

CASE STUDY / **ARCHAEOLOGICAL STUDIES AND PALEONTOLOGICAL DISCOVERIES**

SUBSTATION CONSTRUCTION EXPOSES ANCIENT SPECIES FROM THE CRETACEOUS PERIOD

To transfer wind energy from Wyoming, an area rich in wind and history, to the Coastal region required substation expansion and, therefore, careful consideration of the surrounding land where prehistoric discoveries had been made.



A KNOWLEDGEABLE TEAM MOVED QUICKLY TO MAINTAIN CONSTRUCTION PROGRESS

A natural and cultural resources team monitored substation construction — even during the harsh Wyoming winter — at three sites, identifying and recording findings without halting progress or delaying the schedule.

PROJECT STATS

CLIENT

PacifiCorp/
Rocky Mountain Power

LOCATION

East and Central Wyoming

ANTICIPATED COMPLETION

August 2020

270

ACRES MONITORED
DURING CONSTRUCTION
AT 3 SUBSTATION SITES

51

TYPES OF PREHISTORIC
SPECIES RECOVERED

0

SAFETY INCIDENTS

CHALLENGE

Nicknamed the “Energy State” by the National Renewable Energy Laboratory, Wyoming is well-known for its abundance of natural resources and overwhelming potential for wind energy generation. Realizing this power potential, PacifiCorp, an electric power company in the Western U.S., set out to build a 500-kV transmission line — called Gateway West — to transfer wind-generated electricity from Wyoming to the West Coast.

To handle the increase in electricity, the utility company is developing two high-voltage greenfield substations, Aeolus and Anticline, as well as expanding the existing Jim Bridger Power Plant. The 160-mile-long transmission line will run from Shirley Basin, Wyoming, through the Aeolus substation near Medicine Bow, Wyoming. It will then connect to the Anticline substation and continue out to the Jim Bridger station near Point of Rocks, Wyoming. Substation construction is slated to be completed by the end of 2020.

All three substation sites are located in areas of east and central Wyoming where many archaeological and paleontological discoveries have surfaced, with most of the

archaeological findings from the Archaic period. Such findings, largely including lithic scatters (chipped stone debris from making tools), date back 1,000 to 9,000 years ago, a time when hunter-gatherers roamed the land. Paleontological finds, on the other hand, primarily came from the Frontier Formation of the early-to-late Cretaceous period. During this time, the project area — then ranging from a lakebed to a shallow estuary — was much different than it is today.

That’s precisely why our team was called in: to closely monitor each site during construction and promptly record and preserve historical findings without impacting the construction schedule.

SOLUTION

Before work began on-site, our team developed cultural and paleontological

Archaeology is the study of human artifacts and ancient cultures.

Paleontology is the study of fossils.

monitoring plans as well as the unexpected discovery plan to thoroughly guide the construction company and monitoring crews throughout the length of the project.

With detailed plans in hand, the archaeology of each site was modeled and boundaries set up around the project. Supporting surveys were conducted to add to the understanding of the land, stratigraphy and history and further prepare for what could be discovered during construction. Ultimately, a couple sites in the area turned up very little, as anticipated; however, one revealed more than expected.

Starting in February 2019, our project team went to work on the 140-acre Anticline greenfield site, a long-time wetland, in central Wyoming. While nothing was uncovered within the footprint of the substation — team members were keenly focused on the possibility of finding ancient burial sites — monitoring of the construction process continued for several more months. Additionally, they kept watch on surrounding sites where archaeological discoveries had been made.

The team also surveyed the geology of the 10-acre Jim Bridger expansion site and remained on-site during construction. As expected, nothing was found at this site, which is located in solid rock. Most of the team's efforts centered on Aeolus, where the archaeological and paleontological potential was vast. Down the road from that particular site is an area called Como Bluffs, also known as dinosaur central.

In the middle of the Aeolus substation's 120-acre footprint was a significant hill, which the team nicknamed "conglomerate hill" because of the of type of rock initially found

on the surface. As it was carefully deconstructed in layers, the team made some interesting discoveries. The sedimentary rock revealed that this area was a shallow estuary near a river delta between 100 million years ago and 66 million years ago. More than 50 million years of tidal action had been preserved in the shale that makes up the area's bedrock.

Within an eight-week timespan, the team identified significant fossils of marine life, including oysters, clams and echinoids. There was evidence of tiny fish, sponges, mantis shrimp and burrows as well as ammonites — ancestors of the modern-day mollusk that look like big snails with hard shells and octopus heads. The team also uncovered dinosaur coprolites (manure). In total, the team recovered evidence of 51 different types of species, making this the largest paleontological discovery by Burns & McDonnell to date.

While surveying the hill, the team also noticed orange stripes around the edge, the remains of cyclic volcanic eruptions, which seemed to take place every 1 million to 2 million years.

Roughly 145 million years ago, the region started out as a swamp, but as the Medicine Bow valley broke about 65 million years ago — because of the rising of the Rocky Mountains — it was tilted and rotated, then flooded again, which took the top off. This "hill" was tortured in its life, and the team could see all of that in its geology.

RESULTS

As with all discoveries, the team identified, cleaned, dated and recorded each fossil and finding at Aeolus, writing up an extensive paleontological report with a detailed historical timeline. This report was provided to the Bureau of Land Management, the on-site federal agency; PacifiCorp,

PALEONTOLOGICAL DISCOVERIES

- 14 types of oysters
- 11 types of clams
- 6 types of scallops
- 5 types of cephalopods (squidlike)
- 4 types of bony fish
- 3 types of echinoids (sea urchins)
- 2 types of cartilaginous fish (sharks)
- 2 types of gastropods (snails)
- 1 type of cockles
- 1 type of dinosaur
- 1 type of polychaetes (worms)
- 1 type of stomatopoda (mantis shrimp)

the landowner and client; and the state geologist. The team consulted with the local tribe communities throughout the project and shared the report with them as well.

The entire team actively monitored each site during a nine-month time frame, a portion of which took place during the harsh winter Wyoming months. All work was successfully completed without delay or any safety issues. The archaeology team will return to Anticline in summer 2020 to monitor the installation of the substation's permanent access road and will remain on call until all projects are completed.



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