to the gun for \$8,000. That handshake deal, which included

rights of first refusal to Browning's future inventions, began Winchester's half-century domination of the firearms industry. It also gave John Browning the financial freedom to concentrate exclusively on gun design and invention the rest of his life.

In rapid order, Winchester brought out other Browning rifles, all lever-action repeaters. First came the Model 1886, called by Theodore Roosevelt "the best gun I ever had . . . for it is deadly, accurate, and handy as any, stands very rough usage, and is unapproachable for the rapidity of its fire and the facility with which it is loaded." The Model 1892 followed, and then the

Model 1894 — the famous Winchester 30-30 carbine, the first repeating rifle to fire smokeless cartridges. This was the most popular rifle ever made, with some 6 million sold during more than a century of uninterrupted production.

During his 19-year association with Winchester, Browning sold the company more than 40 gun designs, including pump-action rifles and shotguns, a bolt-action rifle, and a lever-action shotgun. Many were never produced; Winchester bought them to keep them out of the hands of competitors.

The association lasted until 1902, when Browning decided that instead of selling the patent on a revolutionary automatic auto-loading shotgun he had invented, he would prefer royalties. Winchester refused, and Browning took his new shotgun to Fabrique Nationale de Guerre of Liege, Belgium. After the break with Winchester, Browning retained the patents on his inventions and worked on a royalty basis with Fabrique Nationale, Remington, Colt, and Savage.

That automatic shotgun became one of the most popular and profitable guns ever. With the patents now under his control, he also saw the



***The "4 B's": Browning Arms Company's live bird team (which later became a trapshooting squad) in 1892. From left to right: G. L. Becker, John M. Browning, A. P. Bigelow and Matt Browning.***

gun produced as the famous Remington Model 11 Automatic and the Browning Automatic-5, made by his own Browning Arms Company. For half a century it monopolized the market before a competing auto-loading shotgun was developed.

The same vision that inspired the shotgun also launched Browning on an inventive burst that ultimately replaced the cavalry charge with the

trench warfare of World War I and changed the nature of warfare on land, sea, and air; it also put submachine guns in the hands of Prohibition-era gangsters and automatic weapons of many other types in the hands of criminal, revolutionary, military, and police forces throughout the world.

The story of his epiphany goes like this: In 1889 Browning had returned from a two-year Mormon proselyting mission to Georgia, eager to get back to inventing guns. On a fall day, at a weekly shoot of the Ogden Rifle Club, the shortest man in the club was taking his shots. As Browning watched the muzzle blast sway the weeds 10 feet in front of the gun, the inspiration came: Why waste that energy? Why not use it to eject the spent cartridge and replace it with another? Why settle for lever- or pump-actions to make a repeater gun? Why not use the wasted gas to make an automatic? *Why not make a machine gun?*

At the time, the nearest thing to that was the Gatling gun. Invented by Richard Gordon Gatling in 1862, its latest model had 10 barrels that revolved with a hand crank and could shoot 1,200 rounds per minute. But it weighed 600 pounds, required a wheeled swivel mount, and frequently jammed. Within six years Browning had made it obsolete.

The day after he watched those weeds sway, Browning produced and fired a gun that proved his theory would work. Within three months — on Jan. 6, 1890 — he filed his first patent based on the gas-operating principle. On Nov. 22, 1890, less than a year after that first experiment, he sent a handwritten letter to Colt Firearms Co., which at the time was producing the Gatling gun.

"Dear Sirs," he wrote. "We have just completed our new Automatic Machine Gun & thought we would write to you to see if you are interested in that kind of a gun. . . . It is entirely automatic and can be made as cheaply as a common sporting rifle. If you are interested in this kind of gun we would be pleased to show you."

Colt was, and early in 1891 Browning took his crude, hammer-marked, belt-fed experimental model to Colt's Hartford plant, where it performed without a hitch. A few months later, before naval ordnance officers, it fired off 1,800 rounds in three minutes. Though the barrel glowed red, there was no stoppage. The future had arrived, and Browning went to work to replace the primitive-looking experimental gun with a production model. It came to market as the Colt Model '95.

A report by the Inspector of Ordnance to the Secretary of the Navy summarized the results of

intensive testing. Of the Gatling gun, he reported, "No crank gun could be made to handle successfully and safely the modern smokeless powder ammunition, owing to the danger from hang-fires. Repeated instances occurred of cartridges exploding after being entirely drawn from the gun, in rapid fire, and in one case a cartridge was discharged when partially out of the chamber, damaging the mechanism." But Browning's

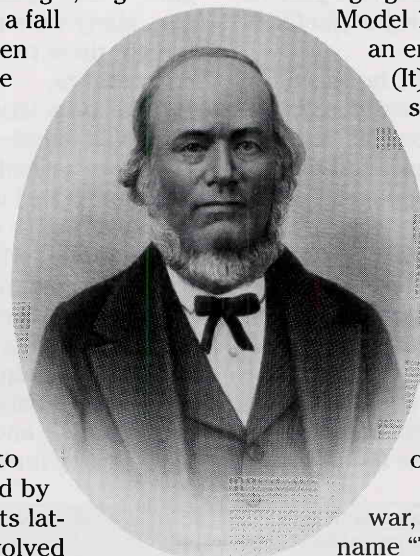
Model 1895, he reported, performed "in an eminently successful manner. . . .

(It) is exceedingly simple in construction, and has not more than one hundred parts, a surprisingly small number, considering the type. It has been designed with great care and with due attention to the often conflicting requirements of lightness and strength, so that with a maximum weight of 40 pounds, no part, with the single exception of the extractor has broken in the course of a number of very severe tests."

During the Spanish-American war, the Model 1895 earned the nickname "The Peacemaker." At San Juan

Hill, Theodore Roosevelt's 1st U.S. Volunteer Cavalry Regiment — the Rough Riders — and other troops were pinned down by entrenched riflemen above. Of the 2,300 Americans on the hill that day, 500 died, and the charge might have failed without Browning's weapon. Mounted on a tripod, and fed by cartridge belts stored in ammunition cans, the gun was designed for defense. But a courageous officer carried it partway up the hill, accompanied by a soldier carrying the ammunition cans. There it raked the enemy positions with withering fire that allowed the cavalrymen to move forward and take the hill. Five years later, during the Boxer Rebellion in China, some 400 Marines and sailors with two Peacemakers protected the foreign legations, holding off wave after wave of attacking Chinese for a month until reinforcements arrived.

A major problem with the weapon was that sustained fire burned out the barrel. To solve that problem, in 1900 Browning designed a machine gun encased in a water-filled jacket. There was no market at the time, but when the United States entered World War I and the War Department called for help, Browning was ready. In April 1917, he astonished top Allied and American military brass by firing his gun at 600 rounds a minute for 33 minutes without overheating the barrel. When someone suggested that this was a specially crafted weapon that couldn't be mass produced,



**ABOVE: Jonathan Browning, father of John M. Browning.**

he invited the group to select for a second test any of a dozen other Colts he had brought. This time the continuous firing was nearly 29,000 rounds in 48 minutes — without a problem. The gun was approved and rushed into production by three different companies.

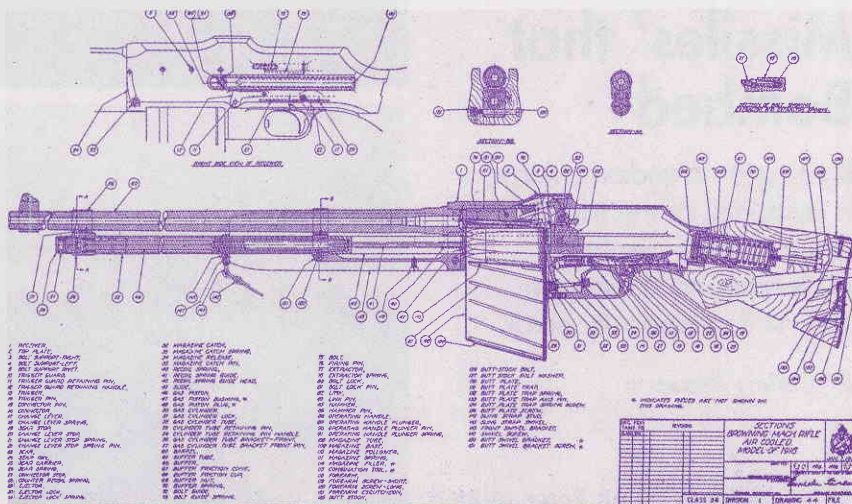
Also enthusiastically approved by the military was another Browning invention with which infantrymen in four major wars became intimately familiar. Recognizing the need for offensive “walking fire,” Browning developed a shoulder-carried 18-pound machine rifle with a range of 600 yards firing 550 .30-caliber rounds per minute from 20-round magazines. Its firepower and reliability under all conditions, from the mud of World War I to the jungles of Vietnam, made the Browning Automatic Rifle — the famous B.A.R. — the most effective infantry weapon of all time.

There was more to come. During the last stages of World War I, in response to the military's pleas for a larger caliber capable of penetrating German tanks, Browning produced the .50-caliber machine gun. The armistice came before it could be deployed, but it played a decisive role in World War II and Korea, mounted on tank turrets, on Naval patrol boats, and in the waist- and tail-turrets of Flying Fortresses and other bombers. Later, again in response to pleas from ordnance officers, he developed a 37-mm cannon capable of firing three heavy projectiles per second with a muzzle speed of 3,000 feet per second. Mounted on strafing planes and, later, on helicopter gunships, it has been a devastating weapon against tanks and ground troops. From World War I through the Korean War, every machine gun used by U.S. forces on the ground, in the air, or on the sea was a Browning.

All this, of course, meant that Browning was giving far less attention to the development of sporting arms, his main source of revenue. In fact, Browning's work for the military brought in very little income. In 1917 the government bought full rights to manufacture his water-cooled machine gun, his B.A.R., and the .45-caliber automatic pistol that became the standard sidearm for all branches of the U.S. military. For all three weapons — plus Browning's services to supervise production — the payment offered was \$750,000, a meager figure he accepted without hesitation. Years later the Associated Press calculated that standard royalties for these three weapons alone would have been \$12,704,350.

John Moses Browning, a selfless patriot and undoubted genius, died of a heart attack while on a working trip to Belgium in 1926, at age 71. Of all that has been said and written about him, perhaps two statements best measure the man.

From Secretary of War Dwight F. Davis, at his funeral: "It is a fact to be recorded that no design of Mr. Browning's has ever proved a failure, nor has any model been discontinued. . . . It is not thought that any other individual has contributed so much to the national security of this country as Mr. Browning in the development of our machine guns and our automatic weapons to a state of military efficiency surpassing that of all



*A diagram from the War Department's 1918 "Handbook of the Browning Automatic Rifle Model 1918 (Air-Cooled)."*

nations."

And from eminent gun authority Captain Paul A. Curtis, writing in 1931: "To say that he was a great gun designer is inadequate. ... Browning was unique. He stood alone, and there never was in his time or before, one whose genius along those lines could remotely compare with his."

WILLIAM B. SMART IS RETIRED AS EDITOR AND GENERAL MANAGER OF THE *DESERET NEWS*. HE IS THE AUTHOR OF BOOKS ON UTAH AND ITS HISTORY.

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# The 'Cruise Missiles' that Bombed

Rusting at Wendover Airport is evidence of the trial-and-error process involved in developing a weapon. At first it was mostly error.

by Dennis Weder

Tucked away on Air Force property in a far corner of the airport in Wendover, Utah, sits an inconspicuous concrete pad. At the northeast corner of the pad stands a small concrete blockhouse, and nearby lies what looks like a pile of old car parts. Closer inspection reveals that, although there are a few old cars rusting in the pile, the majority of the remains are actually the remnants of self-propelled "buzz bombs," the relics of failed test trials at the nearby launch pad dating from a brief but significant episode in World War II.

