

Arminto Petroglyphs: Rock Art Damage Assessment and Management Considerations in Central Wyoming

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Detailed figure recording in 2002 indicates engraved figures are suffering from erosion caused by wind-blown sand from adjacent well pad construction. Approximately 27% of one figure has been lost in the last 20 years. Eventual loss of the two remaining horse figures will amount to loss of about 10% of all known North American armored horse petroglyphs, and 20% of those recorded on the northern Plains. Management agencies should consider mitigative measures for such sites during project planning and permitting.

Keywords: rock art, petroglyphs, armored horses, management, conservation

BACKGROUND

The Arminto Petroglyphs (48NA991) were first brought to the attention of the archeological community in 1984 when R. B. Eckerdt of Chevron USA Inc. reported the site to the Wyoming SHPO. A photograph of one of the armored horses accompanied his letter description. By the time of his letter, the Chevron well had been producing for 25 years. In late 1999, Christopher Arthur, the Bureau of Land Management (BLM) Casper Field Office archeologist, informed us of the site, and we first visited it in February 2000, with subsequent recording through March 2001. Our visits resulted in a formal recording of the site, including preparation of a site form, site and panel descriptions, site map, photographs, and drawings; these are filed with the Wyoming State Historic Preservation Office (SHPO) and the BLM Casper Field Office (Greer and Greer 2002a). Three presentations have been made that focused primarily on the armored horses, although other figures are present (Greer and Greer 2001a, 2001b, 2002b).

THE SITE

The site is located in the open, somewhat rolling country of central Wyoming, west of Casper and south of the small town of Arminto (Figure 1). Petroglyphs are on one of several sandstone outcroppings in the eroded and dissected setting that characterizes this portion of the Cave Gulch drainage south of the Bighorn Mountains. The outcropping is a large pillar with crumbling and rough white to gray surfaces and more stable orange flat surfaces more commonly preferred for petroglyphs (Figure 2). The site is noteworthy in that it blends well into the surrounding landscape as one of many small pillars across the basin. This characteristic is in contrast to many rock art sites, in other areas, that can be spotted from a distance because they are eye-catching and distinct from surrounding formations. Even though there are numerous other similar sandstone pillars, small rock shelters, and protected hardened, smooth rock surfaces across the extended surrounding area, presently no other similar petroglyph sites are known within a reasonable distance, and the site, therefore, is unique within the area.

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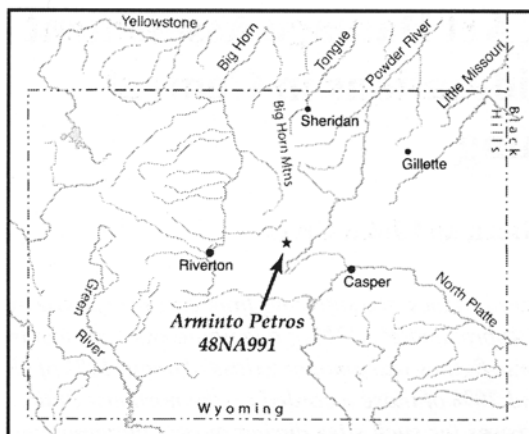


Figure 1. Location of the Arminto petroglyphs.

Although good surfaces abound, there is only one panel and a few scattered figures on the sandstone pinnacle. The primary panel contains two discernible armored horses, and possibly a third, now eroded, and produced in a Plains Biographic style. The other few figures, mostly isolated and widely scattered across the pillar, are both prehistoric and historic, but they do not pertain to the horse panel and appear unrelated to it.

The site is situated in an area of intensive oil and gas exploration and production. Within 1.5 miles of the site, 120 wells have been drilled to depths of 4,600 to 21,000 feet and are now in various stages of production or abandonment (WOGCC 2004). Related facilities include a network of roads, pipelines, powerlines, compressor stations, and other improvements. Just on the west side of the site is a Chevron oil and gas well originally drilled in 1959 to a depth of 11,899 feet, with essentially continuous work and production through the present (WOGCC 2004; Chevron 2004). Although initial production was from a shallower depth, the pad size for such a well had to be substantial, and the pad reached within 40 feet of the site. The wellhead is about 100 feet west of the site, but with a broad cleared work area. The well was temporarily shut-in as uneconomical in 1961 but was re-entered in 1965 and experienced several workover periods through the 1990s.

Thus, the area adjacent to the site has received intensive attention off and on for 45 years, with prevailing winds from the west and southwest sweeping across the bare well pad and impacting

the site with sand, grit, and debris. The effect to the rock of chemicals and diesel smoke from maintenance operations is not known.

