All-domain Anomaly Resolution Office

Supplement to Oak Ridge National Laboratory's Analysis of a Metallic Specimen

January 2026

Overview

In 2024, the All-domain Anomaly Resolution Office (AARO) contracted Oak Ridge National Laboratory (ORNL) to evaluate a metallic specimen. This specimen, reportedly recovered from a private property near Flint Ridge State Park, Ohio, in the mid-1990s, allegedly possessed anomalous compositional and structural characteristics. The property owner reported observing a large unidentified airborne object before discovering the material.

ORNL assessed that the specimen, as received, is consistent with "an ordinary aluminum alloy made for common applications." As a standard handling precaution, ORNL tested the specimen for radioactive emissions and found none. ORNL produced a summary of findings documenting the laboratory's methodology, available on AARO's website. AARO concurs with ORNL's findings and provides this supplementary material to add historical context to account for the specimen's probable origins.

Historical Context and Probable Origins

ORNL's testing revealed large grain sizes, interconnected pores up to 1 millimeter in diameter, and needle-like silicon precipitates. These features align with casting defects and failure patterns commonly documented in industrial settings,[1] all of which compromise the specimen's mechanical strength.[2] The specimen also lacks strengthening additives, such as strontium or sodium, which would be expected features in a high-performance alloy.[3, 4] The specimen's overall form factor does not exhibit any geometry suggesting a functional design or particular intended application. Taken together, these features are inconsistent with those of a component designed for an advanced application.

AARO cannot definitively attribute the specimen to a specific source or manufacturing process. However, its composition is comparable to well-documented, conventionally manufactured aluminum-silicon alloys, most closely matching Aluminum Association reference materials for alloys 369.1 and A413.1.[5] Cast aluminum alloys in the 300- and 400-series are highly suitable for applications that require hardness, impact resistance, and ease of processing into complex form factors, such as engine components.[6] 300-series aluminum alloys began widespread industrial production in the 1970s and now comprise over 90% of all shaped aluminum castings.[7] These finding are consistent with several plausible historical origins, including: a commercial casting; an industrial by-product; a recycled alloy from a non-industrial casting; or a slow-cooling melt resulting from a catastrophic failure of an original component, e.g., an automotive fire. Given its

26-P-0218

consistency with contemporary alloys and incompatibility with high-performance applications, AARO assesses that the specimen is most likely an ordinary, conventionally manufactured aluminum alloy.

---

[1] Jolly, M., & Katgerman, L. (2022). Modeling defects in aluminum cast products. *Progress in Materials Science*. https://doi.org/10.1016/j.pmatsci.2021.100824

[2] Davis, J.R. (2001). *Alloying: Understanding the Basics* (1st ed., p. 378). ASM Intl. Available online: Aluminum and Aluminum Alloys

[3] Ibid. (pp. 392-395)

[4] Ganesh, M.R.S., Reghunath, N., J.Levin, M. *et al.* Strontium in Al–Si–Mg Alloy: A Review. *Met. Mater. Int.* 28, 1–40 (2022). https://doi.org/10.1007/s12540-021-01054-y

[5] Davis, J.R. (2001). *Alloying: Understanding the Basics* (1st ed., pp. 365-366, 404). ASM Intl. Available online: Aluminum and Aluminum Alloys

[6] Ibid. (pp. 365-366)

[7] Ibid. (p. 354)