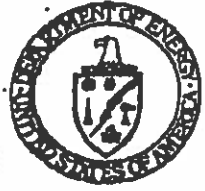


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Department of Energy
Washington, DC 20585

NOV 8 1991

Office of the Secretary of Defense
Chief, RDD, ESD, WHS
Date: 07 MAR 2016 Authority: EO 13526
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Reason: 3.3(w)(1)(4)(5) + 3.5(c) + 6.2(a)
MDR: 13-M-3408

MEMORANDUM FOR BG JOHN GORDON
NATIONAL SECURITY COUNCIL

SUBJECT: Nuclear Warhead Dismantlement/Destruction

Attached is the paper on Nuclear Warhead Dismantlement/Destruction, Issue 6, as requested in your October 4, 1991, Nuclear Initiatives Work Plan. An earlier draft of the paper was circulated for interagency comment and revisions, as discussed in the PCC Subcommittee on November 7, 1991, have been incorporated.

for Paul A. Bradshaw
Anthony F. Czajkowski
Acting Director
Office of Arms Control
Defense Programs

Attachment

cc: Douglas Graham, Office of Secretary of Defense
MG Roland LaJoie, Joint Chiefs of Staff
Robert Walpole, Department of State
Bradley Gordon, Arms Control and Disarmament Agency
[Redacted], Central Intelligence Agency
Richard Davis, National Security Council

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Department of Energy Document Review	
1 st Review Date: <u>11/1/13</u>	Determination: (Circle Number(s))
By: <u>B. Wilson</u> IIS-60 Reviewer	<input checked="" type="radio"/> 1. Classification Retained
Authority DC: <u>DD, X</u>	<input type="radio"/> 2. Upgraded/Downgraded To: _____
Derived From: _____	<input type="radio"/> 3. Contains No DOE Classified Info
Declassify On: _____	<input type="radio"/> 4. Coordinate With: _____
2 nd Review Date: <u>11/4/13</u>	<input type="radio"/> 5. Declassified
By: <u>B. Wilson</u> IIS-60 Reviewer	<input checked="" type="radio"/> 6. Classified Info Bracketed
Authority: DD	<input checked="" type="radio"/> 7. Other (Specify): <u>W/Alt. Eval.</u>

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NSC Nuclear Initiatives Work Plan Issue 6:
Nuclear Warhead Dismantlement/Destruction

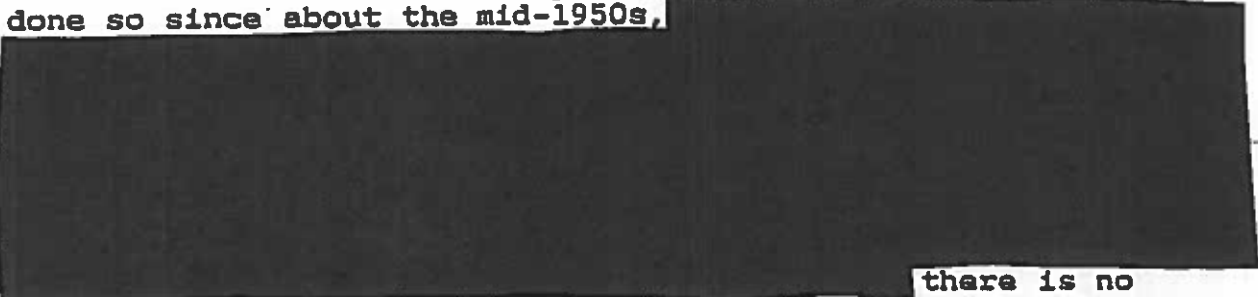
I. PURPOSE

On September 27, 1991, President Bush proposed beginning "discussions with the Soviet Union to explore cooperation" in three areas, one of which is that, "we should explore joint technical cooperation on the safe and environmentally responsible storage, transportation, dismantling and destruction of nuclear warheads." On October 5, 1991, in his response to the President's initiative, Gorbachev stated Soviet "readiness to enter into a detailed dialogue with the United States on the development of a secure and ecologically sound technology for the storing and transportation of nuclear warheads, the means of using nuclear weapons and the raising of nuclear security". While the specific topic of "warhead dismantlement and destruction" was not addressed by Gorbachev, Soviet response to President Bush's Initiatives included expressions of willingness to discuss all the issues proposed. Unofficial Soviet statements suggest that detailed dialogue in the area of warhead dismantlement could facilitate an otherwise difficult task which could only be carried out over a very long period of time. In response to NSC tasking, this paper outlines topics that might be included in the "warhead dismantlement and destruction" area and addresses how the U.S. should organize efforts to pursue bilateral discussions in this area. Because of extensive commonality between the topics and objectives of the two papers, this paper should be read and discussed in the context of the NSC tasked paper on Implementation of Initiative on Safety and Security (Issue # 5).

