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<b>Project Title:</b>	<b>Waste Water Treatment with Magnetic Separation</b>
<b>Organization(s):</b>	<b>Los Alamos National Laboratory</b>
<b>Presenters:</b>	Joe Waynert (LANL), Jon Bernard (DuPont)
<b>FY 2003 Funding:</b>	\$60 K (DOE to LANL); \$150 K (DuPont to LANL; funds-in); \$100 K (DuPont, matching funds)

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**Project Purpose and FY 2003 Objectives:** DuPont is leading the SPI development of a 500 mm HTS reciprocating magnetic separator. An HTS magnetic separator offers significant operational energy savings compared to conventional copper coil separators. The DuPont business plan calls for the development of new applications of magnetic separation that can benefit from the energy efficiency. DuPont and LANL have established a CRADA in FY03 that capitalizes on LANL's experience in magnetic separation. As evidence of their commitment to the development of the technology and to facilitate the exchange of knowledge, DuPont has stationed a full-time employee (Jon Bernard) at the Los Alamos Research Park. After jointly assessing several potential market opportunities, DuPont and LANL agreed to focus on the removal of heavy metals in wastewater using high gradient magnetic separation (HGMS). LANL will work with DuPont to develop an in-situ ferrite formation process that incorporates the heavy metals in a ferrite crystal lattice. The ferrites, having a high magnetic susceptibility, are then readily removed as they pass near a magnetized matrix material.

The objectives for the past year were: to assist in identifying a person to become the on-site DuPont employee; to establish laboratory and office space at LANL for the DuPont employee and appropriately furnish each (including the magnetic separation equipment); to evaluate possible magnetic separation markets and select one which offers significant financial opportunity, yet acceptable risk of entry success; and assess the feasibility of the magnetic separation process applied to this market.

**FY 2003 Performance and FY 2004 Plans:** LANL is providing laboratory and office space in the Los Alamos Research Park building, an HTS magnet, ancillary HGMS equipment and data acquisition, technician support, and technical consultation for the development of the wastewater treatment process. A report was generated detailing eight possible magnetic separation markets. The wastewater treatment market was selected. Following preliminary screening experiments, another report was created which discussed the feasibility of the ferrite process for removing heavy metals from wastewater.

LANL Plans for FY 2004

1. Determine the controlling parameters and their ranges for the ferrite process
2. Complete development of the detailed ferrite process
3. Determine scaling issues for laboratory device to pilot plant
4. Determine a location for an operational pilot plant

**FY 2003 Results:**

Significant progress has been made during the year:

1. A report assessing potential areas of large-scale, mainstream HGMS applications was completed. Wastewater treatment was selected as the area of focus.
2. An HGMS test facility was established at LANL based on an existing HTS magnet. A full-time DuPont employee is stationed at LANL with full access to the facility.
3. The feasibility of ferrite formation in water incorporating heavy metals and removal by passage through an HGMS has been established.
4. A report describing the feasibility of the process was completed and sent to DuPont.

**Research Integration:** LANL has regular teleconferences with DuPont scientific and technical staff to ensure that our direction, efforts, and results are in accord with the needs of DuPont. There are regular weekly meetings involving the DuPont representative, and a cross-disciplinary group of LANL magnetic separation experts, which include chemists, chemical engineers, physicists, and mechanical engineers. Dr. Johnson of New Mexico State University and a graduate student of his are also regular participants in the project.

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