HERC Project Status Report

Idaho Incubation Fund Program

Quarterly Progress Report

April 1, 2012

Proposal No.	**AHRC25**
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Name of Institution:	**Idaho State University/ Idaho Accelerator Center**
Project Title:	**Commercialization of Copper 67**

1 PROJECT STATUS REPORT MILESTONES

This is a quarterly status report beginning FY 2012 for the HERC funded project, Commercialization of Copper 67. The project proposal listed the following major project milestones:

1). Completion of internal infrastructure 2). Testing of all discrete production steps followed by production of trial samples 3). Approval of tissue, animal and human trial samples 4). Delivery of approved quantities to researchers for human trials.

Each of these key milestones will be detailed below with progress.

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2 PROJECT STATUS REPORT – Milestone review

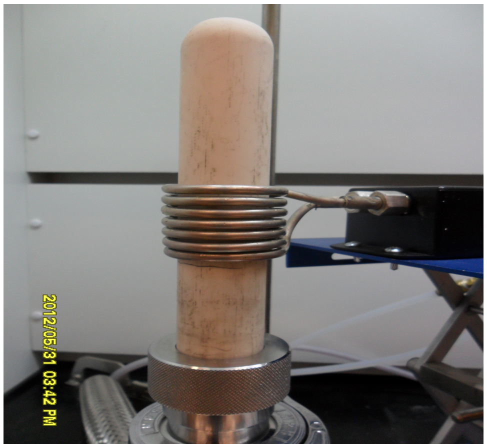
For the three months ending March 31st, 2012, (Q3 FY 2012), the following items were completed against the project plan:

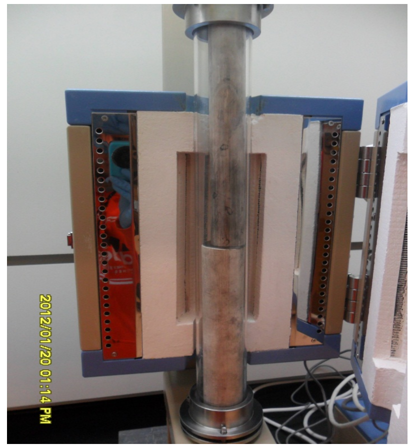
1). **Completion of internal infrastructure**

a). The accelerator guides were straightened and tested during this quarter. The entire beam line was aligned and put under vacuum. An initial test was run of the system to verify vacuum, Rf power and beam diagnostics. The accelerator is performing close to the original design specification, however, several issues were found. One major issue and delay was the need to increase the power service into the facility by 200 amps. The original service was insufficient to achieve full power. The service increase added 6 weeks to the timeline for commissioning the accelerator. A second issue was finding that the residual radioactivity in the guide and from the accelerator room was greater than anticipated. This required the building of additional shielding for the room and at strategic points near the accelerator gun. We will not know if additional shielding will be required until a 50% power test is completed in April. A third issue was the need to redesign the water cooling system for the accelerator guides. The high power accelerator requires very tight cooling control, in the range of plus or minus 2 degrees C, and the original design was not up to the task. The new cooling system for the first guide will be tested in April.

b). The accelerator water cooled window design was completed and fabrication was started. An end-station screening room was designed and the initial concrete blocks were installed. A design for the target cooling system was completed.

c). A new induction furnace was procured for testing of the sublimation process. A new vacuum system was designed an installed for that furnace and an initial test was run. The induction furnaces promises a faster processing time (critical for timely completion of the product before decay loss) and higher yield. In addition, the new furnace takes up significantly less space which is important for the production hot cell at our partner's facility. See below picture comparing the radiant to the induction furnace. Induction furnace is on the left.





For the next (and final quarter) of this project under the HERC funding, the accelerator will be tested at full power and all equipment will be located into a suitable "hot cell" sized hood at the IAC for full process testing.

2). **Testing of all discrete production steps followed by production of trial samples.**

a). We have determined a process for filling the target crucibles with molten target metal. After many trials with different materials, we have custom machined ceramic and graphite parts for the process. This work involved significant material analysis to determine low contamination materials that do not react with the molten metal.

b). Over 50 trials using different process parameters with the radiant furnace were run to determine the best methods for physical separation of the final product (Copper 67) from the starting material. We have achieved greater than 90% recovery of Copper (cold) which convinces us that this process will be commercially viable. In addition, the special ceramic tubes and crucibles were upsized by 50% to match the expected size of the commercial process. We have found that the radiant furnace has certain attributes that improve some outcomes, but, degrade others. In April and May we will run a series of tests comparing radiant furnace to induction furnace to wring out the best commercial configuration.

c). We have determined that the commercial process will require the use of a pure isotope of Zinc as the starting material. That material is very expensive, at approximately $800-1000 per gram. Because of that high cost, it is critical that every possible amount of the material unused in creating Copper 67 must be recovered. We have created a new recovery furnace that has improved losses to less than 2% on average, however, some trials have had higher losses. Work in Q4 will focus on every possible loss mechanism of starting material to minimize loss to less than .1 grams per trial

Project Budget/Financial Status as of Q1, FY 2012

Budget Item	Planned Budget	Actual spend to date	Variance/Explanation
Salary	16,800	0	Expense will begin Q2
Consulting	30,000	24500	Below budgeted spend
Travel expenses	3000	0	Below budgeted spend

d). The chemical separation process has struggled with methods to increase yields to greater than 90%, yet allow reduction of contaminants (so that Specific Activity of the final product meets customer expectations of 5000 Curies/gram). The physical separation process has the effect of allowing a much simpler chemical separation process. A proposal has been made to change to process to an alternate sequence of column processes which will be tested in Q4.

We have learned that our expectation to deliver samples to customers in FY Q4 are too optimistic. The complexities of the process as well as the difficulties in commissioning a custom high power accelerator have pushed the sample delivery timeline to the October quarter. In addition, the cost of the required starting material isotope is too great to be afforded under the current budget. Instead, we have set our goal as a complete processing of all steps of the process, including activation of much cheaper natural Zn using the new accelerator, by the end of Q4 of this project (April to June period).

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3 FINANCIAL

We continue to use other funds for materials and engineering time. We have chosen to minimize spending for the first 3 quarters of this project so that ample funding is available the last quarter for the full process test. We expect to spend the entire remaining budget in Q4 of this project.

4 INTELLECTUAL PROPERTY, APPLICATIONS, INDUSTRY INVOLVEMENT

We have not filed any patents or trademarks on our work yet. We have elected to keep all process steps as trade secrets and property of ISU. We believe that the fully engineered technology will be licensable to our commercial partner.

We have been in contact with researchers at City of Hope cancer research center and with researchers at University of Texas. Researchers continue to inquire about the availability of Copper 67 for their upcoming trials. We believed market demand remains for the product.

Prepared by Jon Stoner
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