conversion (SILC) target which uses lithium-6 to make tritium. The facilities required for the helium-3 target include target fabrication and target processing (including extraction) buildings. Facilities for the SILC target include target fabrication, target processing, and tritium extraction buildings. The APT complex would cover approximately 173 acres. Construction would take approximately 5 years and require approximately 2,760 workers during the peak construction year. Operation of the APT would require approximately 624 workers.

3. *Advanced Light Water Reactor (ALWR):* The ALWR would be a high temperature, high pressure reactor whose primary purpose would be to produce tritium, but which would also generate substantial amounts of electricity. There are two options for the ALWR technology: A large ALWR (1,300 MWe) and a small ALWR (600 MWe). Both options use light (regular) water as the reactor coolant and moderator, and include a power conversion facility as an integral part of the design. The design of the ALWR complex would include an interim spent fuel storage building, a waste treatment facility, a tritium target processing facility, warehouses, and security infrastructure. Fuel rods would be purchased from commercial suppliers.

Large ALWR: The large ALWR complex would require approximately 350 acres. Construction would take approximately 6 years and approximately 3,500 workers during the peak construction year. Operation would require approximately 830 workers.

Small ALWR: The small ALWR complex would also require approximately 350 acres. Construction would take approximately 5 years and require approximately 2,200 workers during the peak construction year. Operation would require approximately 500 workers.

4. *Heavy Water Reactor (HWR):* The HWR would be a low pressure, low temperature reactor whose sole purpose would be to produce tritium. The HWR uses heavy water (i.e. deuterium oxide) as the reactor coolant and moderator. Because of the low temperature of the exit coolant, a power conversion system designed to produce electrical power as an option would not be feasible. The conceptual design of the HWR complex includes a fuel and target fabrication facility, a tritium target processing building, an interim spent fuel storage building, a general services building, and security infrastructure. The HWR complex would cover approximately 260 acres. Construction would take somewhat less than 8 years and require approximately 2,320 workers during the peak construction year. Operation would require approximately 930 workers.

Small Advanced HWR: The small advanced HWR is an emerging design variation of the HWR. The design output of the small advanced HWR would be 470 MWt compared to 990 MWt for the HWR. It would have the same configuration of support buildings although they would be somewhat smaller. The design could be developed to produce tritium to meet steady-state tritium requirements, or modified to meet peak capacity requirements. The total area required for the complex would be 150 to 170 acres. Construction would take approximately 5 years and require approximately 1,800 workers during the peak year of construction. An operational workforce has not been estimated.

5. *Modular High Temperature Gas-Cooled Reactor (MHTGR):* The MHTGR would be a high temperature, moderate pressure reactor whose primary purpose would be to produce tritium, but which would also generate substantial amounts of electricity. The MHTGR would use helium gas as a core coolant and graphite as a moderator. A steam cycle MHTGR would use a heat converter to transfer the heat from the helium coolant to feedwater producing super-heated steam which is then used to drive a turbine in the production of electricity.

The steam cycle MHTGR requires three 350 MWt reactors to produce the maximum (3/8) requirement of tritium. Because of the high temperature of the exit coolant, a power conversion facility designed to produce electricity is an integral part of the design. The design of the MHTGR complex, in addition to the three reactors, includes a fuel and target fabrication facility, a tritium target processing facility, helium storage buildings, waste treatment facilities, interim spent fuel storage facility, general services building, security infrastructure, and power conversion facility. The MHTGR complex would cover approximately 360 acres. Construction of the MHTGR would take about 9 years and require approximately 2,210 workers during the peak construction period. Operation would require approximately 910 workers.

Direct Cycle MHTGR: A direct cycle MHTGR is an emerging design variation of the steam cycle MHTGR. In this design the primary helium coolant drives a turbine generator through a gas-compression/gas-expansion, heating/cooling cycle. Two 600 MWt direct cycle reactors would be needed to produce the maximum (3/8) requirement of tritium. The support facilities, resource requirements, and environmental impacts of the direct cycle MHTGR are similar to the steam cycle MHTGR. A two reactor direct cycle MHTGR would require fewer operating personnel than the three module steam cycle MHTGR.

Use Existing Reactors

6. *Existing Commercial Reactors:* The purchase by the Department of an existing operating reactor, the purchase of a partially completed reactor, or the purchase of irradiation services from a commercial power reactor(s)(with an option to purchase the reactor) are the three options evaluated which utilize existing facilities. Commercial light water reactors use both pressurized water and boiling water technologies. The Department has conducted significant development work on tritium targets for pressurized water reactors. Significant additional development work would likely be required to develop a target for a boiling water reactor. The Department plans to proceed with development of the target for the pressurized water reactor, but has not ruled out the use of boiling water reactors if industry demonstrates an advantage to the Department in developing such a target.

Commercial pressurized water reactors are high-temperature, high pressure reactors that use ordinary light water as the coolant and moderator and are capable of generating large amounts of electricity through a steam turbine generator. A typical commercial light water reactor facility includes the reactor building, turbine generator building, auxiliary buildings, interim spent fuel storage facilities, cooling towers, a switchyard for the transmission of electricity, maintenance buildings, administrative buildings, and security facilities.

Purchase of an Operating Commercial Light Water Reactor or Purchase of Irradiation Services: Approximately 72 to 127 workers (depending upon the number of reactors utilized) would be added to the work force because of the tritium activities. New fencing and security buildings may be required to support additional security requirements. Road access restrictions or construction of new roads may also be required.

Purchase of a Partially Constructed Commercial Light Water Reactor: The number of construction workers and the length of the construction period would vary depending on the percentage of completion of the plant. Data were available for a two-unit reactor plant