NCD Medical: UpCycling of MRI Magnets

Problem Statement, and Team:

- 20-30% of MRI machines are permanent magnet types, versus superconducing magnets. Particularly smaller machines
  - 1000-20000 Kgs NdFeB per machine
  - 200-2000 tons/year available
- Magnets are now disposed of as steel scrap, but can be removed and recycled profitably
- NCD medical is a leader in the installation and service of medical imaging devices, including CT Scanners, MRI Systems, General Radiography, Rad/Fluoro Systems, Digital Flat Panels, Mobile C-Arms and Portable X-rays
- Powdermet Inc is a midstream processor of magnet feedstock, via planar flow strip casting. Intermediate product is high quality NdFeB strip (N48+)

External Perspective / Link to US Supply Chains

- NCD medical is upstream, sales, install, and service of MRI machines
  - Provides access to surplus machines in medical offices
- Powdermet Inc is midstream processor, analyzes incoming magnets, remelts magnets and upgrades composition for energy product and temperature rating needed by magnet producers
- AMT, eVAC, Noveon, Proterial, etc. magnet producers buy feedstock and convert into magnets.

Specific Approach, Objectives

- Develop pipeline and sales partnerships to acquire surplus MRI's from hospitals, medical centers, surgery centers and private practice doctors
  - Estimate tons/year of MRI magnet stream
- Acquire a surplus (extremity MRI) machine and validate cost of disassembly and recovery of magnets
- Develop cost models by analyzing and reprocessing recovered magnet material
- Work with DOE abs to complete LCA and TCE analysis

Major Challenges/obstacles:

- Diverse sourcing of surplus machines, limited skillsets with MRI and magnet handling knowledge
- Cost and labor to remove magnets from MRI machines.
- Cost and process to strip nickel coating from magnets
- Ability to analyze and upgrade RE content to meet higher grade specifications needed for market (38N to 52AH example)

Next Steps/Plan

- Develop MRI pipeline and partnerships
- Acquire scrap machine, remove and demonstrate rapid demagnetization and disassembly
- Identify additional recycle and reuse opportunities and markets for MRI parts
- Validate stripping and cleaning method and costs
- Verify cost and upgrading requirements to modify RE content and verify yields by reprocessing scrap magnets