The potential for technical or regulatory delays in the baseline schedule was also considered in assessing schedule uncertainties for each of the technologies. Technical delays relate to issues such as the maturity of the facility design, operational experience associated with the technology and maturity of the target design. Regulatory delays relate to the potential that independent reviews by organizations external to the Department could take longer than anticipated, either due to administrative licensing proceedings or to resolution of technical issues that delays design acceptance by the reviewing organization. By the end of 1995, a Task Force on External Regulation established by the Department is scheduled to present its recommendations whether the Department's nuclear facilities should be externally regulated, and if so, by what entity. While a number of different outcomes are possible as a result of the Task Force efforts, the Nation's commercial nuclear reactors are now regulated by the Nuclear Regulatory Commission (NRC). Therefore, in considering scenarios that involved regulatory delay, the Department used the NRC regulatory process and structure as the basis for this consideration, and assumed that an NRC license would be obtained for construction and operation of the reactor technologies.

Since the NRC has the greatest amount of experience with regulation of light water reactors, the potential regulatory delays associated with the light water options, either the new ALWR designs or the existing commercial reactor options, were assumed to be the shortest among the reactor technologies. Potential regulatory delays associated with the MHTGR and the HWR would be greater than for the light water candidates because changes to the NRC's regulatory structure would be required to license these technologies. While there will be technical and potential regulatory reviews associated with the APT design, the safety issues associated with this technology are not nearly as complex as those associated with any of the reactor technologies. Therefore, the potential for regulatory delays was assessed to be minimal. The purchase of an existing or partially complete commercial reactor would also require the transfer of a license to the Department, which would require a change to the Atomic Energy Act and corresponding changes to the NRC regulations.

While issues related to the new facility technologies are primarily technical and regulatory, existing commercial reactors are subject to an additional set of institutional issues that must be resolved before this option could be implemented to meet long-term tritium requirements. These center around concerns about the use of civilian commercial reactors for purposes which support military requirements. Such issues have been raised in the past predominantly in conjunction with the use of civilian reactors to produce special nuclear materials (highly enriched uranium and plutonium) which would, in turn, be used to make nuclear weapons. Any concerns will have to be addressed and resolved over the course of the next several years if the commercial reactor alternative options are to be utilized as the primary long-term source of tritium.

The no action alternative would not be able to produce new tritium. Therefore, it could not meet the schedule requirements.

Of the action alternatives, the commercial reactor options have the highest probability of meeting the 2011 start date, if there are no technical or institutional delays. However, as noted above, there are institutional issues related to their implementation. If these issues cannot be resolved, the commercial reactor alternative would remain only as a contingency source of tritium in the event of an emergency.

Even when delays or major issues are taken into account, the ALWRs, among the new facility alternatives, have a high probability of meeting the required 2011 start date. The base case construction schedule of the small ALWR is one year shorter than that of the large ALWR. However, the small ALWR has a higher risk of technical delays due to the uncertainties surrounding its passive safety system and potential regulatory delays, due to the fact that it has not yet received NRC design certification. The APT has only a slightly smaller probability of meeting the 2011 date compared to the ALWRs, and it is expected to have very few technical or regulatory delay problems. The HWR and the MHTGR would have difficulty in meeting the 2011 date.

The sensitivity analysis on producing tritium as early as 2005 assumed that the base schedules could be compressed by 2 years, and that no technical or regulatory delays would occur. It showed that the commercial options have a high probability (0.80 to 0.99) of meeting the 2005 date. The APT and the small ALWR have a small (0.20) probability of producing tritium by 2005 if no delays are experienced. None of the other alternatives could produce tritium by 2005.

The assessment also showed that the schedule for completing all activities to develop a multipurpose reactor would be similar or identical to that of the MHTGR, ALWRs, and purchase of a commercial reactor options if they are used for tritium production alone, as long as the tritium mission is given priority over the plutonium burning and electricity production missions.

In summary, the no action alternative is not able to meet tritium schedule requirements. The HWR and MHTGR have the potential for major technical or institutional delays; thus, there is a low probability of their making tritium by the 2011 start date. The ALWRs and the APT have a very high probability of delivering tritium by 2011. The commercial options have the highest potential for delivering tritium by 2011, if the institutional issues associated with the defense use of such facilities can be resolved. Only the commercial options have a high probability of delivering tritium by 2005, if that becomes a requirement.

2. Ability to produce the required amounts of tritium. Production assurance refers to the ability of the tritium supply alternatives to meet the annual production requirements for maintaining the tritium inventory. The steady-state (3/16) and maximum (3/8) production rates were used in the production assurance analysis.

The second column of Table 1 summarizes the results of the production assurance analysis in terms of the probability that a tritium supply option can meet the maximum rate in any given year. Since the facility is designed to operate for 40 years, a technology that produced at more than the maximum rate in any given year would produce excess tritium. If such a year is followed by a year that the technology produced at less than the maximum rate, the combination of years would still produce roughly the desired overall quantity of tritium over the 40-year lifetime of the facility. Thus, a production rate with a 0.50 probability of a rate meeting or exceeding the maximum rate in any given year provides a reasonable degree of production assurance. A 0.75 probability of meeting or exceeding the maximum rate every year is a high degree of production assurance, since it means that roughly during 30 years of the 40 years of production the maximum rate will be exceeded.

For all tritium supply alternatives, with the exception of the direct cycle MHTGR, there is a high probability of producing the required amounts of tritium (0.77 or higher). The direct cycle