The Allies used the first self-propelled bombs during World War I, but these were really no more than explosive-packed biplanes. They were used mostly to intimidate ground troops since their simple gyroscopic guidance systems did not allow effective targeting.

However, the concept of the "cruise missile" did not die out then. After World War II's Battle of Britain, which resulted in heavy damage to the German fleet of bombers, the Nazi Luftwaffe revived the idea of the pilotless bomb. The Luftwaffe began designing what it eventually called the *Vergeltungswaffe Eins* (Vengeance Weapon 1), more commonly known as the V-1. About 25 feet long with a 16-foot wingspan, the V-1 could fly some 200 miles with an explosive



*Wreckage of the JB-2 litters the ground at Wendover.*

warhead of about 1,800 pounds. The guidance system included a magnetic compass and gyroscopic control of the rudder and elevator on the tail — not much of an improvement over the World War I system. The V-1 was still only effective when aimed at densely populated targets such as London.

The V-1's Argus pulse jet engine — which had been invented decades earlier by German scientists — operated on a ramjet-type principle. First, steam pistons, small rockets, or Heinkel bombers propelled the V-1 to about 200 mph. Once the bomb got up to speed, air streamed into the engine inlet through a line of inlet valves with downstream flaps. When gasoline was injected into the chamber and ignited by a spark plug, the resulting pressure forced the flaps to close. Combustion gases escaped out the rear of the engine to supply the thrust that propelled the bomb. After the fuel had detonated, the pressure in the combustion chamber fell, and the wind forced the valves open and let in fresh air. This cycle repeated about eight times per second. The

PHOTOS COURTESY OF AUTHOR

engine could accelerate the V-1 up to 400 mph as the fuel tank approached empty. The V-1 acquired the nickname "buzz bomb" from the sound made by the detonations.

To measure the flight distance, the nose of the bomb contained a small propeller attached to a counter. When a predetermined number of propeller spins had been reached, the elevator on the tail lowered, putting the bomb into a nose-dive. Since the fuel tank outlet was in the rear of the tank, the nosedive cut off fuel to the engine; when the buzzing stopped, it took only about 15 seconds for the bomb to reach the ground from its normal 2,000-3,000-foot elevation. When people on the ground heard the buzzing stop, they recognized it as a signal to run for cover.

In the V-1 the Germans found an extraordinarily inexpensive alternative to manned bombers, which the Luftwaffe regularly lost in battle. Since it needed to fly only once for about 30 minutes, it could be made of cheap sheet metal and wood at a tiny fraction of the cost of an airplane. It also did not require the expense of a trained crew; in fact, one crew could launch hundreds of bombs with minimal risk (although occasionally a V-1 would crash and detonate uncomfortably close to the launch pad).

After 30 months of secret development, the Luftwaffe launched the first operational V-1s from locations in France in June 1944. The Allies adopted a three-stage defense against them: a patrol by the fastest fighters available, a ring of anti-aircraft emplacements, and a wall of barrage balloons. This system knocked out about 75 percent of the incoming V-1s, but the remaining 25 percent still caused considerable damage, casualties, and psychological trauma.

Meanwhile, the Allies had been working on their own cruise missiles. Northrop Aviation created the Jet Bomb 1 "Power Bomb," or JB-1 for short. But it did not perform well in tests.

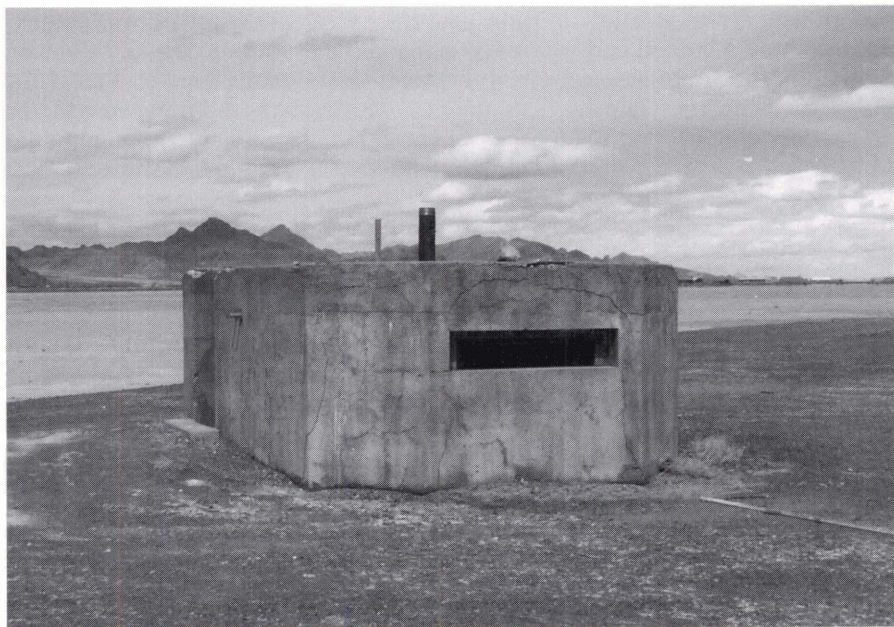
Then, about a month after the V-1 attacks began, the Allies shipped a wrecked V-1 from Britain to Wright Field, Ohio. The U. S. military quickly decided to halt all other development of cruise missiles and concentrate on an American version of the V-1. Northrop began construction of the JB-2 using original German parts and copies made by Ford Motor Co. By October 1944, the military was testing the first JB-2s at Eglin

Field on Florida's Gulf Coast.

It took nearly 50 JB-2 launches to achieve success. Many crashed on the beach and still lie there on Air Force property. The successful models crashed into the ocean after depleting their fuel. Ironically, these successes forced a relocation of the testing to an inland location so that the crashed weapons could be recovered for evaluation. The military selected Wendover, on the Utah-Nevada state line.

The Army Air Corps had been using Wendover as a training base since the early 1940s. The federal government already owned 90 percent of the surrounding land. It lay far enough inland to be safe from attack and was isolated by the salt flats in Utah and the sparsely populated desert of eastern Nevada; yet a major highway and railroad gave it east-west connections. In addition, the weather was clear most of the year.

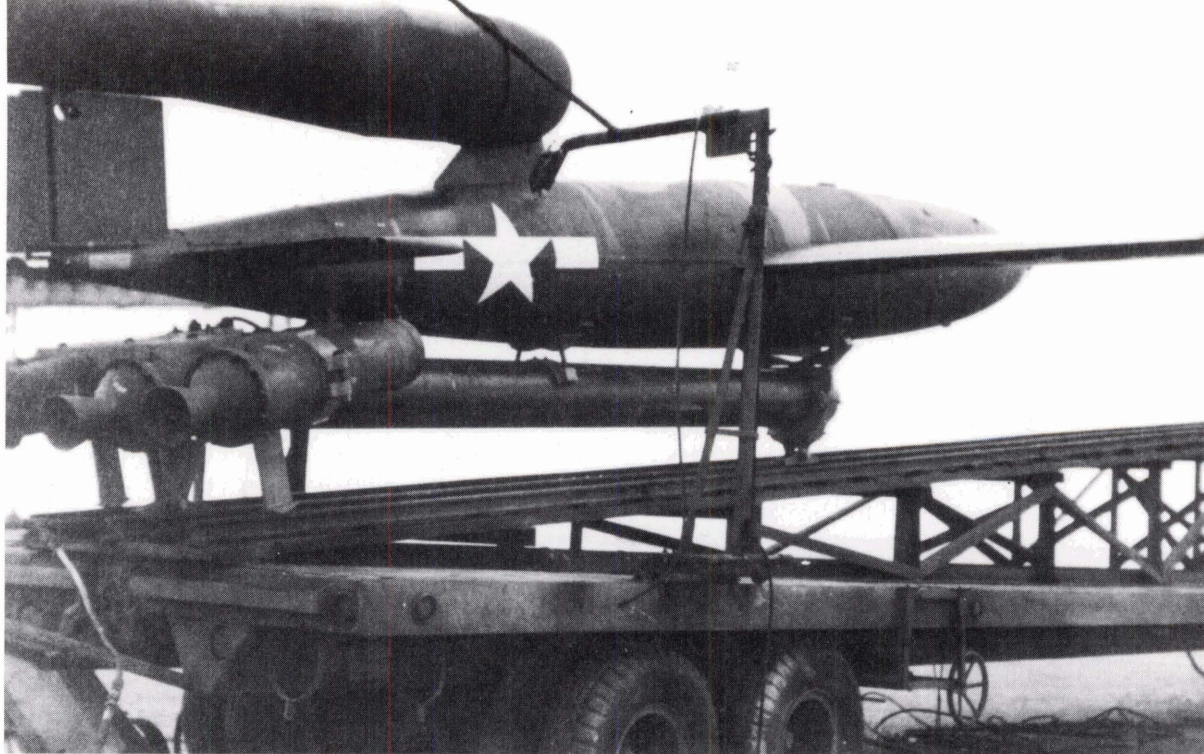
From July 1941 through April 1944, the field at Wendover was used for the training of bomber crews. At its peak, it was the largest World War II bomber training facility in the world. Briefly in 1944, P-47 (Thunderbolt) pilots also trained at the field. However, the fighter squadron was quickly



*A bunker at the launch site.*

moved to other bases when Wendover was chosen as the location for Project Silver Plate — the training of a crew to drop an atom bomb. At the same time, the military chose Wendover for continued JB-2 testing.

Some have suggested that Wendover was selected as the primary JB-2 test site to divert attention from Project Silver Plate. The populations of both the base and the town were undoubtedly distracted by the frequent launches of the noisy JB-2s. However, the real reason



probably lay in the millions of acres of government-controlled land over which to fly a notoriously errant weapon. In June 1945 the military built a launch pad with two ramps and a bunker off the southwest corner of the field, just inside the Utah state line.

The military justified this project because it anticipated a land invasion of Japan. The JB-2s were to be used as the Germans had used them: to wreak havoc on Japanese installations and the general populace before any Allied ground forces were put in harm's way.

Development of the JB-2 at Wendover during late 1944 and early 1945 resulted in several significant advances, including a much-improved guidance system and a lowering of the required launch speed to 100 mph. Researchers also worked on replacing the rocket booster motors because of the shortage of rocket propellant. Experimentation on flywheel and chemical-reaction launching systems and new launch-pad designs, including mobile ramps and reusable rocket-booster assemblies, took place at both Wendover and Eglin. These developments had their difficulties, however, resulting in the aforementioned pile of crashed bombs near the launch pad.

Other launch scenarios — aircraft carriers, LSTs (landing ship transports) and even submarines — were investigated. When the war in Europe came to a close in May 1945 and the Japanese surrendered several months later, testing of the JB-2 slowed but did not cease entirely until just before the program was closed down in March of 1946. The Navy took possession of the remaining JB-2s and renamed them "Loons."

The U.S. never used the JB-2s in combat

### ***The JB-2 buzz bomb.***

because of the rather convincing impact of the atomic bomb. However, the work and money expended on the JB-2 did not go to waste. This program became the first step in a long series of guided-missile and guided-bomb projects continuing to the present. Many of these weapons systems are still being tested in the area east of Wendover now known as the Utah Test and Training Range. And, occasionally, crews attempting to recover a modern test weapon from the range still encounter one of the old JB-2s resting peacefully miles from the nearest road.