II. BACKGROUND

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While the U.S. routinely dismantles retired warheads, having done so since about the mid-1950s,


there is no procedure available for dismantlement. This was also the case for U.S. warheads prior to about 1954 when it was recognized as being necessary to disassemble retired warheads and recover the nuclear materials for recycling and reuse in new warheads. The U.S. now has well exercised, safe, secure, and environmentally

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responsible capabilities for nuclear warhead dismantlement including pre-disassembly staging and post-disassembly material and component recycling, storage, and waste disposition.

In the context of the Presidential Nuclear Initiatives discussions on warhead dismantlement and destruction, the U.S. should pursue as its overall objective the facilitation of Soviet warhead dismantlement and appropriate disposition of the disassembled parts or materials. It is very much in U.S. interests that Soviet warhead dismantlement activities be accomplished in a timely fashion and that they are consistent with responsible safety, security, and environmental standards. Exchanges of information about these activities, in some cases, may enable the Soviets to accomplish some dismantlement operations sooner than otherwise would have been possible. It is assumed in this joint technical cooperation that each side would accomplish its own dismantlement and destruction operations according to a schedule of its own choosing and without direct involvement of representatives of any other party. If one or more Republics should require that nuclear warheads be dismantled or destroyed at facilities other than those located in the Russian Republic, additional problems must be addressed.

An essential precondition for effective implementation of the initiative is that any discussions must not provide to the Soviets -- or through them, to any other state or subnational group -- information on, or access to, sensitive data, technologies, or procedures that could improve their military capabilities, readiness posture, or ability to compromise the reliable operation of U.S. nuclear weapons. Nuclear weapons and materials production processes are of special concern because of the associated nuclear proliferation risks. To ensure full protection of such data, technologies, and procedures, each topic selected for possible discussion with the Soviets must be unclassified or declassified and subjected to thorough "red teaming" before tabling with the Soviets.

III. TOPICS FOR DISCUSSION

During the initial technical discussions the following topics might be discussed with mutual benefit in understanding how the sides might facilitate their own planned stockpile reductions in terms of dismantlement of nuclear warheads.

- A. Nuclear Weapons Management. These general topics are suggested as initial information, important for understanding how the U.S. manages its nuclear dismantlement operations. This, along with comparable characterizations of Soviet procedures and decision making processes, would be shared as general information on each other's weapon dismantlement complex, facility and weapons safety processes, safety standards and criteria, security

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standards, modes of transportation, and safety analysis methodology.

- Roles and responsibilities of Department of Defense (DOD), Department of Energy (DOE), Nuclear Weapons Council (NWC)
- Key surety groups/committees (e.g. Nuclear Explosives Safety Study Group)
- Details on the Department of Energy Personnel Assurance Program (PAP) program for critical duty personnel

This area would be the same as that described for NSC Issue Paper Five on joint technical cooperation on nuclear safety, storage, security, and transportation. Unless there are different technical and policy experts involved, there would be no need to repeat this discussion.

B. Warhead Dismantlement or Destruction Operations. The term "dismantlement" as used here should only be construed as referring to those activities necessary to retire warheads so completely that they could not ordinarily be reassembled into detonable warheads without extensive refabrication of materials and components.

Warheads are disassembled and the subassemblies, components, base materials, or waste materials are disposed of in ways which meet approved safety, security, and environmental standards.

Any nuclear parts remaining from dismantlement of Center or Republic nuclear warheads not destroyed should be afforded especially strict safety and security protection to prevent diversion for unauthorized uses. Non-nuclear parts removed from Center or Republic dismantled nuclear warheads should be destroyed. Since dismantlement of large numbers of warheads is a process requiring years rather than weeks, emphasis on early, irreversible field demilitarization of tactical nuclear weapons held by the Center and the Republics may be a most important option. Demilitarization is discussed more fully in the November 7, 1991, Alessi memorandum on Strawman Measures for Soviet Tactical Nuclear Weapons.

