Technologies Underlying Weapons of Mass Destruction

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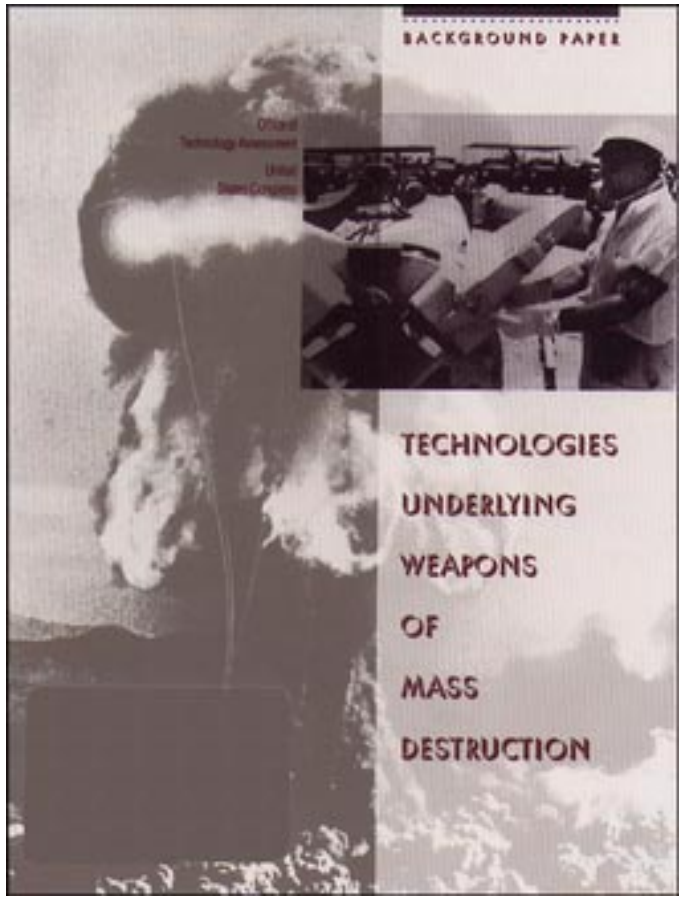

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Foreword

Controlling the spread of weapons of mass destruction depends on how hard it is to manufacture them and on how easy such weapon programs are to detect. This background paper, a companion volume to OTA's report *Proliferation of Weapons of Mass Destruction: Assessing the Risks,*[1] reviews the technical requirements for countries to develop and build nuclear, chemical, and biological weapons, along with the systems most capable of delivering these weapons to distant or defended targets: ballistic missiles, combat aircraft, and cruise missiles. It identities evidence that might indicate the production of weapons of mass destruction, and technical hurdles that might provide opportunities to control their spread.

Of the weapons considered here, nuclear weapons are the most difficult and expensive to develop-primarily due to the difficulty of producing the required nuclear materials. These materials, and the equipment needed to produce them, have quite limited civilian applications and are tightly controlled. States have produced nuclear weapon materials indigenously by evading international controls, but at great cost and with substantial opportunity for detection. For chemical and biological weapon materials, in contrast, most of the equipment needed also has civilian applications and has become widely available, making the capability to produce such weapons much more difficult to monitor and control.

The level of technology required to produce weapons of mass destruction is relatively modest: ballistic missiles and nuclear weapons date back to World War II, and basic chemical and biological weapons predate even that. Since export controls ultimately cannot block the spread of general technological capability, an effective nonproliferation regime must supplement them with other nonproliferation policy measures. Nevertheless, export controls can prevent states from pursuing the easiest or most direct routes to weapons of mass destruction, and they will remain an important component of nonproliferation policy.

[1] U.S. Congess, Office of Technology Assessment, *Proliferation of Weapons of Mass Destruction: Assessing the Risks*, OTA-ISC-559 (Washington DC: U.S. Government Printing Office, August 1993).

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