DENNIS WEDER IS THE RANGE ENVIRONMENTAL COORDINATOR AT THE UTAH TEST AND TRAINING RANGE.

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The Cold War was good business for Utah. As hatred and mistrust between the U.S. and the Soviet Union grew, Utah companies nabbed a bucket load of military contracts and testing programs. The missile industry, in particular, exploded during the early 1960s.

By then, missiles had already gained a foothold in Utah. During the 1950s, Utah companies made missile engines, liquid fuel, and guidance systems. But that was just a beginning. "Other missile-connected industries are bound to follow these pioneer leaders into the western area where land, elbow room and power and manpower are plentiful," the *Deseret News* predicted.

The *News* got it right. In 1957 the missile industry employed only 600 Utahns. But by 1961 that number had grown to 10,500.

The military bases and industries established in Utah during World War II made perfect breeding grounds for the weapons that became the darlings of the nation's defense strategy in the 1960s. The state also had plenty of educated, underemployed people. It had open space ("desert wasteland," some called it) in which to run missile tests. Finally, Utah's business, government, and church leaders eagerly welcomed military spending.

Minuteman missiles probably had the biggest impact on Utah. These intercontinental ballistic missiles (ICBMs) would fly 6,300 miles carrying nuclear warheads with 50 times the force of the Hiroshima bomb, be aimed at Soviet targets from underground silos in the Midwest, and launch instantly at the touch of a button. When the military announced the contracts on this missile, Utah companies had landed the lion's share of the work. Hercules would make engines, Thiokol would make revolutionary solid-fuel boosters, Geneva Steel would make the steel for the silo casings, and Graver Tank & Manufacturing would make the casings. Boeing would assemble the missiles at Hill Air Force Base.

During the early 1960s, the Utah papers ran frequent, enthusiastic stories on all aspects of the project. On Feb. 7, 1960, a *Salt Lake Tribune* reporter described a Minuteman engine test at "a barren area of Box Elder County." With a thunderous roar, the engine, bolted to a huge concrete-and-steel structure, burned thousands of pounds of propellant in a few seconds, creating a "searing white flame."

Another article discussed the Air Force's idea of putting missiles on trains. The military thought

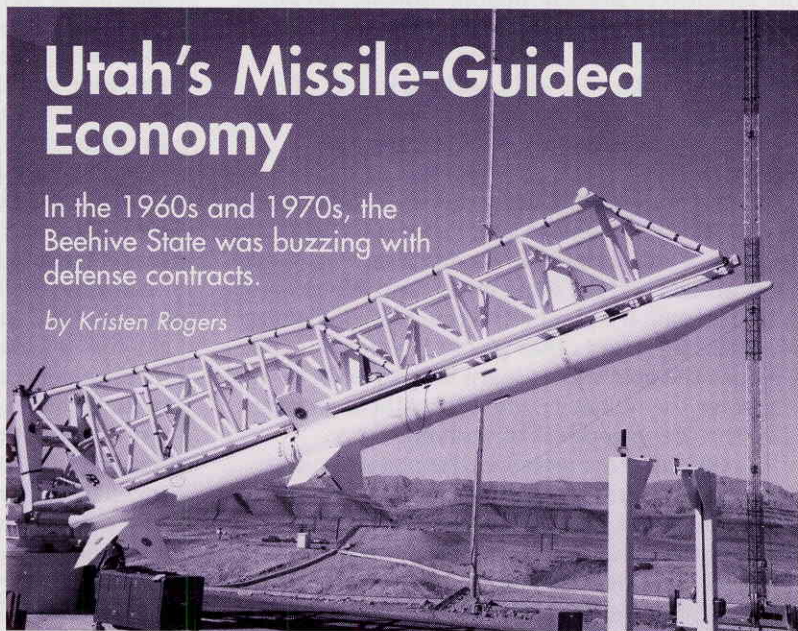
it could confuse the enemy by moving the missiles around — a concept that would return in full force in the late 1970s with the MX missile plan (see separate story). The Hill Air Force Base pilots assigned to learn to "fly" the Mobile Minuteman Test Train called it the "choo-choo that flies."

In February 1961, the *Deseret News* wrote that the Minuteman had become the nation's most effective weapon "should the cold war suddenly become hot. Minuteman is Uncle Sam's ace in the hole in the deadly game of life and death that

## Utah's Missile-Guided Economy

In the 1960s and 1970s, the Beehive State was buzzing with defense contracts.

by Kristen Rogers



*An Athena missile at the Green River Test Complex (n.d.).*

may depend upon the first card dealt." That same month, the *Tribune* ran a story on how local businesses could "bag" Minuteman contracts.

Meanwhile, some farmers and ranchers in the high-plains states balked as the military began acquiring land for the missile silos. "Why does it have to go here?" they asked. The Air Force PR officer would give them a stock, somewhat callous reply: "Just lucky, I guess. You have as much right to be protected as anyone." Later, the same Utahns who were benefiting from the Minuteman contracts would know how it felt to be the "lucky ones" when the MX planners turned their eyes to the West Desert.

The first Minuteman test, in February 1961, went well, but during the next three shots one missile went "wild," one blew up in the silo, and one fell short of its target. When a test in November 1961 finally succeeded, the *Deseret News* expressed relief that the Minuteman was almost ready, given "the present international situation."

In the midst of the extraordinary military

buildup on both sides of the Iron Curtain, the Bay of Pigs and Cuban Missile Crisis played out. The classic film *Dr. Strangelove* satirized the arms race and attitudes of the time.

In 1962 Leonard Arrington and Jon G. Perry wrote in *Utah Historical Quarterly*, "From bases in the continental United States or from mobile launching bases on submarines, it is now possible, within an hour of launching time, to drop nuclear or thermonuclear warheads upon any spot on the globe."

Americans placed great stock in the ability of the missiles to prevent hostile attacks. "So far, [the] theory of deterrence has proven correct," the Ogden *Standard Examiner* wrote in 1963. "We can only hope it will continue to pay off. But, meantime, the Utah plants will — and must — continue to play their vital roles in the over-all effort."

In 1964 the military began to use another Utah resource — uninhabited land — for missile testing. Test shots out of Green River and Blanding would send Athena and Pershing missiles to White Sands, N.M. The military planned to watch each flight and retrieve stages and other pieces that fell to earth. Because the goal was to learn how to build better weapons, the military named the Athena missile after the Greek goddess of wisdom.

In response to worried citizens, the White Sands safety director emphasized, "If there were any chance that [the tests] would endanger residents of the area, we just wouldn't do it." If a missile malfunctioned, he said, it would be destroyed midflight. Yet the very first missile veered off course and continued flying until it slammed into the ground near Durango, Colo.

Nevertheless, regular testing began. Every time a test took place, the military would close roads, reroute airlines, and evacuate the few ranchers and sheepherders living in the flight path.

"The rocket took off like a flaming arrow shot from some giant's bow," a Los Angeles writer wrote after a 1968 Athena test. "Fire and thunder trailing in its wake, it pushed back the night and rattled the ears of the shivering little group watching from a windy ridge a mile away. In moments, the missile was another star speck in the cold, clean heavens."

By the early 1970s, Green River's Utah Launch Complex had significantly boosted the town's economy. Town businesses that once had found the winter months slow indeed could now stay open year-round.

Through the 1960s and '70s, Utah industries continued to land missile contracts. Utah companies built engines for and assembled the Minuteman II and Minuteman III. They also played a large part in the fabrication of Bomarc, Sergeant, Pershing, Polaris, Trident, and Cruise missiles. The nuclear submarine-launched Poseidon missile was built almost entirely in Utah.

"The work's interesting, but it's discouraging sometimes when you think about the product you are making — a weapon for destruction," said Ronald Toone, an employee of Sperry Utah, which landed a contract to build Sergeant missiles in 1966.

One missile program scored a near miss in Utah. In 1968, the military announced it would install 10 antiballistic sites around the country — one of them right in the Salt Lake Valley. Officials promised that the Sentinel antiballistic missiles would guard against both intentional and unintentional ICBM launches from other countries. In particular, the government named China as a possible aggressor. Each Sentinel missile would carry nine warheads "which — hopefully — will destroy enemy missiles in vast explosions high above the earth," wrote the *Deseret News*.

Sen. Wallace Bennett touted the economic benefits for Utah, but critics responded that the Sentinels would not work and were a waste of money. State representative Allen E. Mecham, one of a few local officials to denounce the plan, pointed out that the Sentinels would make Salt Lake City a target for attack. The city was "asking for trouble if it allows the defensive weapons practically in the middle of town," he said.

In the end, the Sentinels never came to Utah. A lawsuit challenged the plan, and Richard Nixon cancelled the program in 1970.

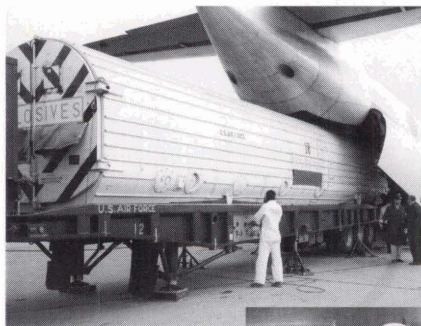
By then, the missile industry had greatly cooled down. In 1963 almost 14,000 Utahns held jobs in manufacturing "transportation equipment," almost all of these being missile jobs. In fact, the number of missile jobs at that time nearly equaled the number of jobs in agriculture. However, by 1969 the number had shrunk to 4,900.

During the missile heyday, many Utahns had banked on continuing large military contracts.



**Thiokol Chemical Corporation technicians cleaning a mix of solid propellant out of a 300-gallon mixer. The propellant was used in Thiokol's first-stage engine for Minuteman missiles (n.d.).**

Developers built large numbers of homes in northern Utah, but when research and development on the missiles ended, many houses

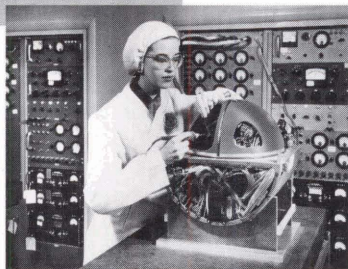


remained empty.

In 2000, 4,974 Utahns still held jobs in the manufacture of missiles and space vehicles.

However, this represented only 3.8 percent of the state's total manufacturing jobs, down from nearly 7 percent in 1986 (before the Berlin Wall fell) and almost 25 percent in 1963.

Though the missile industry no longer plays a huge role in the economy, it transformed the state where "land, elbow room and power and manpower are plentiful." It affected Utahns' lives even in rural areas. And it helped the state move toward a greater involvement in research, manufacturing, and high-tech endeavors.



**TOP: A Minuteman missile is loaded aboard a C-133 B Cargomaster at Hill Air Force Base for shipment to the launching site, 1964.**

**ABOVE: A worker puts the finishing touches on a Sergeant stable platform in a specially designed "clean room" at Sperry Utah, (n.d.).**

KRISTEN ROGERS IS THE EDITOR OF *BEEHIVE HISTORY*.

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## A Partial List of Military Installations and Companies in Utah during WW II

**TOOELE ORDNANCE DEPOT** for munitions storage: 902 igloos (100 reinforced for high explosives), 12 magazines for small arms munitions, 31 warehouses, \$1 million tank-repair shop.

**DESERET CHEMICAL DEPOT:** A secret during the war. Used for storage and shipment of poisonous gases, chemicals, and chemical-filled ammunition. Now the center of controversy over the incineration of those chemicals.