The following areas may be important in discussions with appropriate technical experts from the Center and the Republics:

1. Technology and Processes:

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- General description of U.S. warhead disassembly and disposal
 - Safety specifications for component and subassembly containers
 - Specifications for gravel gerties (disassembly areas) at the DOE Pantex Plant
 - Dismantling operations involving high explosives
 - Disposition or long-term storage of waste high explosive, light metallic compounds, low level radioactive waste, heavy metals in slurry or solution, PCBs, asbestos, tritium, and mixed waste (radioactive plus other hazardous waste materials)
 - Disposition and storage of recovered special nuclear materials (plutonium and enriched uranium), including necessary environmental protection measures
2. Physical Security and Safety Arrangements:
- Safety Orders -- Safety standards and implementation
 - ~~Safety risk assessment methodology as used in U.S. nuclear weapon dismantling facilities~~
 - Radiation safety and standards
 - High explosive safety and standards
 - Environmental monitoring technology
 - Physical security standards and integration of security procedures
 - Security force training/certification requirements
 - Soviet observers at unclassified portions of Nuclear Explosive Safety Study Group studies of weapon disassembly operations and transportation; master studies would be most conducive to unclassified discussions since the issues are treated in a generic fashion
3. Nuclear Control Arrangements:
- Two person concept
 - Custodial responsibilities from retirement until completed disassembly

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4. U.S. National Environmental Protection Act (NEPA), Resource Conservation and Recovery Act (RCRA), and Clean Air Act Activities -- Environmental Impact Statement and Environmental Assessment procedures at U.S. nuclear weapon dismantling and material storage facilities.

C. Follow-on Steps. The following are potential steps which may be implemented if initial discussions are assessed as mutually beneficial and both sides agree that further cooperation would be useful. These discussion topics represent yet an increased level of detail and, in some cases involve more sensitive technologies, if sharing such information were judged to be necessary to accomplish the U.S. objective of timely, responsible and safe Soviet warhead dismantlement.

- Specific safety issues associated with weapon dismantlement including transportation to disassembly facility
- Emergency response capabilities for security, safety, and environmental incidents -- expand any information exchange and assistance provided during the Chernobyl episode, including use of the U.S. Atmospheric Release Advisory Capability (ARAC).
- Observation of emergency response exercises
- Joint exploration of plutonium dispersal contamination and exposure concerns and dispersal consequence mitigation concepts
- Joint Nuclear Explosive Safety Study Group (NESSG) safety studies
- Visits to restricted areas of warhead dismantlement facilities and material and component storage facilities
- Conceptual discussion of access control and delay system features for storage facilities, including ~~automated personal identification/validation~~ technology, contraband detection, and passive/active barrier combinations

IV. Organizing U.S. Efforts.

For the U.S., the management, technical, and operational expertise for warhead disassembly and subsequent reuse or disposition of components and materials, including long term storage, resides within DOE. However, because pre-disassembly

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storage and staging is a joint DOD and DOE effort and because of the close interaction between DOE and DOD on all matters pertaining to nuclear weapons, these two Departments would work together to: refine the list of issues for possible discussion; recommend their prioritization; develop draft presentations for the Soviets; and "red team" those presentations to ensure full protection of U.S. sensitive data, technologies, and procedures.

As a venue for such meetings, options include Washington, Geneva and Moscow. Geneva may have the disadvantage of its association with traditional arms control negotiations. While meetings in Moscow would be difficult from the point of view of administrative support for the U.S. side, there may be advantages in Soviet flexibility to engage in technical dialogue.

To preserve the exploratory, technical, and non-negotiating thrust of the President's initiatives, to avoid creating expectations of major breakthroughs or agreements, and to protect against any efforts to exploit these discussions to obtain sensitive information, the following approach should be adopted:

o at the next Bartholomew-Obukhov meeting, the U.S. would propose a small working group meeting on warhead dismantlement and destruction issues for about a week in early December, and suggest 1-2 "icebreaker" topics, e.g. general presentations on management of nuclear weapons dismantlement issues and an overall description of U.S. dismantlement operations;

o U.S. presentations and follow-on discussions would not go beyond those materials cleared in advance by DoD and DOE; Soviet requests for further information would simply be "taken" for consideration by the U.S. at a later date (i.e. a "backstopping" mechanism would not be appropriate or necessary while bilateral meetings are in progress because of the technical details involved and the necessity for thorough, time consuming security and technology transfer review of information to be exchanged); and

o based on each meeting, each side could propose further discussions on these or other topics through the Bartholomew-Obukhov channel.

As a rule, every effort should be made to: keep the size of the U.S. team small and largely technical in composition, bringing only those technical and policy experts necessary for discussion of the pre-agreed topic(s); limit the bilateral meetings to one or two weeks, spaced apart sufficiently to permit internal reviews of results and effective preparation for any follow on; and limit topics for discussion to one or two issues per meeting. If required and appropriate, the working group

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might be provided carefully controlled visits to certain areas of dismantlement facilities in the U.S. and USSR of relevance to its discussions.