The well is on federal surface managed by the BLM. In the period when the well was drilled, archaeological effects were not considered for permitting, and even if they had been, there probably would have been a decision of "no effect." Effect during that period would have meant direct construction impact, and well pad construction approached the rock pinnacle but did not attempt to remove it. Wind impact, vehicles driving across the associated occupational midden, and visitors destroying the rock art were not considered until much later in the permitting history, and even then were classed as indirect impacts with no direct effect and therefore not worthy of much attention. Today it is somewhat better understood that all impacts – initial construction activity, follow-up vehicle traffic, and vandalism – are direct impacts of a federal permit issued for the requested action.

NEW FIELD WORK

In May 2002, James Keyser, George Poetschat, and Mike Taylor visited the site for detailed recording of two of the five figures — the armored horses — and to make personal observations of figure detail and condition. Work consisted of photography and direct tracing of the figures (Horses 1 and 2, Figure 3). Tracing was done on clear plastic with an indelible pen. New photographs and tracings were then compared with Eckerdt's 1984 photograph (Figure 4).

The two recognizable naturalistic images are both boat-form horses wearing armor, with a single rectangular-body rider on each horse. These images must date sometime between approximately A.D. 1650, when the horse was first introduced into this part of the northwestern Plains (Eckles et al. 1994), and A.D. 1800, shortly after which leather horse armor was abandoned due to the efficacy of firearms.

Our attention focuses on Horse 1, the more detailed figure (Figure 5). The horse is composed of shallow, firmly incised lines cut into a hardened surface low on the large light-colored sandstone hoodoo. Horse 1, the more detailed horse and rider, has a feather fringe along the back of the armor cover; arms, hands, and facial features on the hu-

man; ears, mane, saddle, brand, and four clear legs for the horse; a rein held by the rider; and an arrow sticking in the front part of the armor cover. Comparing our recent detailed recording with Eckerdt's 1984 photograph, taken in good light and with the rock surface slightly dampened, provides an opportunity to evaluate the extent of weathering that has taken place during the last two decades.



Figure 2. Arminto petroglyphs, looking northwest. The armored horses (arrow) are on the lower block just to the right of the person. Photograph by J. Greer, 3/2001.

ANALYSIS

To evaluate physical change to the figure, Eckerdt's photo of Horse 1 (Figure 4) was compared with our recent photograph (Figure 5), tracing (Figure 6), and field observations. It is clear that there has been considerable damage during the ensuing years. Abrasion by wind-blown sand and grit has removed a significant portion of the panel (Table 1). Originally, there were approximately 442 linear centimeters of incised lines comprising the figure, all of which were sharply cut into the rock surface and clearly visible in 1984. Our 2002 tracing shows that large areas (indicated by gray hatching) have been badly abraded by blowing sand and grit. In these areas, about 116 linear cm of incised line have been lost – the line is no longer visible, completely removed by erosion. Another 20 linear cm have been abraded to such an extent that they

are barely visible, that is, the line has been noticeably affected by erosion, now thinner than the original when compared to the earlier photograph. This combined damage has removed almost half of the back of the horse, 15% of the feather fringe from the armor, all of the rider's left arm and hand, part of the left side of his body, some of the facial features, and much of the left side of the head and neck. In addition, a broken fragment has removed part of the rein and most of the arrow stuck in the front of the armor. Abrasion is also notable. None of the lines that compose the figure is as sharp and crisp as they were only 20 years ago. In summary, a quarter (26%) of the figure is completely gone, and another 5% is damaged to such an extent that it can barely be seen. In total, a third (31%) of the figure has been badly damaged or destroyed by wind and sand erosion in only 20 years.

Our current photograph (Figure 5) also shows a scabby texture, especially along the figure's left side, that results from wind abrasion and renders this part of the surface unstable. The massive flaking that removed the rein and part of the arrow at the upper right is the result of a "peeling" of one of these "scabs," and its loss indicates that other scabby parts of the panel are likely to suffer exfoliation in the near future. This would be detrimental to what little still remains. At this rate, the panel could be completely gone in another 10 to 50 years.

Table 1. Incised lines of Horse 1.