Six air force bases, including **HILL FIELD**, **SALT LAKE CITY ARMY AIR BASE**, and **WENDOVER** bombing and gunnery range. The crew that flew the *Enola Gay* (which dropped the bomb on Hiroshima) trained at Wendover, as did crews that bombed Germany and took part in D-Day. Ground-to-air pilotless missiles were among the many weapons tested, developed, or trained on there.

**DUGWAY PROVING GROUNDS:** Used to test weapons such as toxic chemicals, flame throwers, and chemical spray systems. Detailed German and Japanese structures were built at Dugway, then bombed with incendiary bombs and rebuilt three times. From 1958 to 1968 a chemical, biological, and radiological warfare course was taught at Dugway. In 1968, a nerve gas leak killed thousands of sheep on the West Desert. The protective biochemical gear used in the Gulf War was tested at Dugway.

Five depots for military supplies, including **CLEARFIELD NAVAL SUPPLY DEPOT**, a logistics base for the Pacific Fleet.

**OGDEN AIR MATERIEL AREA:** Aircraft maintenance and repair. Employed 15,000 civilians, 6,000 military, and thousands of POWs.

**OGDEN ARSENAL:** Ammunitions storage since 1921. During WWII it was expanded to produce bombs, artillery shells, and machine-gun belts. At its peak, 6,000 were employed.

Defense contracts at **GENEVA STEEL**, **BROWNING/REMINGTON** factory (called Utah Ordnance Plant; it produced .50-caliber and .30-caliber ammunition), **EITEL-MCCULLOUGH RADIO TUBE PLANT**, **UTAH OIL REFINERY**, **LEHI REFRACTORIES**, and **STANDARD PARACHUTE**.

**B**old, red letters on the sign's white background warn: DANGER: IMPACT AREA. TRAVEL EXTREMELY DANGEROUS. The sign stands alone on a dusty gravel road which winds into southeastern Utah's vast canyonland and disappears.

Forty-seven miles away, where the narrow, rough road has degenerated into a dirt trail, Beverly Ekker scurries about the ranch house, glancing at the kitchen clock.

It's launch day [1969]. For the 13<sup>th</sup> time in a year, the Ekkers must leave home while personnel at Gilson Butte fire a Pershing artillery missile more than 450 miles to the White Sands Missile Range in southern New Mexico.

Gingerly, in the manner of new mothers, Beverly places two-week-old Janie Marie in her basket. She props the basket securely in the back seat of the blue sedan, then drives out of the valley and northwestward into the rolling hills.

Two and a half hours and 79 miles later, mother and daughter arrive at the A. C. Ekker "city home" in Green River, Utah. Janie Marie's father and grandparents, Mr. and Mrs. Arthur Ekker, will arrive in a few hours. The men can't afford to lose even a minute caring for the cattle.

The two families evacuate each time a two-stage Pershing ballistic missile is launched from Gilson Butte, 42 miles northwest of the Ekkers' ranch house. It's a safety move taken because the missile's first, or booster stage (about half the length of the 34 1/2-foot-long missile) separates from the second stage in the Utah sky and drops to the ground. . . .

The Ekker ranch house is in the heart of the 248,893-acre booster impact zone in Wayne County, Utah. They are the only residents of that zone, situated between the 11,000-foot-plus Henry Mountains and Hanksville on the west and Green River's juncture with the Colorado River . . . on the east.

The Y ranch has been in the family since 1909, when Mrs. Arthur Ekker's father came to Utah and settled in the semi-arid valley. . . .

Arthur and his son operate the ranch, which stretches nearly 40 miles north to south. . . . The Ekkers maintain 440 Hereford cattle, the maximum number allowed by the BLM.

When plans for the three Utah missile launch sites were disclosed in 1962, the Ekkers and other

residents weren't happy about "the Army coming in and taking over our land." The Army conducted a public relations program to inform residents of the missile program. . . .

"It has not proved as much a bother as we first thought," [A.C. says]. . . . "It hinders our work, sure. We've had cattle in the corral overnight without water because of an evacuation. Last fall there were two missile firings during our roundup and calf-weaning work. But there has been nothing serious." (Even the Ekkers' side interest, a tour-guide business called Outlaw Trails, Inc., sometimes is interrupted by an evacuation.)

Money from the Army has soothed once-angry residents. A rental fee, based on an Army Corps of Engineers appraisal of the type and use of land, is paid to each landowner. The one-year contracts are negotiated individually. Since payments vary, the Army won't reveal figures.

The Army also pays each adult \$12 for each evacuation day (a 12-hour or less evacuation is considered one day), and \$6 per day for expenses of children under 12.

Forty-five families totaling 158 persons are within the evacuation zones of the two other launch stations. Also in southeastern Utah, one site is for Athena missiles near Green River and the other for Pershing missiles near Blanding. These families also leave before each firing. . . .

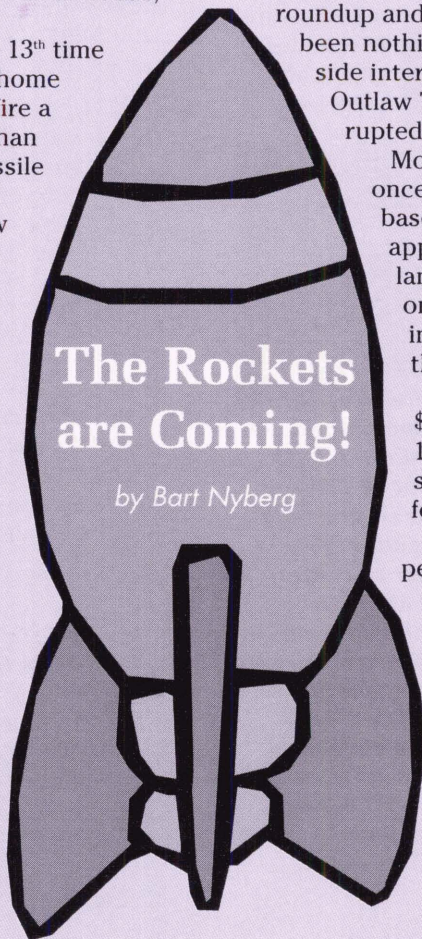
"They schedule firings and scrub them, schedule and scrub . . . so that you can't go by the written notice," A.C. says. "When we want to know exactly what they're going to do,

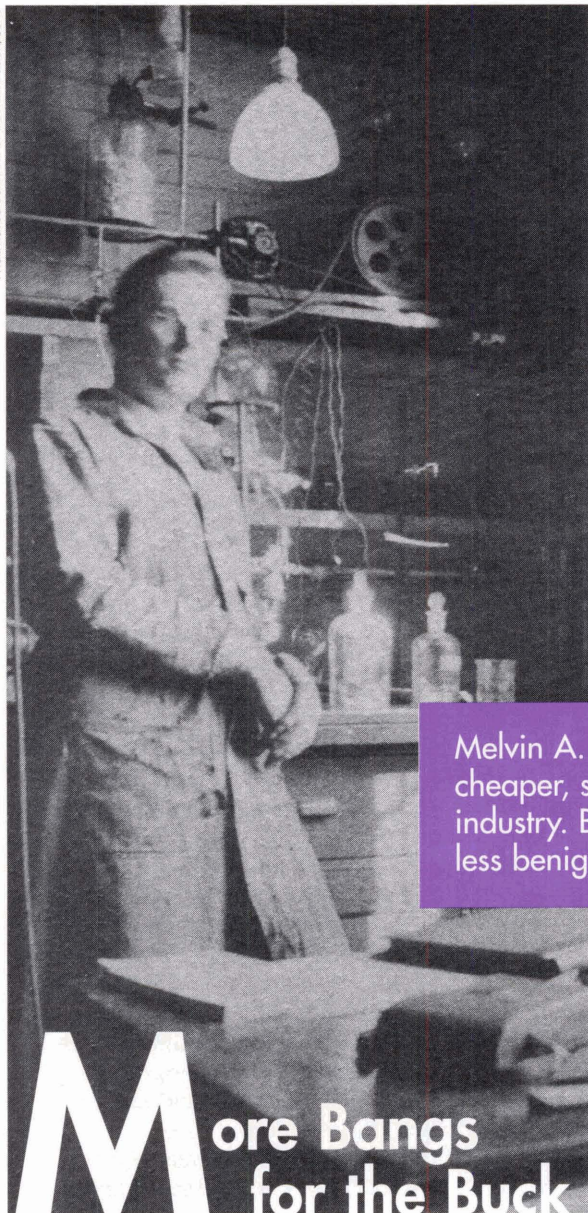
we telephone the range control manager. They make it as convenient as they can. . . ."

The Army isn't certain when the interstate missile test program will end. Originally scheduled for 77 missiles, there have been more than 10 Athena launches since July 1964. The program was scheduled to end by 1969, but two launches in early January started this year's program, which is expected to average two launches a month. . . .

Some evacuees, like the Ekkers, wouldn't care if the launchings were halted permanently. Others, particularly large families with limited incomes, welcome the extra cash and wouldn't mind evacuating every week.

***This story originally appeared in the Denver Post on March 30, 1969. Used by permission.***





Melvin A. Cook specialized in developing cheaper, safer explosives for the mining industry. But a few of his inventions had less benign applications.

best known for the production of blasting agents used in open-pit

bomb that kills most living things within a square mile in order to create an instant helicopter landing pad," began a December 1971 story syndicated by the *Washington Post Service*.

Using two scientists as its source, the story continued: "The above-ground explosion creates an enormous force that literally blows away all trees and brush. . . . The blast — almost as powerful as the explosion of a small atomic bomb — sends a mushroom cloud 6,000 feet in the air, the scientists said."

Before long the U.S. military began using the bomb against North Vietnamese soldiers and their emplacements. Two decades later, several more were unleashed during the Gulf War and, in 2001, others were dropped on al Qaida positions in Afghanistan.

Curiously, even though the *Salt Lake Tribune* reprinted the 1971 story, there was no mention of the Utah connection. The "Daisy Cutter" bomb casings were made in Phoenix. But the explosives that made it such a ferocious weapon were developed by IRECO Chemicals, a Utah company

mining. And the man behind IRECO Chemicals was Utah native Melvin A. Cook.

The third of 10 children, Melvin was born near Bear Lake in 1911. In spite of family financial hardships, all of the nine Cook siblings who survived childhood graduated from college. Melvin earned a bachelor's degree in chemistry from the University of Utah in 1933 and a master's degree in physical chemistry in 1934. He went on to Yale, where he earned a doctorate in 1937 and was awarded the Loomis Fellowship as the top graduate in chemistry.

A job in the Eastern Laboratory of the Du Pont Company gave Cook access to one of the finest explosives libraries in the world. Within a few years he had developed a safer generation of commercial explosives, eliminating the need for blasting caps in open-pit mining and liquid nitroglycerine in oil and gas exploration.

During World War II, Du Pont discontinued most commercial work to focus on military explosives. Cook worked on "shaped" (directional) charges for the bazooka, substantially improving the effectiveness of the weapon. He represented the company on a brain trust of about 25 of America's leading physical scientists that included Albert Einstein.

## More Bangs for the Buck

by David Hampshire

At the height of the Vietnam War, in a nondescript building on the western shore of Utah Lake, employees of a local company were packing the punch into one of the most powerful conventional weapons ever developed.

Its official designation was the BLU-82/B. Within the military it was nicknamed "Commando Vault" or "Big Blue 82." But in the popular press it became better known as the "Daisy Cutter." The 7 1/2-ton bomb was designed to clear helicopter landing pads in the jungles of Vietnam. Dropped by parachute from a C-130 cargo plane, it would explode a few feet above the ground, flattening trees up to four feet in diameter in an area the size of two football fields.

