IGEMs/HERC Project Status Report
Idaho Incubation Fund Program
Semi-Annual Progress Report
June, 15th 2016

Proposal No.	**AHRC33**
P.I. Name:	**Jon Stoner**
Name of Institution:	**Idaho State University/ Idaho Accelerator Center**
Project Title:	**Development of a commercial process for I-123**

Proprietary Information – not for public review

Executive Summary:

The goal of this project is to investigate a commercially viable process for producing an “in demand” medical isotope, iodine-123. The initial work has shown feasibility of the nuclear reactions $^{124}Xe(g,p)^{123}I$ and $^{124}Xe(g,n)^{123}Xe(\beta+)^{1123}I$. Over the last year we have completed activation studies with small vials of 10% enriched ^{124}Xe with very encouraging results (> 1mCi/gm/kw*hr) and constructed a target system for large scale studies. We determined a method to separate the product and final work in June, 2016 will test the entire system.

Update to Mid Year Review

The initial work reported previously showed the feasibility of our plan to irradiate Xe-124, converting a portion of the target into I-123 through the reaction Xe-124 (g,n) Xe-123 (B+ decay) I-123. Our experimental results showed that we can achieve ~ 1.4 mCi/g/kw*hr of ^{123}I from a ^{124}Xe target at 40 MeV. This equates to a potential 525 mCi of activity/one liter enriched target per 10 hour day.

To show commercial feasibility, we constructed a target allowing us to irradiate larger quantities of gas.

Figure 1 target system as drawn in Solidworks

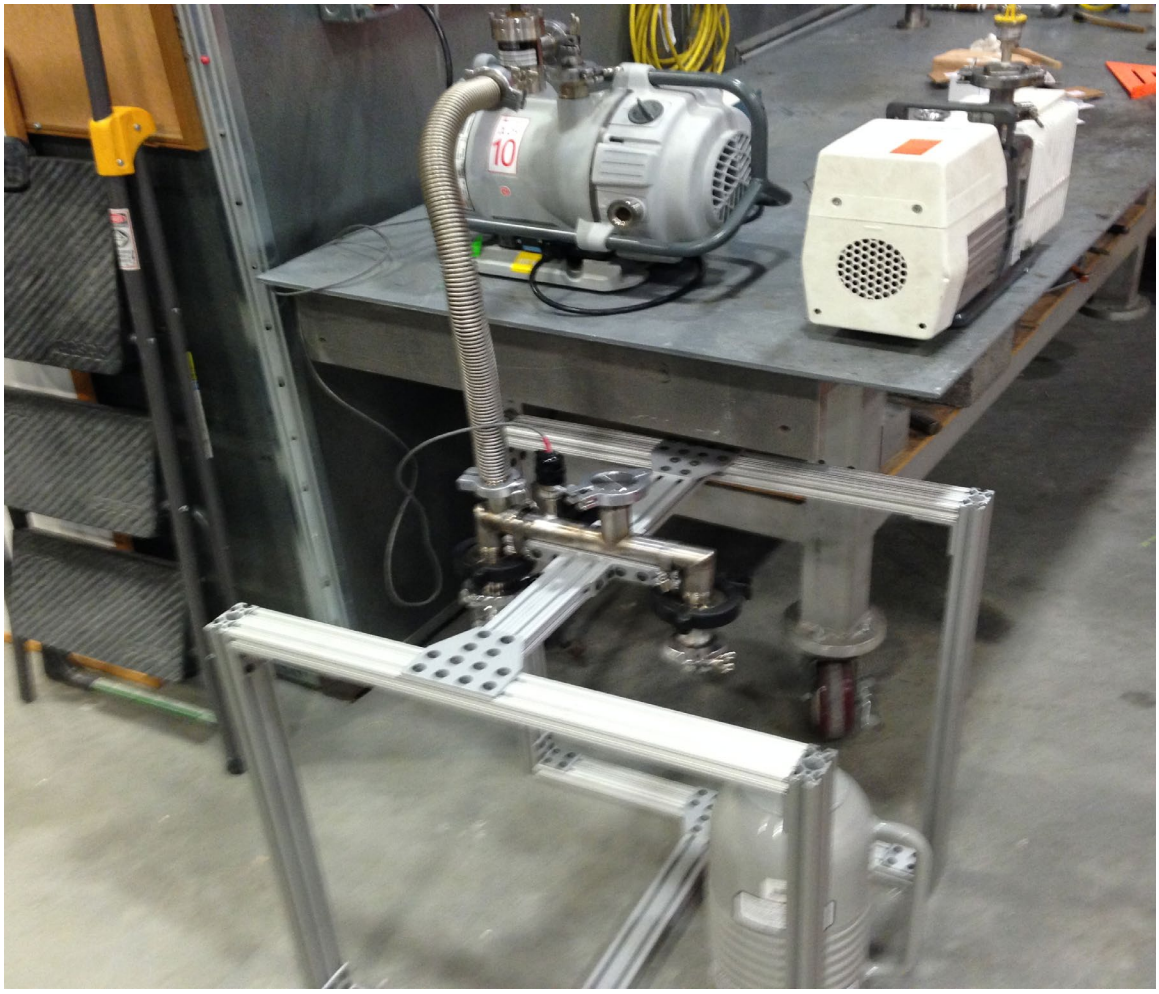

Figure 2 Target system as constructed

We received two liters of Xe gas donated by Idaho National Labs for our experimental irradiation planned for June, 2016. The value of the donated gas was several thousand dollars.

Separation

During the second half year of this grant we spent several hundred man-hours trying to determine a method to separate the I-123 and purify it. No commercially available anion exchange resin was satisfactory for the process because of quaternary amine groups which refused to release the I-123. We developed a process to modify the commercially available resins using the Hoffman reaction. After considerable experimental testing and thanks to the donation of an iodine tracer by International Isotopes Inc. we showed excellent recovery using our modified resin.

Final Testing

We will complete testing of the new target system and separation process in June of 2016. The final report will provide a complete review of the results.

Intellectual Property

We believe that our final target and extraction process may lead to at least two patent applications for the commercial process. We are continuing our investigation of prior art.

Follow on grants

So far this program has been exceedingly successful in attracting donated materials and follow-on grants. The PI has received two grants from INL as a result of the knowledge gained from this work and one from DTRA. In addition, INL and the PI are working on a follow-on grant to DOE using experience gained from this work. Our private sector partner, International Isotopes remains very interest in the final commercial viability of this process.

FINANCIAL Summary FY 2016 to June 30th, 2016 (anticipated spend)

	Original Budget	Revised Budget	Final Balance
Total Personnel Costs	35,260.00	47,725	0
Materials and Supplies	2,440.00	6350	0
Beam Time	10,000.00	7625	0
Capital	14,000.00	0	0
Totals	**61,700.00**	**61,7000**	**0**

We anticipate the expenditure of all funds in this grant by June 30th. We adjusted the budget (as previously explained) due to need to create all equipment as opposed to purchase available equipment.

Prepared by Jon Stoner P.I.
Director of Technical Operations IAC
Office of Research, ISU