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Project Title: Isotope Production R&D at LERF, Jefferson Lab’s High Power Electron Linear Accelerator

Applicant/Institution: Dr. Andrew Hutton / Thomas Jefferson National Accelerator Facility

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DOE Office/Office of Science Program: Office of Nuclear Physics

DOE Office/Office of Science Program Office Technical Contact: Dr. Dennis R. Philips

COVER PAGE: SUPPLEMENT FOR COLLABORATIONS

The collaborating institutions are:

Thomas Jefferson National Accelerator Laboratory (Jefferson Lab, Jlab), Pi: Dr. Andrew Hutton;

Virginia Commonwealth University (VCU). PI: Dr. Jamal Zweit; and

South Dakota School of Mines and Technology (SDSMT) PI: Dr. Douglas Wells

The three institutions bring together in-depth expertise to this research activity. Relevant to this R& D program are Jefferson Lab’s expertise in SRF electron accelerators, radiation physics and controls and mechanical engineering; VCU’s expertise in radio-chemistry, isotope separation and medical isotope research for therapy; and SDSMT’s expertise in photo-nuclear reactions. Both VCU and SDSMT have extensive knowledge of medical isotope research and market needs. The overall planning of each major aspect of this activity, namely, design of the high power target system, irradiation of targets, separation of the desired isotope, measurement of yields, optimization of beam parameters will be discussed and reviewed by all PIs and investigators.

Dr. Andrew Hutton of Jefferson Lab is the lead PI coordinating the overall research activity. The leadership structure is not hierarchical. Once all PIs agree on a path for an activity, carrying out of that activity is the responsibility of the PI of the expert institution. Each PI will communicate the progress and results to the collaborators at agreed upon intervals. Jefferson Lab will be responsible for providing the electron beam, designing the target system to handle 50kW of beam power, testing the target system at the designed beam power and irradiating both Gallium and Zinc targets at different energies albeit at lower currents (in order to avoid radiological concerns). VCU will be responsible for isolating the desired isotope and testing the delivery mechanisms. SDSMT and Jefferson Lab share the responsibility for measuring the yields and training a graduate student. Graduate student training will include simulations, participating in the tests and analyzing the data from the tests. All institutions participate in establishing optimal beam parameters for Cu-67 production.

Jefferson Lab’s facilities include LERF and CEBAF accelerators. Both SRF electron accelerators are continuous wave electron accelerators. Jefferson Lab has a well equipped machine shop and radiological instrumentation. VCU’s facilities include state-of-the art radio-chemistry lab, hot cells and isotope delivery testing equipment. SDSMT

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|  | **Names** | **Institution** | **Year1 Budget** | **Year2 Budget** | **TOTALs** |
| **Lead PI** | Dr. Andrew Hutton | Jefferson Lab |  |  |  |
| **Co-PI** | Dr. Jamal Zweit | VCU |  |  |  |
| **Co-PI** | Dr. Douglas Wells | SDSMT |  |  |  |
| **TOTALs** | | |  |  |  |