Lines Forming Figure	Total Length
Total original linear	442 cm
Lost	116 cm (26%)
Affected	20 cm (5%)
Total damage	136 cm (31%)

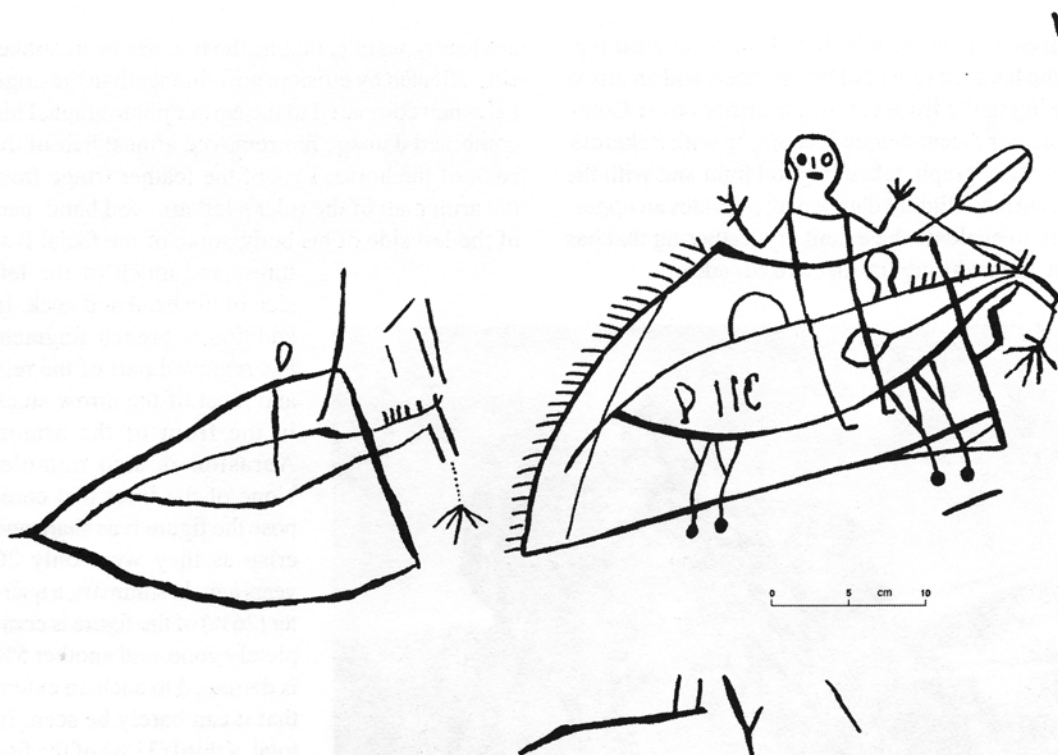


Figure 3. Armored horse panel, showing the two identifiable horses. Horse 1 (right) is a composite drawing from the Keyser 2002 field tracing plus additional lines visible on the 1984 photograph. Horse 2 (left) is the Keyser 2002 field tracing (there is no 1984 photograph for comparison).