V. Exchange of Information

It is assumed that the discussions of topics presented under the headings "Initial Explorations" and "Follow-on Steps" would be parts of mutual exchanges of information. This does not necessarily mean that the sides would be expected to match detail for detail information provided, however, in many of these technical areas, if the U.S. is to be able to assist the Soviet processes, frank discussions including relatively unconstrained dialogue, within the previously authorized bounds, will be necessary.

It would be a mistake to assume a priori that the Soviets have nothing of technical value for the U.S. In non-weapons science and technology, the Soviet approach has shown significant differences from that of the US. The Soviets in many cases show an excellent intuitive approach to provide guidance instead of over reliance on computer models and predictions. Because of the chronic shortages in their system, they also tend to make efficient and innovative use of materials and components. The Soviet system may be more austere, but their technical people can be quite innovative.

While we must carefully review all information which is to be discussed with the Center and the Republics, we should recognize that these are not normal times. In order to be effective, the U.S. response may need to consider a more expeditious method of processing and transferring safety, security, transportation, storage, and dismantlement information and technologies. In the case of Restricted Data and Sensitive Use Control Information, there is presently no intention to discuss topics requiring exchange of Restricted Data or Sensitive Use Control Information regarding U.S. nuclear weapons. Sensitive information which has been published in open literature without approval of U.S. government authorities would not be releasable in these discussions unless a specific decision to do so were made as a result of thorough review. However, discussion of weapon design information associated with Center and Republic nuclear weapons may be necessary and will require U.S. administrative or legislative action to permit U.S. representatives to discuss such information.

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Appendix

1. Program of Work for First Discussions

Week beginning:

12 November DOD-DOE meet to establish terms of reference and drafting responsibilities for U.S. presentation at mid-December U.S.-Soviet Experts Working Group (EWG) on Warhead Dismantlement and Destruction

-- Presentation (possibly along the lines of an overview of U.S. methodology regarding warhead dismantlement, including general discussions about demilitarization) would be designed as an "icebreaker."

-- Intention would be to elicit Soviet discussion of their approach and, if they are prepared to identify problem areas where they might be interested in possible U.S. technical assistance.

25 November DOD-DOE review/"red teaming" of draft presentation and list of questions to pose to Soviets on their practices.

late November At Bartholomew-Obukhov meeting, U.S. would:

-- Formally agree to establishment of EWG (if required).

-- Propose mid-December experts meeting (one week) in Washington.

-- Identify head of U.S. EWG¹ and provide general description of U.S. team (e.g. senior experts on warhead dismantlement and destruction).

¹U.S. will need to resolve this issue in the near future.

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-- Describe proposed agenda (see above), and urge Soviets to send appropriate experts.

-- Suggest Soviets give thought, in advance, to specific areas where they might be seeking U.S. technical assistance.

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early December U.S. experts preview presentation to Steering Group.

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Section 6.2 (a)

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mid December U.S.-Soviet EWG meeting takes place

DOE

2. Warhead Dismantlement and Destruction

SECTION 6.2(a)

In order to gain an appreciation for the dismantlement and destruction process, one must have an understanding of the components involved -- the nuclear warheads and the associated "packaging" (e.g. reentry bodies, firing sets, etc.). Most U.S. warheads consist of



contain radioactive materials and, thus, present considerable risk to the environment, safety and health of personnel involved in operations associated with these weapons.



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OSD 3.3(b)(1) + OSD
Section 6.2 (a)

[REDACTED]

Loss of any of these components to third world countries or to other subnationalist groups could have extremely adverse consequences.

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Conventional high explosives are used to initiate the nuclear chain reaction. Explosives surround the primary.

[REDACTED]

The need for extreme care and strict adherence to safety practices during the removal of the high explosives cannot be overstated.

[REDACTED]

Overall, a nuclear warhead, regardless of size, is a complex device containing many potentially lethal components. Its handling during assembly, subsequent storage and transportation must be accomplished by specially trained and experienced personnel and demands extreme safety and security measures. Mishandling invites the potential for the most severe and catastrophic consequences, thus the requirement for safety is of paramount importance.

