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Advanced Surveying Technology Aids Chirikof Island Cleanup Investigation

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ATO MINUTE

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From the air, Chirikof Island in the Gulf of Alaska looks like a giant Dassault Mirage 2000 – a fighter plane with a delta wing. It is located about 80 miles southwest of Kodiak Island, Alaska.

As part of the NAS communication infrastructure, Chirikof Island supported the operation of a Civil Aeronautics Administration radio range from about 1943 to 1946, including during World War II.

Now completely abandoned, the former CAA site is strewn with lead-encased cables and wires, rusted and collapsed radio towers and support structures, abandoned mechanical support equipment, derelict boats, and drum piles. Severe weather and high winds (sometimes up to 100 miles per hour) quickened the erosion of the abandoned range site. The erosion has been much more severe than on other parts of the island, largely due to the removal of the vegetative cover to facilitate the construction and operation of the radio range. Over the years, contaminants such as petroleum-based hydrocarbons, lead-based paint, lead cabling, arsenic and diesel fuel were accumulated and scattered across the abandoned CAA site at the northern end of the island. The site is now a historical environmental liability for the FAA as determined by the Alaska Department of Environmental Conservation. The contaminants must be removed from the island to comply with federal, state and local environmental regulatory and policy requirements supporting a clean environment.

In April 2017 the FAA, with support from the NAS Integration Support Contract and Brice Environmental Services Corp., set out to conduct an investigation to categorize environmental contamination for remedial action. To scope out the work, the Western Service Area Environmental Cleanup Program and Engineering Services deployed a talented team of subject matter experts led by Aemon Wetmore to provide an efficient, technically advanced, complex investigative and remediation-based cleanup effort.

Fallen radio tower.

With an area of about 33,000 acres surrounded by rough seas, and with no power source or docking infrastructure, the island poses unique challenges for the investigation and cleanup effort. Portable and foldable buildings, engine generators, heavy equipment, landing craft and barges all had to be brought in to the island, and the cleanup team had to be completely self-reliant and self-

sufficient while on the island. As the island is also a designated wildlife refuge, the cleanup must also protect native animals – for example, bald eagles have built nests on the rusted and fallen radio towers.

To scope out what needs to be done, the team worked closely with many stakeholders: service centers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and other federal and state legal and regulatory communities. The team obtained permits for land use and cleanup and deployed innovative survey technology. The tools included the Global Navigation Satellite System and GPS-enabled dual-frequency receivers and an unmanned aircraft system operated by a licensed pilot under contract to ATC-Facilities and Engineering Services – to collect real-time cadastral survey data and high-definition images in Class G unrestricted airspace.

The Brice Environmental Chirikof on-site cleanup team, from left to right – Robert Melrose, site superintendent; Dylan Hickey, surveying and aerial mapping; Scotty Mann, project manager; and Duffy Daniels, operator.

The survey technologies are significantly more advanced and far more efficient than those used just two or three years ago. To obtain high-quality orthorectified images, team members used two inexpensive drones and aerial triangulation and ground-control points to capture topographic contours, and they built dense point clouds. The use of drones as part of the innovative technology resulted in a digital surface model that shows terrain contours. The high-quality, georeferenced images allowed the team to estimate the quantity and better define the scope of work in preparation for the planned cleanup in April 2018. Combined with real-time kinematic satellite navigation survey data, orthorimages provided a solid basis for estimating the quantity and volume of contaminated soils surrounding abandoned drum piles that must be removed and likely disposed of off site.

According to Valerie Holmes, WSA Environmental Cleanup (ECU) program implementation manager, and Bryan Beatson, WSA ECU contract support subject matter expert, “The use of drones and advanced GIS survey technology as part of ongoing ECU efforts on Chirikof Island has far-reaching implications for the rest of the FAA.” Drones equipped with high-quality, digital single-lens-reflex cameras can fly in adverse conditions and provide universal, high-definition quality images and engineering data. “The new drone technology,” they added, “will exponentially increase the capability of the FAA to make informed data-driven ECU and other engineering decisions.”

The new technology could be easily adapted or adopted to support other engineering groups or facility projects, such as operations and maintenance or the Fall Protection Program Office, to improve the overall cost, schedule and scope efficiency, and ultimately a far better end product or deliverable than previously thought possible.

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