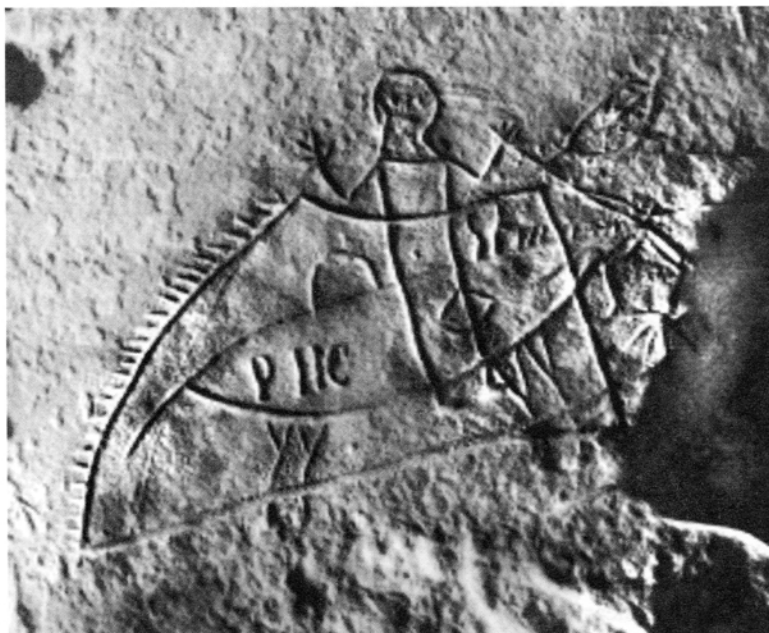
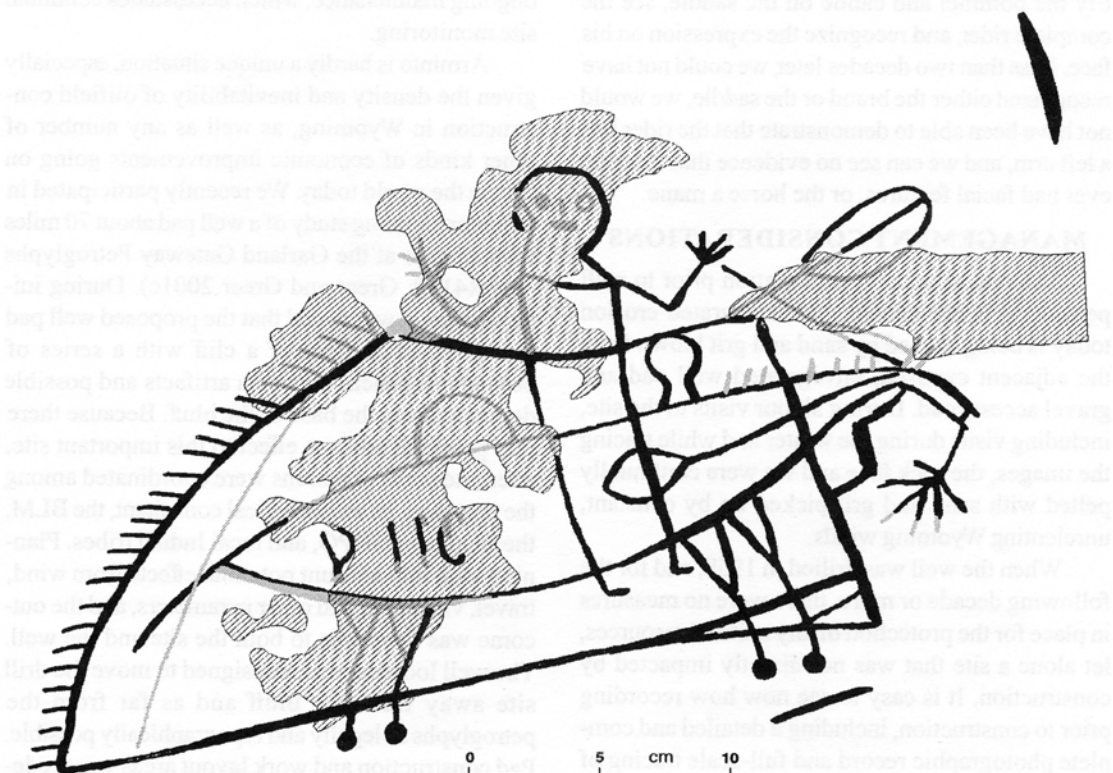


Figure 4. Condition of Horse 1 in 1984. Photograph by R. Eckerdt, Chevron USA.

Figure 5. Recent photograph of Horse 1 showing significant damage in only 20 years. Many lines have disappeared, and the surface has been heavily eroded into scabby patches along the figure's left side and above the horse's head. Note how much detail visible in Figure 4 has been lost. Photograph by J. Keyser, 5/2002.



Figure 6. 2002 tracing (J. Keyser) showing visible lines (black) and those that have eroded away since 1984 (gray). Gray hatching indicates heavily eroded scabby or missing areas.



Horse 2, just to the left of the larger, better-preserved Horse 1, is still easily identified as an armored horse. However, these are only two of several remnant figures partially discernible across the extended rock face of the pinnacle. Almost certainly there have been figures on this panel, or other parts of the rock surface, that are now gone. For instance, from examining the surface in different lighting conditions, we have identified a third armored horse directly below Horses 1 and 2 that is no longer clearly recognizable. It seems to have been of the same general size, shape, and character, but wind-blown sand has eroded the surface to the extent that its details are almost impossible to discern.

It is clear that in relatively recent times there has been a greatly accelerated rate of erosion of the panel, explicitly measurable for Horse 1. Even if calculated from the latest date when the image likely was carved (A.D. 1800), we see that it remained very clear for at least 180 years (and possibly as much as 325 years if produced near the earliest reasonable date of approximately A.D. 1650). In that time, erosion was so negligible that by 1984 it was still possible to read the brand on the horse, identify the pommel and cantle on the saddle, see the complete rider, and recognize the expression on his face. Less than two decades later, we could not have recognized either the brand or the saddle, we would not have been able to demonstrate that the rider had a left arm, and we can see no evidence that the rider ever had facial features, or the horse a mane.