3. [REDACTED]

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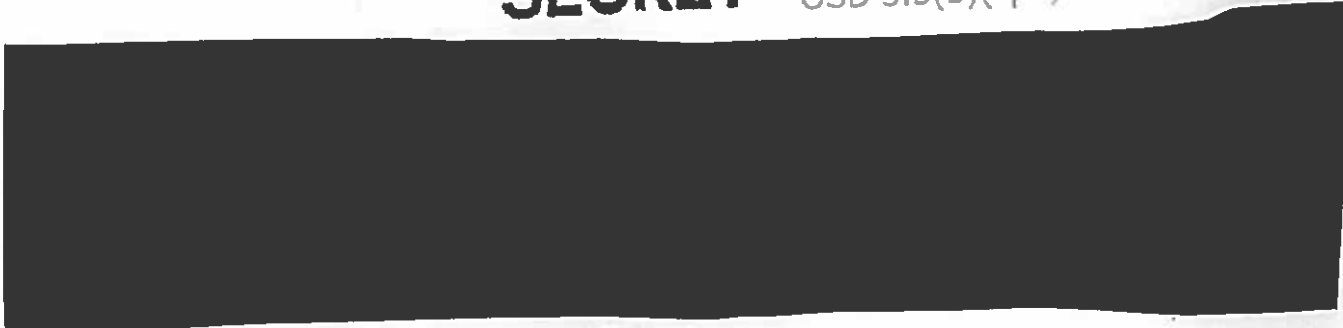
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4. Dismantlement and Destruction Process

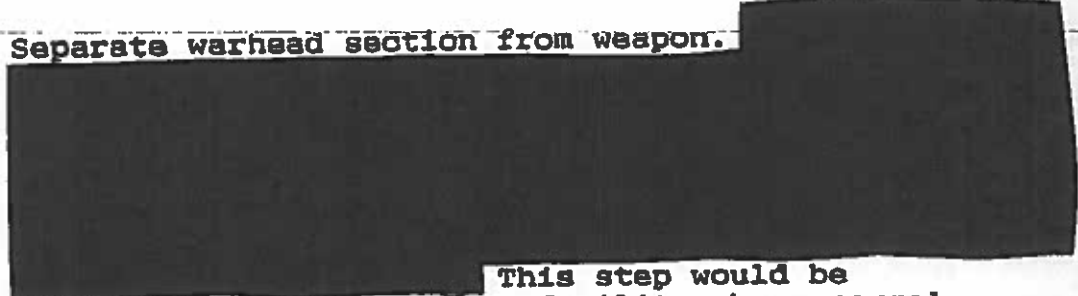
The dismantlement and destruction process can be thought of in terms of six steps, not including the transportation of weapons or warheads to interim storage facilities awaiting dismantlement:

- o Removal of RV or warhead compartment from delivery system. This would be the removal of reentry vehicles or the warhead compartments from missiles, or separation of the warhead from the gravity bomb or artillery shell. In some weapons, the warhead is an integral part of the weapon and dismantlement would not include this step. This step would normally be accomplished at a military facility whose normal mission is the maintenance of deployed weapons.

DOE
SECTION 6.2(a)

OSD
Section 6.2 (a)

- o Separate warhead section from weapon.



This step would be accomplished at a military facility whose normal mission is the maintenance of deployed weapons or at the DOE Pantex Plant, Amarillo, Texas.

- o Removal of nuclear explosive package from warhead section aeroshell. The remaining components of the Weapon Electrical System would be separated and any reusable components or materials would be recovered. This step and all following steps are performed in the U.S. at the DOE Pantex Plant, Amarillo, Texas, unless otherwise indicated.

- o Separate nuclear explosive



OSD 3.3(b)(4)

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DOE
11 SECTION 6.2(a)

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- o [REDACTED]
- o Remove high explosive from primary pit. Once the electronics are removed from the nuclear weapon, the high explosive must also be quickly removed (with a minimum of movement and transportation) to reduce the potential for an accident, because the detonators are still present.

o [REDACTED]

Nuclear warhead dismantlement and destruction, in this context, assumes that disassembly is accomplished in such a way that the components could not ordinarily be reassembled into a detonable warhead without extensive refabrication of materials and components.

[REDACTED] Presently, however, such reprocessing of plutonium cannot be accomplished in the U.S. and it is necessary to reuse fully fabricated plutonium components recovered from disassembled warheads. Certain other high value, nonnuclear materials are recovered and reused, while those materials of relatively low value, considering the recovery costs, are disposed of in waste streams. These waste streams are carefully managed to ensure that maximum protection is afforded the environment as well as protection of the health and safety of personnel. Because the future supply of plutonium and HEU is expected to exceed warhead production requirements, arrangements for the safe and secure long term storage of these materials are being made.

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