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Pit Manufacturing Fiscal Year 2012 Program Report to the University of California

In 1996, the US Department of Energy (DOE) tasked Los Alamos National Laboratory (LANL) with the mission to produce war reserve (WR) pits for the nation's nuclear weapons stockpile. With the delivery of W88 pits to the stockpile in Fiscal Year (FY) 2007, LANL has now re-established this nation's nuclear pit production capability. LANL has continued work on key technological and infrastructure investments and continues planning as needed for process improvements and capability enhancements through the application of technology.

At the conclusion of fiscal year 2012, the Plutonium Sustainment Program (which prior to 2009 had been known as the Pit Manufacturing and Capability program) has produced a total of thirty of the required thirty-one W88 pits originally ordered by NNSA, (see Table 1) with three programmatic uses. In January 2011 LANL was provided direction from NNSA to reduce the total number of WR pits from thirty-one to twenty-nine W88 pits and focus remaining production resources toward scaled experiments. Specification changes in 2008 necessitated a reapportionment by the NNSA W88 program of the intended use for the pits built previously and has therefore adjusted the distribution table published in previous years (2007 and 2008). Table 1 now represents the present apportionment of these accepted pits. Finally, in October of 2012, NNSA directed LANL through the Plutonium Sustainment Program to build one final W88 pit as an "extra" pit for potential future use in surveillance activities. This pit had been started in FY11 as a back up to meeting the requirement of 29 WR pits by FY11. This final pit was finished in in January, 2012 and Diamond Stamped as a WR pit in April, 2012.

Table 1. LANL Pit Manufacturing through FY11.

| Fiscal Year | Total Pits Built against a 29 unit requirement | Pits delivered to the WR Stockpile | Pits delivered to Destructive Testing | Pits delivered to Shelf Life Surveillance |
|--------------|--|------------------------------------|---------------------------------------|---|
| 2007 | 11 [*] | 3 | 1 | 6 |
| 2008 | 6 | 5 | 0 | 1 |
| 2009 | 4 [*] | 4 [*] | 0 | 0 |
| 2010 | 6 [*] | 5 | 0 | 0 |
| 2011 | 2 | 3 [*] | 1 [*] | 0 |
| 2012 | 1 | 1 | 0 | 0 |
| Total | 30[*] | 21[*] | 2[*] | 7 |

^{*} One pit built in FY07 was accepted in FY09, One pit built in FY09 was accepted in FY10, and two pits built in FY10 were accepted in FY11

In FY11 Lawrence Livermore National Laboratory's (LLNL) Design Agency released the Advanced Engineering Release (AER) to LANL for fabrication of a W87 pit based on the previously built design utilized by the Rocky Flats Plant. After the conclusion of the W88 pit manufacturing mission at LANL, the Plutonium Sustainment Program directed LANL to

transition to a W87 pit type using the AER from LLNL. Two “transition” pits were fabricated that have features of both the W88 and W87 pit types. The strategy is that with the fabrication of each successive transition pit a W87 pit type will be more fully realized. A total of 3-5 transition builds are anticipated in FY12 and F13. There is an Integrated Product Team (IPT) formed that is lead by LLNL with membership by LANL that guides the details of each subsequent build. Ultimately a Development series, Process-Prove-In (PPI) series, Qualification series and finally WR pit production will occur between FY13 and FY19.

Technological enhancements and infrastructure investments have continued over this same time period. In 2012 LANL supported the scaled pit experimental program, Gemini, by fabricating the plutonium parts for the Pollux test object. This effort lead to fundamental improvements in full scale pit production. Furthermore, in 2012 near-net-shape plutonium castings at LANL were performed for both a W88 geometry and a W87 geometry. The W87 pit development effort will utilize this new process for all future pit builds, thereby greatly reducing the amount of Pu required for each casting. This reduced Pu will generate savings in pit-related cost, schedule, waste generation, and worker dose.

In 2012, several construction projects to maintain and upgrade critical equipment at end-of-life where supported. In particular an electron beam weld was restored to operational status, the Pu foundry furnace replacements continued, and the new electro-refining (ER) glove box line was moved into to PF-4 and seismically anchored. The ER and Pu foundry projects will continue for 2-3 years. These are critical to supporting the NNSA/DoD capacity requirements of >10 pits per year.