"Americans are blasting Indochina with a

ABOVE: Melvin Cook in his lab in 1936.

Another member of the brain trust was Princeton professor Henry Eyring, who, in 1946, accepted the position of dean of the graduate school at the University of Utah. Cook was encouraged by Eyring to pursue a position at the university and, in 1947, he was named professor of metallurgy.

In April 1947 came an event that would help solidify Cook's reputation as one of the country's premier experts in explosives. A ship carrying Army-surplus ammonium nitrate exploded in the harbor of the Galveston Bay community of Texas City, Texas, touching off a devastating chain reaction. Fire spread to a second ship, a chemical plant and nearby oil refineries, triggering other explosions. Before it was over, 560 people were dead, thousands of others injured, and a mile-long strip of the waterfront was a mass of charred debris.

Until that blast, many explosives manufacturers believed that ammonium nitrate would not explode unless it was sensitized with nitroglycerine. Cook, an expert in the properties of ammonium nitrate, disagreed. In the flood of lawsuits that followed, he was called to testify. When the government was found negligent, grateful plaintiffs sent Cook a telegram. "This victory (is) due in no small part to your monumental efforts," it said.

Cook had another attribute that made him valuable as a witness. He stuck to his guns. "Dr. Cook is a big man, blond and affable, as unassuming and harmless looking as an inactive stick of dynamite," said a 1951 story in the *Deseret News Magazine*, "but he can be peppery as a string of firecrackers in an argument, and he will stick his neck out as long as a ten-rod fuse for a pet theory."

In retrospect, the dynamite analogy was ironic. Over the following two decades, Cook may have done more than anyone else to make the use of dynamite obsolete in open-pit mining. And the same compound that had wreaked so much havoc in Texas City — ammonium nitrate — played an important role in dynamite's demise.

Using ammonium nitrate as an explosive was nothing new. It was used in weapons as early as World War I. But the Texas City disaster had alerted engineers to its potential for peace-time uses. By the mid-1950s, owners of open-pit mines were starting to replace conventional explosives with a mixture of fertilizer-grade ammonium nitrate and fuel oil (ANFO). It was cheap, easy to handle, and much safer than dynamite.

But it wasn't perfect. It wasn't water resistant, and it caused relatively little fragmentation of the rock and ore.

Then, in October 1956, Cook had a better idea. At a seminar in Minnesota, he was approached by H. Earl Farnam of Iron Ore Company of Canada. The Canadian company was having blasting problems at a mine in Labrador, and Farnam invited Cook to take a look. In December, Cook

flew to the mine.

In a wheelbarrow, Cook mixed up a "slurry" composed of ammonium nitrate, aluminum powder and water — yes, water — and poured it into a nine-inch-diameter hole at the mine. The slurry was detonated using boosters that Farnam had at the mine.

"Most everybody thought we were crazy putting water with aluminum powder and ammonium nitrate, but when the blast went off they quit laughing," Cook told the *Salt Lake Tribune* in 1966.

"As Mr. Farnam knows, this shot is famous today in Canada and elsewhere as the first use of slurry explosives," Cook wrote later. The following summer, he developed another slurry using ammonium nitrate, TNT and water.

It didn't take the mining industry long to recognize the advantages of slurry explosives. They were cheaper — much cheaper — than dynamite or TNT. They could be used in wet underground formations. And the individual ingredients, which weren't dangerous by themselves, could be mixed together on site.

By 1963, the wheelbarrow was being replaced by specially built trucks which carried the ingredients in separate compartments. At the site they would be mixed and pumped down the boreholes.

In his self-published autobiography, Cook depicted himself as a reluctant businessman. But he wasted little time in forming a succession of privately-held companies to develop and market his new products. Among them were Intermountain Research and Engineering Company (IRECO) in 1958, Mesabi Blasting Agents (MBA) in 1960 and IRECO Chemicals in 1962. IRECO and MBA were later merged into IRECO Chemicals. In each company Cook held a substantial share of the stock.

In a 1965 interview with the *Deseret News*, Cook said that IRECO Chemicals had established three plants to make slurry ingredients: in Arkansas, Minnesota and at Pelican Point, on the shore of Utah Lake. The company even had its own aluminum-processing plant in Indiana. "We make more slurry explosives than any other company in the U.S.," Cook told the newspaper. "We figure we have about 25 percent of the slurry business. . . . Our main problem is keeping up with the growth of the market."

In 1966 Rio Tinto Zinc (RTZ), an international mining and smelting firm, spent more than \$5 million to buy a 50 percent interest in IRECO Chemicals.

In 1968 Cook was invited to Sweden to accept the Nitro Nobel Gold Medal, which was first awarded in 1967, the centennial of Alfred Nobel's invention of dynamite, in recognition of "outstanding contributions to the current development within Alfred Nobel's field of activity." In the words of the selection committee, "the slurry or water-gel

explosives are perhaps the most epoch-making innovation in the field of commercial explosives since Alfred Nobel's invention of dynamite."

Ironically, the Nitro Nobel committee was honoring a man who was helping put manufacturers of Nobel's invention out of business. "Dynamite Industry Is Quietly Fading Away," said a headline in the *Wall Street Journal* in May 1971. "Fertilizer Product Gains Most of Market."

According to the *Journal*, ammonium-nitrate products had taken over about 85 percent of the nation's explosives market. "As a result, 22 dynamite plants have been closed in the past 11 years and several of the remaining 14 plants are in jeopardy. Estimates are that dynamite will drop to 5% of the explosives market by 1980."

The article also noted that, in the wrong hands, ammonium nitrate could be a deadly weapon, a fact that Timothy McVeigh demonstrated with such appalling results in Oklahoma City 24 years later.

Although Cook was earning recognition and riches from his work with the mining industry, it wasn't his only claim to fame. He was the director of the University of Utah's Explosives Research Group (which later became the Institute of Metals and Explosives Research), a military-supported organization that specialized in fundamental studies of detonation. He was a consultant for at least 100 companies around the world. He was a prolific author, writing several books and numerous academic papers. And he was the father of five children, including Garfield, who succeeded him as president of IRECO Chemicals, and Merrill, future business partner and perennial political candidate.

Unfortunately, the "peppery" disposition that served Cook so well in arguments also led to rifts with a number of business partners and even members of his own family. In the mid-1960s, his brother, Vernon O. Cook, served as managing director of MBA and later IRECO Chemicals. However, after RTZ acquired a 50 percent share of IRECO Chemicals in 1966, Melvin believed that his brother had been co-opted by the new ownership. "From then on he (Vernon) was bent on 'getting' me, even though I championed his cause to the end, first his end and then mine," he wrote later.

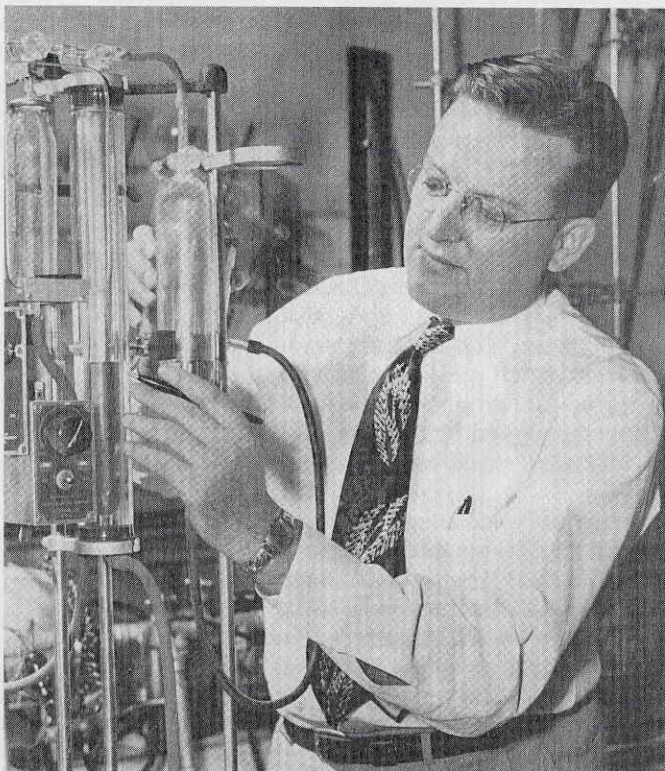
In 1972 Melvin stepped down as president of IRECO Chemicals — turning over the reins to his son Garfield — but stayed on as board chairman. However, in a 1974 letter to shareholders, he was sharply critical of the direction taken by "present management," which still included his own son.

"The young president (Garfield) found himself 'walking a tight wire,' torn between loyalty to the chairman, his father, and board members representing the majority shareholders," *Deseret News*

business editor Arnold Irvine wrote a year later.

Melvin responded by pouring his energy into a new slurry product marketed by a new company, Cook Associates — which he started with Garfield's younger brother, Merrill — and resigning from the IRECO Chemical board of directors. Merrill eventually bought out his father's interests in Cook Associates and its successors.

Although Melvin Cook made his reputation and his fortune from peacetime applications of his



***A photo from the Deseret News Magazine, Nov. 4, 1951, is captioned: "Considered the foremost U.S. expert on explosives, Dr. Melvin A. Cook, a professor at the University of Utah, has played an important part in the nation's war effort, winning worldwide acclaim for his accomplishments."***

inventions, he remained a consultant for the U.S. military. In the late 1960s he was asked to develop slurry explosives that could be used in the 750-pound M117 bomb in use in Vietnam. IRECO Chemicals developed three slurries, including DBA-22M. Although DBA-22M was never used in the M117 bomb, Cook got the chance to demonstrate its effectiveness on a much larger scale.

By this time, international treaties prohibited the atmospheric testing of nuclear weapons. But the U.S. military hadn't given up on the concept of atmospheric tests, and proposed testing a conventional bomb of unprecedented size: 45,000 pounds. The program was code-named "Project Cloudmaker." Cook estimated that filling such a

large bomb with conventional explosives would take weeks but that he could fill the enormous bomb casing with DBA-22M in about an hour. It was slurry in a hurry.

"The first full-scale bomb was loaded at Pelican Point in a period of 75 minutes," Cook recalled. "I was on hand for the loading, and the huge bomb was trucked immediately to Kirtland Air Force Base."

On Jan. 15, 1969, a B-52 bomber released the huge weapon at about 52,000 feet. Cook reported that the event was monitored by planes owned by Howard Hughes, "long the 'devil's advocate' of the AEC (Atomic Energy Commission)." The bomb exploded at about 45,000 feet. "The burst was so immense that the Hughes team thought it was a real atom bomb and reported to the newspapers that the USA had broken the test-ban treaty by firing a small atom bomb in the atmosphere," he wrote.

Cook said that Project Cloudmaker "went on to completion with what I understood to be unflinching success with DBA-22M gaining much favorable notoriety as an ideal large-size bomb filler." He reported that an underwater test of another slurry developed by IRECO Chemicals generated seismic waves that were measured around the world.

In light of such successes, he asked himself, why did IRECO get such limited attention from the armed forces? Would it have been different, he wondered, if Utah had had a senator with clout in the military like Washington's Henry Jackson?

However, the success of Project Cloudmaker did prompt the military to begin testing DBA-22M in the parachute-deployed bomb to be used to clear helicopter landing pads in the Vietnamese jungles.

Judging from his autobiography, Cook did not anticipate — or approve of — the transformation of the Daisy Cutter from an instant bulldozer to an antipersonnel device. "The BLU-82/B thus gained much unfavorable publicity," he wrote. "(But) IRECO was never linked to this device (in the media) during the period of its use so did not come in for the sort of adverse publicity that Dow experienced in their manufacture of 'NaPalm.'"

