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LA-UR-02-~~xxxx~~

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(Summary Paper)

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Submitted to: Twenty-Sixth Actinide Separations Conference
June 3 – 6, 2002
Berkeley, California

Los Alamos
NATIONAL LABORATORY

Pyrochemical Glovebox Line Replacement and Modernization Effort at Los Alamos National Laboratory Plutonium Facility

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Los Alamos National Laboratory (LANL), as part of the stockpile stewardship mission, is developing the capability to manufacture replacement pits for the United States nuclear weapon stockpile. Part of this effort requires that the various manufacturing activities formerly performed at the Rocky Flats be reconstructed at LANL, modernized to improve operation, and re-certified for pit production. Part of this effort requires that new pyrochemical metal production facilities be installed in TA-55 to replace existing outdated equipment.

The purpose of this effort is design, build/procure, assemble, cold test, and support installation activities for ten pyrochemical processing gloveboxes and processing support equipment for insertion into a selected PF-4 laboratory (See Figure 1). Eight of the gloveboxes will be connected to a common trolley tunnel with a state-of-the-art automated transport system that can access each glovebox. Five of those gloveboxes will be designed to accommodate standard water-cooled pyrochemical processing furnaces with appropriate lift mechanisms for handling the furnace products and processing hardware. Another glovebox will be designed to accommodate an improved breaking press that will be designed/procured to break alpha metal up to a thickness of 1", eliminate introduction of hydraulic oil to the glovebox environment, provide appropriate shielding for prevention of glovebox damage due to shrapnel projectiles, and use interchangeable impact tools in order to be able to process both contaminated and clean metals with the same machine. In addition, a storage glovebox and a distillation glovebox (already developed) will be attached to the transport system. Two other gloveboxes, one accommodating two casting furnaces and another storage glovebox, will be installed in the laboratory independent of the transport system.

A transfer system (trolley) will be incorporated to handle material flow between the pyrochemical furnace gloveboxes, the press glovebox, the storage glovebox, and the distillation glovebox. The trolley will be very simple to operate, able to accommodate at least 50 pounds, require minimal maintenance, and be able to be requested and operated from any of the glovebox locations on the line. The transfer system will be capable of discharging its load in some manner through the open door to the entrance of each of the gloveboxes on the line. This may be an automatic function with manual selection for unusual loads or a completely manual operation. An existing commercial or otherwise proven system will be used if possible to minimize the design and test time needed for the system. Two commercial systems examined so far are the Montrac monorail type system available from Montech Incorporated and the Linear Synchronuous Motor system available from MagneMotion Inc.

Work to be completed during FY02 includes glovebox design, transport system industry research, demonstration of selected commercial transport systems, transport system conceptual design,

metal breaking press conceptual design, and glovebox furnace lift mechanism design. Glovebox fabrication/procurement, material transport system procurement, press procurement, lift mechanism procurement, system assembly and staging, system testing, assistance in installing the system into TA-55, assistance with NMT configuration management approvals, and shakeout testing of the system is scheduled for FY03 and FY04. The goal is to have a fully functioning and modernized pyrochemical processing line in PF-4 ready for processing sometime in the first or second quarter of FY04.

Figure 1 – Conceptual Design of LANL Pyrochemical Processing Line