IGEM Grant Report

☒ Progress (due January 1) ☐ Annual (due July 31) ☐ Final (due August 31)

IGEM Grant # IGEM 25-007 Principal Investigator Vivek Utgikar

Name/Full Title of Project Recovery of Critical Materials from E-Waste

Submission Date 12/31/2025 Primary Institution University of Idaho

Section 1: Project and its goals
The overall goal is to develop an efficient and environmentally responsible recycling pathway consisting of oxidation, solid-state chlorination, and electrochemical reduction to recovery Nd from spent NdFeB magnets into high-purity neodymium metal.

Section 2: Project accomplishments for the reporting period and future plans
Accomplishments: 1. Successful demagnetization and size reduction of magnets; 2. Systematic oxidation studies to convert NdFeB phases into oxide forms; 3. Optimization of ammonium-chloride-based solid-state chlorination which also accomplishes effective separation of iron from neodymium through removal of volatile iron chloride; 4. Preliminary Nd electrowinning experimentation in newly developed experimental setup.
Future Plans: 1. Electrowinning experiments; 2. Process flow sheet development

Section 3: Summary of budget expenditures
personnel costs (salary and fringe): 62.7% of the total budget, 80% spent. The expenditure is on track with the balance of funds to be used for stipends for graduate and undergraduate students.
Operating expenses: 19.2% of the total budget, ~37% spent. The expenditures in this category are anticipated to rise significantly, with increases in analytical charges and initiation of the electrochemical experimentation.
Student tuition/health insurance: 18.1% of the total budget, 70% spent. The balance of the funds will be expended over the remaining project period.
Overall, the project expenditure is consistent with the anticipated spending.

Section 4: Economic development/impact
Manuscripts under development for submission to journals. Companies identified for future contact after acquisition of critical data/results

Section 5: Faculty and student participants.
1. Vivek Utgikar, PI, faculty: Overall project direction; 2. Krishnan Raja, co-PI, faculty: Supervision and guidance of research effort; 3. Dijina Asarinte Valappil, graduate student: Project task execution; 4 and 5. Diba Zadehgol and Mahir Adib, undergraduate students: Assisting graduate student

Section 6: Long-term sustainability plan
Technical focus areas identified for future research. Also identified are potential funding agencies and industry partners.

Section 7: Expenditure Report
Attachment “IGEM 25-007 Dec 2025 Progress Report Expenditure Attachment.docx”.

Section 7: Expenditure Report

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Submission Date December 31, 2025 Primary Institution University of Idaho

Recovery of Critical Materials from E-Waste

Expenditures

Category	Budgeted	Spent	Balance
Personnel (Salary + Fringe) PI, co-PI, Students	87,752	70,723.52	17,028.48
Operating Expenses (Materials/Supplies, Publication)	26,832	10,065.40	16,766.60
Graduate Tuition and Health Insurance	25,416	17,863.00	7,553.00
Total	140,000	98,651.92	41,348.08