However, Cook didn't escape media scrutiny some two decades after Vietnam when Timothy McVeigh used a mixture of ammonium nitrate and fuel oil to blow up the Alfred P. Murrah Federal Building in Oklahoma City, killing 168 people. A *Deseret News* reporter called to ask him how it felt to see an explosive that he had helped develop used for such a sinister purpose.

"People misuse technology that has benefited mankind . . . that's sad and unfortunate," Cook said. "But I never told anybody about making a bomb."

By the time Cook died in October 2000, he had patented more than 100 inventions, written six books, and published more than 200 articles in

scientific journals. And he was a wealthy man.

"I have a clear conscience realizing I have maintained basic honesty, integrity, and generosity evidently not always easily done in business," he wrote in the third and final volume of his autobiography, published in 1988. However, he also acknowledged that, among his professional associates, he had made more enemies than friends.

"This history shows my slurry development was a major success, but it could have been far better, and if it had, most of my enemies might still be my friends," he said, trying to pass judgment on the previous 50 years. "Was it worth it all? I think it was not."

But given the chance to do everything over again, would he have done things differently? Somehow, it's hard to imagine.



WRITER/EDITOR DAVID HAMPSHIRE IS CO-AUTHOR OF *A HISTORY OF SUMMIT COUNTY* (1998) AND AUTHOR OF OTHER BOOKS AND MAGAZINE ARTICLES ON UTAH AND ITS HISTORY.

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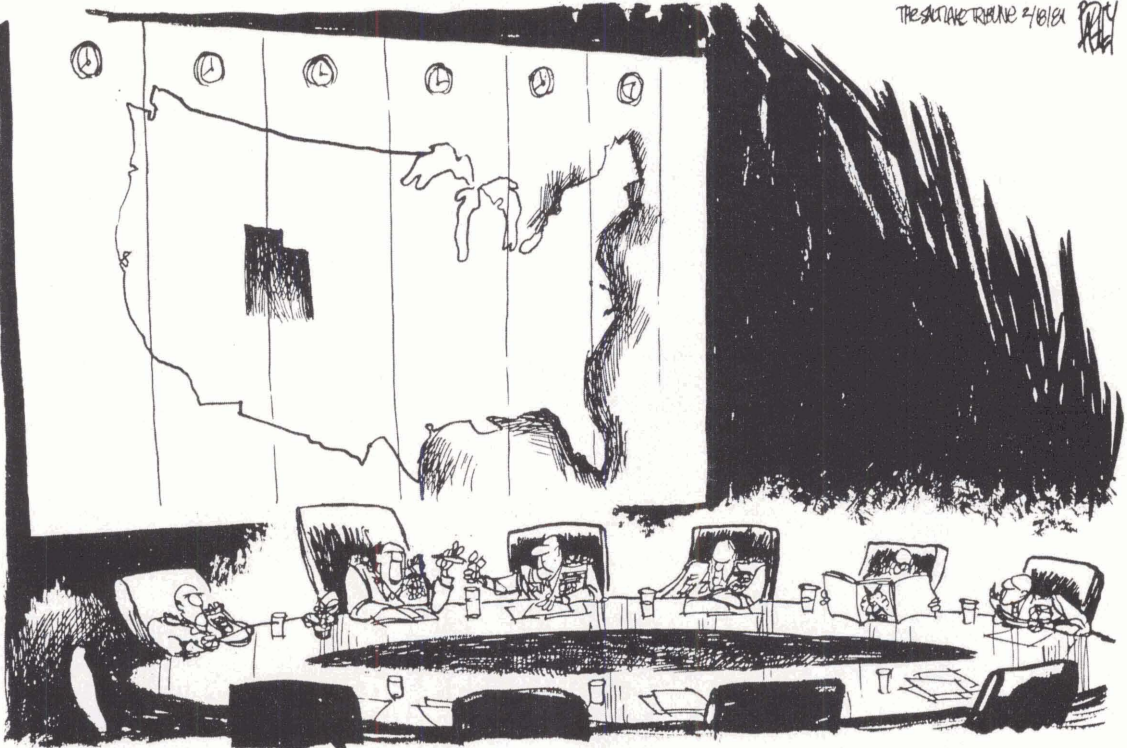
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"Even if the MX didn't deter the Russians, We wouldn't have to hear any 'I-told-you-so's' from those panty-waists in Utah."

I began speaking and writing against MX — more accurately at that time, the basing mode for MX — in the late fall of 1978, picking up steam and a very small band of supporters in the early spring of 1979. I wrote an op-ed column for the *Salt Lake Tribune* at that time, though the article wasn't published until early autumn of 1979. To the best of my knowledge, this was the first public criticism of the MX in the West.

To our incredible good fortune, the White House made an instant decision to rebut my article with one of their own, authored by Antonia Chayes, then

Undersecretary of the Air Force. This rebuttal was flown out by White House jet and hand-delivered by the Air Force to the *Salt Lake Tribune*. Unlike my article, which languished in the bowels of the editorial offices for the better part of a year, hers was published the next day. Antonia Chayes' article elevated our tiny band of MX

opponents to the Air Force's status and the battle was commenced.

In those early days I met with six University of Utah students in the basement of the Christian

Center on University Street. This little band was then known as the Brine Shrimp Alliance. They asked me to join them as adviser and quickly thereafter invited Frances Farley, then the only woman in the Utah Senate. They also recruited General William Fairbourn, the retired head of the First Marine Division, which had been stationed two decades earlier at Guantanamo Bay at the time of the Cuban Missile Crisis.

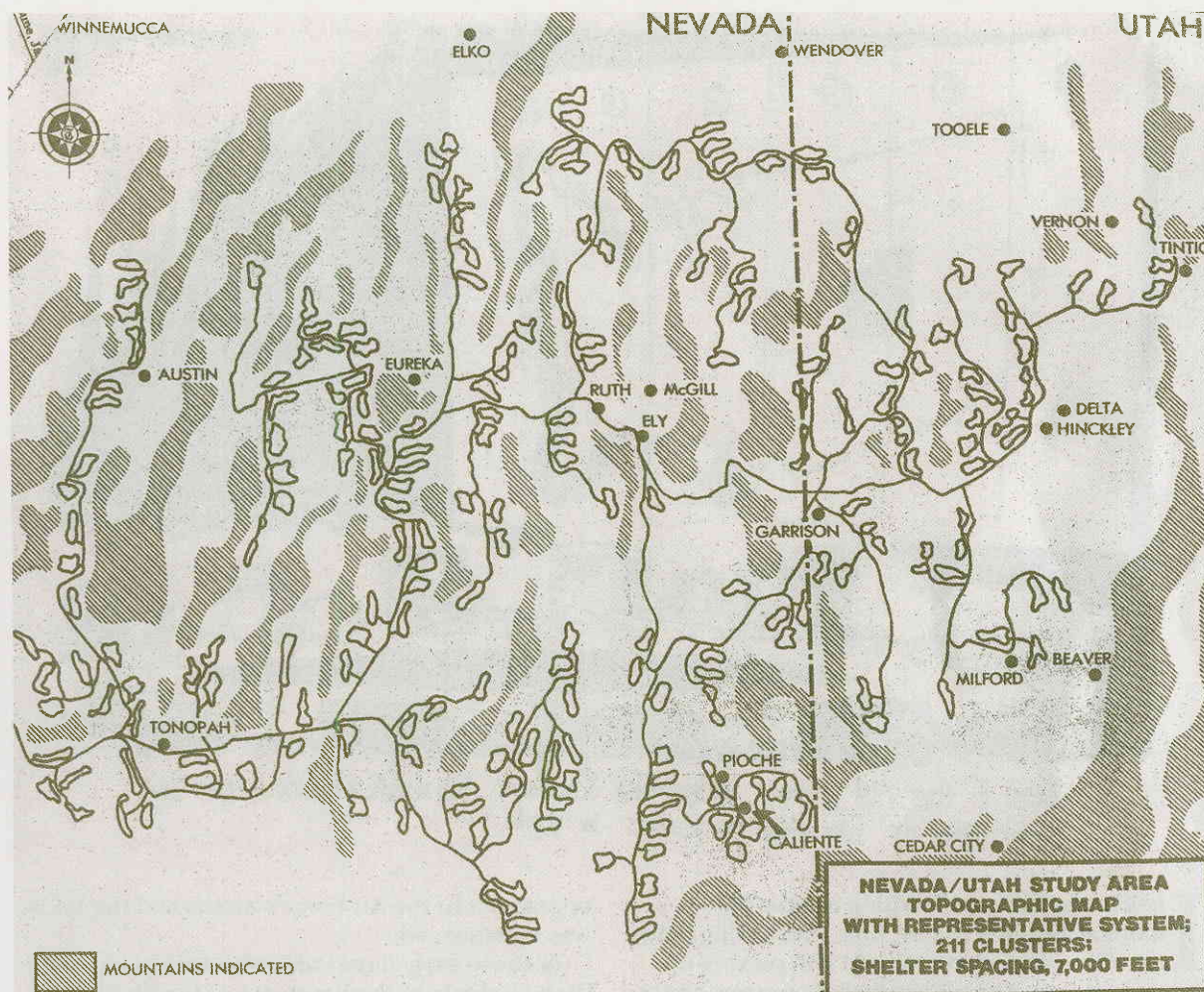
## MX: A Personal Essay

The MX missile system would have put the Great Basin on the map — as the target of the Soviet Union's entire land-based arsenal of long-range thermonuclear warheads. A key figure in the fight against the proposal recounts the events from his own perspective.

by Edwin B. Firmage

I saw the basing mode of the MX as the Achilles heel in this armor-plated colossus. Whether or not the missiles ever flew, the basing mode would surely have killed the West — the valleys of Franciscan priests, Navajos, Shoshones,

ABOVE: Pat Bagley cartoon, *Salt Lake Tribune*.



Utes, Paiutes, and all the descendants of the Old Ones, the Anasazi. Gone forever, I believed and still believe, would be all of Brigham Young's Great Basin Kingdom, the wondrous land of John Wesley Powell and Theodore Roosevelt, and the redrock country of Edward Abbey and his motley crew.

With the advantage of hindsight afforded by the apparent death of the Cold War, the basing mode would appear to have been designed by Rube Goldberg, not the Pentagon's best and brightest. It called for the shuttling of hundreds of MX thermonuclear warheads between thousands of pod-encased silos. These warheads would have been carried in eternal transit between largely empty silos. The number of pods matched perfectly the number of Soviet land-based nuclear warheads. The Soviets, therefore, would have to expend their entire land-based long-range arsenal of thermonuclear warheads on thousands of largely empty silos to ensure the utter destruction of this huge missile system.

In other words, should deterrence fail, we — the people, the land and the water, the rattlesnakes and coyotes, lions and bears and birds of the Great Basin — would have absorbed the

***Map of the proposed MX system, from the Salt Lake Tribune, January 28, 1980. When State Senator Francis Farley saw the map, she called it "shocking."***

entire land-based nuclear savagery of the Soviet arsenal so that Minutemen based elsewhere would survive. In the words of General Lew Allen, then the chairman of the Joint Chiefs of Staff, with a candor that endeared the military to me: "We're sorry that someone has to be the bull's-eye, but you're it!" Indeed. It was a new twist to Jesus's comment that he who lived by — or lived nearby — the sword would most surely die by the sword.

