Introduction

- Nuclear Thermal Propulsion (NTP) is the best way to get Mars.
- Testing NTP is challenging due to the radioactive exhaust it produces even with existing technologies.
- The task of this project was to determine alternative technologies for aerosol and noble gas filtration.

Objectives

- The focus of the project was to determine alternative methods for filtering aerosols (HEPA) and noble gases (charcoal) through research on nuclear and coal factories.
- Research cost, flow rate, size, efficiency, and max operating temperature for each method.
- Determine which alternative technology would be the best option, if possible.
- Risks were taken into consideration such as hydrogen embrittlement and maintenance.

Outcomes

- Four alternatives were found:
  - Electrostatic Precipitators
  - Cyclonic Separators
  - HEGA Filters
  - Carcerands
- Electrostatic Precipitators can withstand higher temperatures, have a higher efficiency, and are more durable than HEPA Filters.
- No alternative was found to be suitable for filtering radionuclides at extreme temperatures.
  - Carcerands requires further research and testing.

Summary

- Alternate methods were discovered for radioactive NTP exhaust filtering through research.
- Identified several alternate technologies for filtering NTP exhaust.
  - Electrostatic Precipitators were found to be a viable alternative to filtering aerosols.
  - No alternative option was found suitable for filtering radionuclides.