MANAGEMENT CONSIDERATIONS

The rate of panel disintegration prior to well permitting is not known, but accelerated erosion today is being caused by sand and grit blown from the adjacent exposed, unvegetated well pad and gravel access road. During all our visits to the site, including visits during the winter and while tracing the images, the rock face and we were continually pelted with sand and grit picked up by constant, unrelenting Wyoming winds.

When the well was drilled in 1959, and for the following decade or more, there were no measures in place for the protection of any cultural resources, let alone a site that was not directly impacted by construction. It is easy to see now how recording prior to construction, including a detailed and complete photographic record and full-scale tracing of

the panel, would have preserved, at least for future research, figures on the sandstone surface. Additionally, a low wall or fence could have been constructed to buffer the petroglyphs from windblown sand and vehicle traffic.

There is still time to save what remains of the site. Although planting vegetation to cover the well pad completely—the source of most of the sand and grit transported by the wind—may appear desirable, it would not accomplish the task. Traffic from oilfield trucks on and off the pad will not allow vegetation to take hold everywhere (especially in this desert environment), and the necessarily low vegetation density on parts of the pad unaffected by traffic would not keep sand from blowing and continuing to damage the rock art panel. The only reasonable solution, at this point, appears to be the construction of a barrier, such as a solid wood fence, or the planting of a row of dense vegetation along the eastern edge of the well pad, to deflect wind-blown sand and grit. A vegetation row would be temporary at best, and a wooden fence in this environment would have a very limited life. Therefore, any projected mitigative measure needs to consider ongoing maintenance, which necessitates continual site monitoring.

Arminto is hardly a unique situation, especially given the density and inevitability of oilfield construction in Wyoming, as well as any number of other kinds of economic improvements going on across the world today. We recently participated in a similar planning study of a well pad about 70 miles west of here at the Garland Gateway Petroglyphs (48FR4130; Greer and Greer 2001c). During initial survey, it was found that the proposed well pad was planned in front of a cliff with a series of petroglyph panels, and with artifacts and possible deposits along the base of the bluff. Because there was potential adverse effect to this important site, alternate plans of actions were coordinated among the company, its archeological consultant, the BLM, the Wyoming SHPO, and local Indian tribes. Planning took into account potential effects from wind, travel, visitation, and other parameters, and the outcome was favorable to both the site and the well. The well location was redesigned to move the drill site away from the bluff and as far from the petroglyphs as legally and topographically possible. Pad construction and work layout areas were rede-

signed, vehicle traffic and equipment storage were minimally restricted to certain areas, and construction was monitored by an archeologist and tribal representative to assure that no cultural deposits or tribal values would be affected without adequate study; no materials were noted on the surface at the new location. We have visited the area several times since completion of the well and rehabilitation of the pad, and the petroglyphs and associated cultural deposits remain unaffected and preserved.

In planning around such important sites as Garland and Arminto, it is necessary to view all potential effects—both short term and long term—as being part of the permitted action and therefore necessary for management consideration. Direct construction effect would result in immediate damage to the resource by construction equipment. Indirect construction effect would include collateral damage from wind and sand (as at Arminto), off-project vehicle parking or traffic, loading and unloading areas, and storage of goods such as pipe. Indirect project effect would include opening an area with roads and facilities, increased public access, vandalism, facility maintenance, and future project expansion. Maintenance and related construction impacts, such as well reentry, pipeline connection, and rehabilitation, are an integral part of any project and should be planned up-front. Utmost consideration should be given, not to unilaterally limiting or impeding development, but to project planning to assure that development and resources can coexist without undue restrictions or damaging effects to either.

FINAL COMMENTS

The Arminto Petroglyphs are an example of deleterious effects of construction occurring adjacent to such sites without adequate planning and mitigative considerations. The historical, cultural, and interpretive importance of these carved figures is high, especially since they are two of only 10 rock art horses wearing armor known on the entire northern Plains (Greer and Greer 2001a, 2001b, 2002b; Greer et al. 2005; Keyser and Klassen 2001), and only about 21 known for all of North America (Mitchell 2002, 2004; and our continuing research). Since no physical example of this kind of armor has been preserved in any ethnographic material collection, drawings such as these constitute our

only means of studying its form, design, and construction. This also can be said for many other portrayals of discontinued cultural traits and Native American beliefs for which we have only scant pictographic evidence. The imminent destruction of the two remaining horse figures at Arminto will remove 10% of all known North American armored horses, and 20% of those on the northern Plains, from future study and consideration. Future permitting by land-managing agencies needs to consider the immediate and long-term effects of construction projects on significant archeological and cultural sites such as this.

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WOGCC (Wyoming Oil & Gas Conservation Commission)

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