This was one of the deadliest threats to the western United States and the whole world ever proposed. The geometric qualitative and quantitative jump this single weapons system produced made a Soviet response inevitable. The system was capable of launching many warheads from each missile with missile trajectory correctable by satellite. Both these numbers of missiles, and their accuracy, made MX a ferocious first-strike weapon capable of destroying hardened missiles in their silos and not simply large and defenseless

cities. Nothing in the Soviet arsenal could come close to this. The chance of preemption was large, I believed.

The world, however, and Utah most surely, was still in the grip of the Cold War. Up was down. Right was wrong. We projected our own evil outward and the Soviets did the same.

But even without any war, our future in the West seemed doomed. The MX basing plan would have demanded more concrete than the entire interstate highway system, covering with roads and tracks a vast portion of an area the size of Pennsylvania and Rhode Island combined. In so doing it would have consumed in great gulps the entire water system of this magnificent arid desert whose fragile soils still bear the tracks my forebears. Never mind that entire communities of shepherds and cattlemen, ranchers and farmers, businesses, teachers and students would be ground under in the name of national security.

In that first year I spoke before many almost-empty halls and churches, sounding an alarm that few heard. The phalanx against us was formidable. Save Frances Farley, virtually all our elected representatives initially favored MX, including both our senators and congressmen as well as the President of the United States, Jimmy Carter. Both houses of Congress had already funded MX. Gov. Scott Matheson, who was to become a valued opponent, was in this first year a proponent; indeed, he'd written a letter inviting MX basing in Utah.

The missile system was then perceived by our representatives and the media as if it were one big post office that would attract a flood of federal dollars and good jobs to our state. The state's dominant faith, the Mormon church, also supported MX — or so it seemed, if one listened to church-owned KSL radio and television editorials, which gave out an unrelenting stream of statements praising MX. To KSL's credit, however, I was allowed to rebut every single editorial immediately, on both radio and television, which I did regularly with enthusiasm and alacrity.

Our little band of supporters, the Brine Shrimp Alliance, was transmuted into an anti-MX organization without a name. With the help of Frances Farley, General Fairbourn and others, we spoke before many groups. The Sierra Club, the Audubon Society, Friends of the Earth, the arms control organizations, the Federation of American Scientists and the Committee for a Sane Nuclear Policy (SANE) all began to help out. Soon, with my wife, Gloria Firmage, we launched Utahns United Against MX, with Chase Peterson — who was then vice president for Health Sciences at the University of Utah and would later serve for many years as the university's president — as our vice president. He, with his wife, Grethe, helped enormously, as did many others.

Utahns United helped direct the many citizen

groups that came to oppose MX. Groups rarely in alliance came painfully and gradually to see a common foe. Peace and environmental groups joined organizations such as the National Taxpayers Union that opposed the vast and open-ended cost of this monster weapon. Conservative farming and ranching communities joined hands with the Sierra Club, the Audubon Society, and Friends of the Earth. Utah's AFL-CIO, under the brilliant statesmanship of Eddie Mayne, also joined, even though its workers would have been the recipient of jobs and money from MX.

My prime objective was to bring in as our allies the nation's churches. I believed the entire concept of Mutual Assured Destruction, with the appropriate acronym MAD, raised spiritual and ethical issues to the highest possible level. How can proposed planned intentional genocide constitute "national security?" What is left of the ethical and the spiritual values of any state of any group or any individual that supports such a plan?

My first contacts among our churches were to Elder (now President) Gordon B. Hinckley of the Church of Jesus Christ of Latter-day Saints; to our Episcopal bishop of Utah, Otis Charles; and our Catholic bishop, William Weigand. Some of our earliest meetings were in Congregation Kol Ami, at the invitation of Rabbi Eric Silver. A young Methodist minister, Stephen Sidorak, was an early ally, as was Rev. Richard Henry of the First Unitarian Church of Salt Lake City.

Early on, in part to attract the interest of the press, we initiated our dog-and-pony shows with visiting religious, environmental and military leaders. Among the speakers were Harvey Cox of Harvard Divinity School and William Sloane Coffin, minister of Riverside Church in New York City and chaplain at Yale during the Vietnam War, along with retired Vice-Admiral John Marshall Lee. Bill Moyers, a friend from my White House days — where he served as press secretary to President Lyndon Johnson when I served as White House fellow to Hubert Humphrey — conducted a national forum on MX from Salt Lake City as we took our battle nationwide.

We invited the Mormon church into this dialogue, a move of great importance to our eventual success. Since the church was conservative and nationalist by nature, at least in the 20th century, and at that time not inclined toward ecumenical or interfaith dialogue or open participation in things seen to be "political," this was no easy walk.

I knew that formal opposition to the MX by the church's First Presidency and the Quorum of the Twelve was essential to our success, both in Utah and Nevada and in Washington. I felt that a democratic country, the United States, could hardly force-feed a missile down the throats of Utahns and Nevadans while the Mormon church, whose people constituted more than 70 percent

of the population of Utah and a large minority in Nevada, firmly resisted.

I began by writing long essays — actually little books — on spiritual and theological teachings on force and war in the Old and the New Testaments. And, drawing from uniquely Mormon scripture, I wrote on war, violence, and spirituality. With these writings in hand — along with my own personal writings on arms control, nuclear weaponry, the war power, and peaceful resolution of disputes — I began a long series of meetings with Hinckley, chairman of the Public Affairs Committee, in effect the church's major advisory committee on matters of church and state.

I also drew heavily upon the writings of President J. Reuben Clark, Jr. Clark is a fascinating figure in the history of the United States and the Mormon church who, I believe, had a dramatic effect on his successors in church office. He served variously as ambassador to Mexico, as the legal adviser (or solicitor) to the State Department, and finally as Undersecretary of State. He negotiated virtually all the arms control and disarmament treaties for the United States between World Wars I and II. While profoundly an orthodox Mormon conservative, Clark was also a pacifist. He opposed military intervention in other countries and was an ardent anticolonialist. He led the opposition to any concept of mass bombing of civilian centers in World War II. And, in Mormon general conferences, he publicly denounced the United States for the destruction of Nagasaki and Hiroshima by atomic bombs.

These materials helped influence, I believe, the decisions by the First Presidency to publish three statements on the testing, stockpiling, possession and intended use of nuclear, biological and chemical weapons, the unholy trinity of genocidal weapons of mass destruction. These statements,

**We all — the entire human race — were living as if in a basement filled with gasoline. One of the two superpowers held five matches and the other held three.**

together with a critically important article by President Spencer W. Kimball on idolatry and nuclear weaponry, were published as a Christmas message in 1980 and as an Easter message in 1981, together with the final MX condemnation in early May of that year.

One by one, other individuals and groups came to oppose MX. I spoke throughout the western states with Cecil Garland, a good friend and a celebrity of sorts, who had been interviewed by Bill Moyers in Salt Lake City. Garland, a real-life cowboy with a red bandana from Callao, Utah,

had been an outspoken environmentalist for decades but was well respected throughout the cattle and sheep community (so much for stereotypes).

Environmental laws helped us immeasurably. Legislation required an environmental impact statement to be made by the administration and then defended in hearings in each county throughout the West. I attended each hearing in each county.

Humor, not always intended (the very best kind), occasionally interrupted the seriousness of this debate. The Air Force reportedly responded to a sheepman's objection to the construction of MX during lambing season (he feared loss of lambs and ewes) by suggesting the delay of lambing season. (Even if this tale is apocryphal, it is too good to leave out of this narrative.)

I had the support of a number of our state's and the West's cartoonists. I met with Pat Bagley of the *Salt Lake Tribune* frequently. His cartoons, along with those of Calvin Grondahl and Steve Benson, helped laugh MX out of our states.

A major event in our state, televised throughout the country, was initiated by Gloria and me but wonderfully planned and executed by Chase and Grethe Peterson. Several Nobel laureates came as speakers and participants to our two-day symposium, "The Health Effects of Nuclear War." Thousands saw it on television or in person. Several of these experts were from the University of Utah, and some had tested Utah fallout victims — our "downwinders" — who had lost family members to diseases spawned by open-air testing of nuclear weapons. These survivors now formed the backbone of Utahns United, particularly in southern Utah.

The vision we all came to share was that the introduction of nuclear weapons into world strategy changed entirely the concept of any win-lose scenario in fighting wars, at least nuclear wars. We believed that no one "won" a nuclear war. We all — the entire human race — were living as if in a basement filled with gasoline. One of the two superpowers held five matches and the other held three. One more match no longer put one side ahead or behind the other. Rather, each additional match — or missile — seemed only to assure a final conflagration.

I traveled to other states — including Colorado, Nevada, the Dakotas, Idaho and Arizona — and organized anti-MX groups there. In Nevada I met with a good friend, Sen. Harry Reid, a Mormon and a firm opponent of MX, and with another close friend, Rep. Jim Santini. I addressed ecumenical groups frequently.

In Colorado, our small band of MX opponents was led by Franciscan Sister Francis Russell. Another staunch MX opponent was Sister Mary

Luke Tobin. I met Luke in one of the Dakotas, where I was the spokesperson for the Mormons as she was for the Catholics, in an interfaith rally sponsored by the state's Catholic and Methodist bishops.

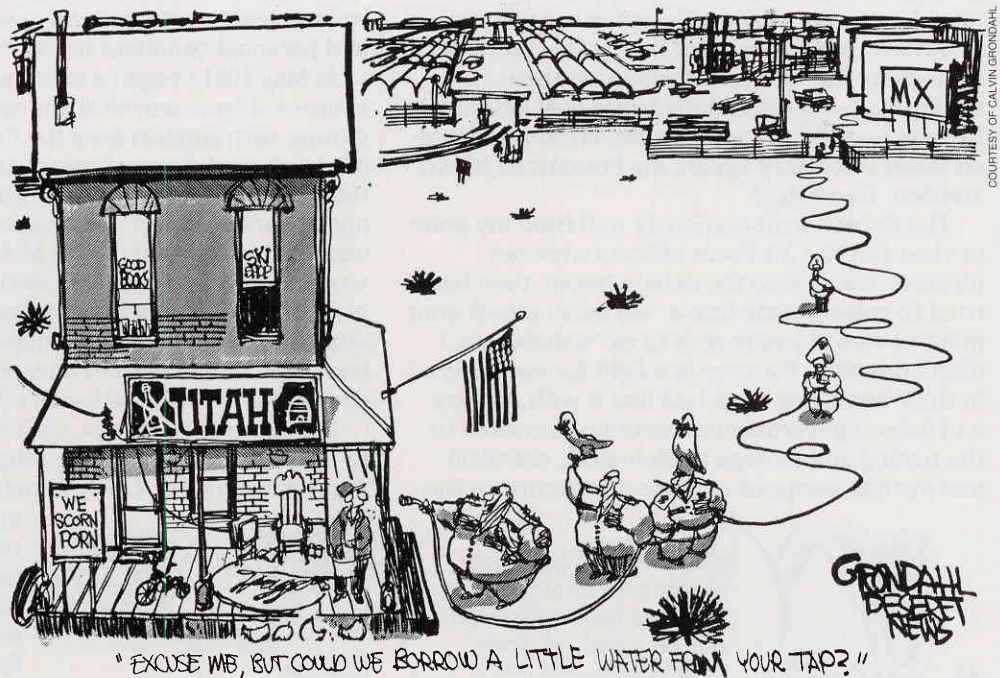
I met Sister Rosemary Lynch, also a Franciscan and one of the great pioneers of opposition to the nuclear arms race, in Santa Fe, N.M., under similar conditions. I was the house Mormon while Lynch represented Catholicism at an interfaith religious seminar. She and I became close friends and spoke frequently together throughout the MX debate and thereafter. She, along with five or six sisters in a simple candle-light vigil, had begun the Lenten desert experience outside Las Vegas, protesting and witnessing against the continued testing of nuclear weapons. Throughout the nation, I observed the sisters of Roman Catholicism, often much more educated on this topic than the bishops and priests, quietly educating and leading their male brethren.

