



### A193 An Unusual Tool/Fracture Mark Case to a Smokestack From a 19<sup>th</sup>-Century Steam Engine

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The goals of this presentation are to educate about examination of tool marks and the use of fracture matches to determine the common origin of a portion of a 19<sup>th</sup>-century cast-iron smokestack and also learn about the theft of antiquities from federally protected archeological sites and how the Antiquities Act of 1906 and the Archaeological Resources Protection Act of 1979 apply to persons accused of theft, and also to educate the participants on the history and processes of gold mining in Kern County, California.

This presentation will impact the forensic science community by helping them understand the process of forensic examinations of antiquities illegally harvested from archaeological sites.

The theft of antiquities from federally designated archeological sites is a growing problem in the United States. The price of iron as well as other metals such as copper, silver, and gold in the recycled metals market has steadily increased, thus making the harvesting of metal-bearing materials from abandoned sites economically attractive. The unfortunate effect of this phenomenon is the vandalism, destruction, and theft of antiquities from unprotected federal lands. The Antiquities Act of 1906 signed by President Theodore Roosevelt and the Archeological Resources Protection Act (ARPA) of 1979 were enacted to protect antiquities from being obliterated, removed, or destroyed from federal and Native American lands.

In the summer of 2011, the Bureau of Land Management (BLM) submitted evidence to the Kern Regional Crime Laboratory (KRCL) items that had been illegally harvested from an abandoned gold mine designated as an archeological protected site. These evidence items included the following: a flattened riveted cast-iron section of 19<sup>th</sup>-century smokestack seized from the suspect, a concrete cutting saw with circular metal cutting wheel seized from the suspect, a rounded section of a cast-iron 19<sup>th</sup>-century smokestack recovered from the mine site, and a circular metal cutting wheel recovered from the mine site. BLM requested the laboratory to determine if the flattened smokestack seized from the suspect's vehicle was at one time part of the smokestack remnant recovered from the mine site.

An examination of the flattened section seized from the suspect and the remnant from the mine site was conducted using standard comparison methodology and recorded using digital photography. The process of restoring the flattened section of smokestack, the comparison of cut marks and fracture mark analysis, the legal implications of ARPA, and a brief history of gold mining and its processes in Kern County California will be discussed.

The process of examination included:

1. Visually determining if the two items are compatible.
2. Reshaping and reforming the unknown items that an attempted alignment could be accomplished.
3. Aligning the items to determine where common tool marks could be compared.
4. Searching for fracture matches when conventional tool marks comparisons were not feasible.
5. Identifying fracture matches to establish common source.

Conventional tool mark techniques were not used due to the nature of the cutting instrument, which was determined to be a worn-down grinding wheel on a gas-powered concrete saw. However, a fracture match was identified in an area where the grind cuts were incomplete. The fracture match was difficult because of the brittleness of the metal caused from years of oxidation and corrosion in the open-air environment.

In conclusion, fracture mark comparison is possible when conventional tool mark examination and identification techniques fail, working with decomposing and corroded metal has its challenges when attempting common source identifications, and 19<sup>th</sup>-century manufacturing techniques do allow for individualization.

**Fracture Match, Tool Mark, ARPA**