By this time I had also met frequently with Gordon B. Hinckley and had shared with him most of my memoranda on biblical, New Testament, and Mormon canonical teachings on force, war, violence, and nuclear weaponry. He had shared these with various colleagues. One early morning, as I was preparing to fly to Washington for one last effort to dissuade Jimmy Carter and his staffers from the MX folly, N. Eldon Tanner of the First Presidency called and asked me to personally explain my feelings on MX to him, President Spencer W. Kimball and President Marion G. Romney. I spent two or three hours with them.

Within an hour after that meeting, Tanner called me again. He said that Kimball wanted me to tell the Quorum of the Twelve what I had said to the First Presidency. This I did, speaking for just over an hour.

Later that day, I flew to Washington for my final effort to change the minds of the Carter administration on MX. My White House visit was both cordial and futile.

Not long after that, I resigned from the Carter presidential campaign. At that time I had a fairly high political profile, having been a Democratic Congressional candidate in 1978. But MX, for me, was an issue of such importance that it dwarfed any other collection of differences between candi-



**Calvin Grondahl cartoon, Deseret News.**

dates and parties. Instead, I supported the independent candidacy of Rep. John Anderson, who broke with both parties on the issue of nuclear weaponry, MX, and our environment.

In October 1980, a critical debate occurred in Nevada, the other state within which this misbegotten missile and its basing mode was to be located.

MX basing was planned to cover major portions of seven Nevada counties, including areas least able to defend themselves against this colonial imposition. Though such action was prohibited by the Treaty of Ruby Valley, we argued, huge portions of Native American land would be sacrificed, including the sacred lands of the Western Shoshone. A plebiscite, not legally binding upon the President or the Congress but hugely important in a democratic state, was scheduled to be conducted in the affected counties. The federal government, mainly the Air Force, and the missile-makers had spent more than \$24 million to influence this vital vote. We had but \$7,000 to spend. Our only real advertising was a debate between me and the Air Force officer in charge of MX development and deployment in Nevada. It was held the night of the last World Series game and broadcast live virtually everywhere in the Intermountain West.

Our polls were indicating a large shift in public perception on MX. Public opinion had gone from 80 percent favoring MX to 53 percent now in opposition. This debate, therefore, was critical.

I arrived at the television station as the World Series ended. The studio, to my surprise, was entirely occupied by the military, in Air Force blue. Long rows of generals and other officers had come, obviously to fill the entire studio, to be seen by the viewers, to shore up their spokesman — a colonel in charge of MX-basing in Nevada — and to intimidate me. My allies included Sister Rosemary Lynch, my Franciscan friend, and Sen. Harry Reid.

The debate went extremely well from my point of view. But the Air Force officers were not pleased. Just before the debate began, they had tried to soft-soap me into a “we won’t attack your point of view if you’re nice to us” non-debate. I didn’t buy that. We were in a fight for our survival in the West. Many of us had had it with military and federal governmental assurances related to the testing and storage of biological, chemical and nuclear weapons of mass destruction in the

With Reagan’s election, my efforts turned toward persuading him to oppose MX. I wrote him a long letter outlining my opposition to the missile and the basing mode. It was hand-delivered to Reagan and read with him by an old friend from Brigham Young University days, Richard Wirthlin, formerly chairman of the economics department and now chief pollster and personal confidant to the President.

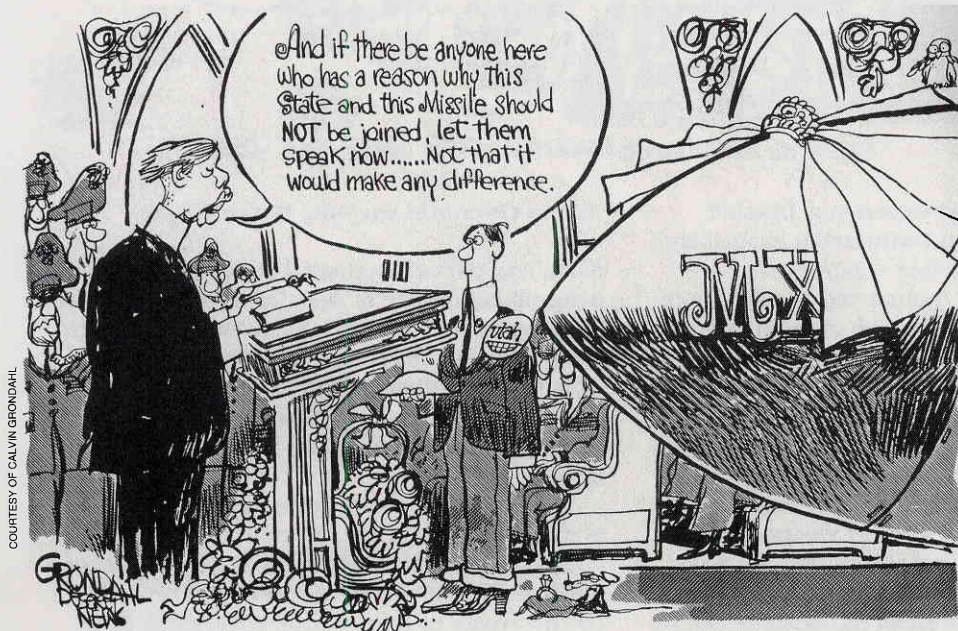
In May 1981 I began a national speaking tour sponsored by ecumenical and interfaith religious groups, with support from the Center For Defense Information, the Arms Control Association, SANE, the Sierra Club, and other environmental and nuclear arms-control organizations. Three others went with me: Admiral John Marshall Lee, whose vast knowledge of weapons systems, together with his invulnerability to military and conservative attacks, made him critically important; a woman representing the Western Shoshone; and the president of the Nevada Cattlemen’s Association.

We began in Pasadena, Calif. My first duty was to brief John Dart, then the religious editor of the *Los Angeles Times*. Thirty minutes before the

interview, I received a telephone call from Mormon church headquarters. The First Presidency had just approved a statement unequivocally opposing MX basing and, once again, condemning any intended use of nuclear weaponry. This was in early May of 1981. This statement, in retrospect, effectively killed MX basing as it had been proposed by the administration, and in reality killed any

other basing of significant scope, anywhere. I told John Dart of this, and the next day the *Los Angeles Times*, and every other paper of note in the United States, played the statement as the major story on page one, a pattern followed by the electronic media. Our speaking tour became instantly of much greater significance and visibility.

We spoke from Los Angeles up the coast to San Francisco, Seattle, Portland and beyond. Then to Chicago and the Midwest. Next, to Atlanta and the South. Then to Rochester and New York City. In New York, I spoke at the Riverside Church as the guest of Rev. William Sloane Coffin, who had spoken earlier in Salt Lake City.



**Calvin Grondahl cartoon, Deseret News.**

West. These actions seemed based on the assumption that people and other life forms in the West were primarily expendable for the “general good,” an abstraction that to me seemed philosophically and ethically fractured, if not downright evil. I went for the jugular and found it.

As the presidential campaign came to a close, Rep. Anderson, though well-equipped to be President, faded like legions of third party candidates before. I voted for him nevertheless as, philosophically and ethically, I felt I could not cast a better ballot.

Almost exactly a year before I spoke in Rochester, Mount St. Helens had erupted, dropping volcanic dust across the Midwest and into New York State, reminding our Midwestern and Eastern fellow citizens that we are in fact one nation, both indivisible and organic, that the winds blew eastward, as Utah and Nevada downwinders had discovered to their peril. I told our friends in Rochester, and later in New York and Washington, D.C., that any nuclear strike in the West would indeed kill us first, but that the survivors would envy the dead, that death by fallout would end their lives and the life of our nation no less surely. With the memory of the white dust from Mount St. Helens still fresh in their minds, our audiences got it.

Our national coverage after the MX statement from the First Presidency was substantial. We reached millions through newspapers and TV. We appeared on network news and talk shows, in churches and synagogues, in interviews with religious broadcasting networks, in environmental programs, in ranching and farming communities, and in universities across the nation.

From New York we flew to Washington, D.C., where we briefed every committee and subcommittee, representatives and staffers, who would touch any part of MX. By now, the tide had clearly turned in our favor, and the Air Force, which previously had canceled all other debates with me, began to prepare for a last-ditch defense of the missile.

By now, Governor Matheson was in complete and effective opposition to MX. He helped greatly in this last stage of our speaking efforts and throughout the state and nation.

After my return home in midsummer 1981, all Utah-based speaking was superfluous in light of the final First Presidency MX statement. I spoke in other states and on national media. On Nightline, with Ted Koppel moderating, I debated the Pentagon general in charge of MX for the nation. I rebutted columnist Bill Buckley when he wrote an acid attack on Mormon First Presidency opposition to MX and threatened to undo all our work. My rebuttal appeared in the *Deseret News* and was sent to all newspapers subscribing to Buckley's nationally syndicated column.

I also attended a series of briefings at the White House that fall, and there debated from the floor once again General Lew Allen, who had been asked to discuss military strategy in the nuclear age. I debated Caspar Weinberger, the Secretary of Defense in the new Reagan cabinet. At a supper and reception in the White House, I pursued him relentlessly, violating all the canons of etiquette in which office politics are to be avoided at party gatherings.

Shortly after these events, the Reagan

administration made its decision. There would be no basing in Utah and Nevada. MX numbers were to be drastically cut to a symbolic few and then stuffed down existing Minuteman silos, where the politically costly determination on basing had already been paid. I continued my opposition to MX and allied systems, wherever based. But my

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own influence, of some use in the West, was decidedly less elsewhere.

Nevertheless, the MX debate, started in Utah and Nevada in 1979, played a decisive if largely unrecognized role in ending the Cold War exactly a decade later. Our debate and our grassroots organization went nationwide and worldwide in the early 1980s. And we scored a stunning victory in derailing what was originally designed to be the greatest geometric jump, both quantitative and qualitative, in the nuclear arms race. The Soviets would have responded in kind. And another and perhaps fatal round of escalating responses would surely have been in store.

A truly great American, Dwight D. Eisenhower, in his valedictory to the nation as its President, warned against the military-industrial complex. We learned that real leadership on this issue is and always will be among the people. Renewal comes from the bottom up, not the top down — as anyone knows who ever met Mr. Thomas Jefferson.



EDWIN BROWN FIRMAGE TEACHES CONSTITUTIONAL LAW AND INTERNATIONAL LAW AT THE UNIVERSITY OF UTAH COLLEGE OF LAW IN SALT LAKE CITY, UTAH, AND HAS RECEIVED THE TURNER-FAIRBORN AWARD FOR SIGNIFICANT CONTRIBUTIONS TO PEACE.

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A story is told about J. Golden Kimball, a Mormon general authority (born in 1853) whose colorful language and sermons have made him a minor legend.

“Before [one church] meeting, the bishop had urged President Kimball to give the young men a good roasting because they were getting pretty wild. He rose, leaned way out over the pulpit, and shook his long bony finger at the youths in question. ‘Go to hell!’ he shrieked. ‘Go to hell! That’s where you’re going to anyhow if you don’t quit your damn foolishness! I hear you’re all going around with a six-shooter on your hip. Better watch out. The damn thing’ll go off and blow your brains out.’”

Quoted in Thomas E. Cheney,  
*The Golden Legacy: A Folk History  
of J. Golden Kimball* (Salt Lake City:  
Peregrine Smith, 1974), 31-32.