February 14, 1978

SECY-78-93

~~CONFIDENTIAL~~

COMMISSIONER ACTION

For: The Commissioners

From: James R. Shea, Director
Office of International Programs

Clifford V. Smith, Jr., Director
Office of Nuclear Material Safety and Safeguards

Thru: Executive Director for Operations (OD)

Subject: US POSITION ON IAEA SAFEGUARDS EFFECTIVENESS PRINCIPLES AS DETAILED IN STATE CABLE 254712 OF OCTOBER 23, 1977

Purpose: To inform the Commission on the background of the above cable, which was issued without NRC clearance, and to request any Commission input to the NRC staff's approach to the Executive Branch on this matter.

Discussion: The subjects of IAEA safeguards effectiveness principles and the formulation of explicitly quantifiable safeguards criteria to serve as goals in the assessment of IAEA safeguards performance were discussed periodically last year by members of an informal interagency group convened by DOE. These principles and criteria were developed for the purpose of providing advice to Dr. Carl Bennett, the US representative to SAGSI.* The group includes representatives from ACDA, State, DOE, and NRC (NMSS and IP).

Executive Branch personnel wanted to issue a cable which reflected prevailing US Government views on IAEA safeguards, particularly as they related to safeguards effectiveness criteria, in time for the September 28 SAGSI meeting. For a variety of reasons ACDA did not get this cable out in time, thereby missing the SAGSI meeting deadline.

*One of the main functions of SAGSI (Standing Advisory Group on Safeguards Implementation) is to advise the IAEA Inspector General on selected substantive and technical issues related to the development of IAEA's Technical Safeguards Manual.

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U.S. NRC Declassification Review

1ST REVIEW – DATE: 20250609 REVIEWER 3591 AUTHORITY: ☐ DC ☑ DD 2ND REVIEW – DATE: 20250609 REVIEWER 3470 AUTHORITY: DD	DETERMINATION [CIRCLE NUMBER(S)] 1. CLASSIFICATION RETAINED 2. CLASSIFICATION CHANGED TO: ____ 3. CONTAINS NO NRC CLASSIFIED INFO 4. COORDINATE WITH: ____ 5. DECLASSIFIED 6. CLASSIFIED INFO BRACKETED 7. OTHER (SPECIFY):

Discussion: (Continued)

Around September 29 ACDA drafted a revised cable and distributed it for interagency comment. NRC's comments, most of which reflected NMSS views, were received by ACDA around October 4. While some of NRC's suggestions were accepted and incorporated into a later version of the draft, a number of NRC's major comments were not accepted.

The Interagency Steering Group on International Safeguards met on October 7 for one of its periodic discussions. At that meeting NMSS suggested that the Executive Branch prepare a report to support the safeguards criteria contained in the subject cable. Apparently, this was not considered by the other participants to be compatible with the limited response time available and the Executive Branch's perceived need to go on record at that time with a US Government position paper on IAEA safeguards, particularly in hopes of exerting a positive influence on the impending US-EURATOM and US-IAEA discussions on EURATOM/IAEA safeguards.

The draft cable underwent a number of additional revisions during the succeeding three weeks, without NRC participation. The cable (Enclosure 1) was eventually sent by State without NRC clearance on October 23, two days before the start of discussions in Europe. The cable proposed several quantitative effectiveness criteria for international safeguards of plutonium, high and low fissile content uranium, and thorium. This includes quantities of nuclear material that must be detected through IAEA safeguards in various kinds of facilities, and ranges for detection probabilities and for false alarm rates.

The safeguards criteria proposed in the cable were based primarily on inputs from ACDA. No formal study or analyses had been conducted, however, to arrive at the technical criteria nor were any rigorous attempts made to check the criteria for internal consistency. The Executive Branch considers the criteria proposed in the cable only as desirable goals for the international safeguards community, not as currently attainable objectives, and it intends to keep the criteria under continuing review in the future.

In light of the foregoing, the NRC staff proposes to send to Frank Houck of ACDA, the Chairman of a newly-established interagency subgroup on upgrading of IAEA safeguards, by

Discussion: (Continued)

February 27 a letter which transmits the staff's comments on the subject cable (Enclosure 2) and calls for early discussion of these comments by the working group. These comments cover both the conceptual basis of the technical criteria as well as their practicality.

We anticipate that this matter will be discussed at the next meeting of the working group (probably in early March), which was set up to tackle selected aspects of the US Government Action Plan for safeguards support to the IAEA. We will explore with the Group what further efforts might be needed to resolve the issues raised by NRC.

Recommendation: It is requested that the Commission review the attached material and, if desired, provide us with any further guidance or suggestions not later than COB February 23, 1978.

James R. Shea

James R. Shea, Director
Office of International Programs

Clifford K. Smith

Clifford K. Smith, Jr., Director
Office of Nuclear Material Safety
and Safeguards

Enclosures:
1. State Cable 254712
2. NRC Staff Comments

DISTRIBUTION
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sioners' comments should be provided directly to the Office of the Secretary by
of business Thursday, February 23, 1978.

sion staff office comments, if any, should be submitted to the Commissioners NLT
ry 21, 1978, with an information copy to the Office of the Secretary. If the
is of such a nature that it requires additional time for analytical review and
t, the Commissioners and the Secretariat should be apprised of when comments
expected.

01 OF 02 STATE 254712 **CONFIDENTIAL** 7913
N ACDA-12

OCT-01 EUR-12 EA-10 ISO-00 OES-07 SS-15 PM-05
IO-13 NSC-05 ERDA-05 SIG-01 FEA-01 CIAE-00 INR-07
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D OFFICIAL USE STATE 254712

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11652:N/A

PARM, TECH, EEC, IAEA
T: IAEA SAFEGUARDS EFFECTIVENESS PRINCIPLES: US
ON

(A) STATE 16748 (1976)
ITC 128803 (1976)

ING THE PAST TWO YEARS THE U.S. MISSION TO THE IAEA
N PROVIDED WITH GUIDANCE, REFTELS (A) AND (B), ON
ITION OF THE USG ON VARIOUS MATTERS WHICH AFFECT
NE THE TECHNICAL EFFECTIVENESS OF THE IAEA SAFE-
SYSTEM. THE MATERIAL IN THIS TELEGRAM BUILDS UPON
RLIER GUIDANCE AND INCLUDES QUANTITATIVE CRITERIA
CTIVES WHICH WE BELIEVE ~~SHOULD BE THE GOAL FOR THE~~
SYSTEM. WE EXPECT TO KEEP THESE MATTERS UNDER
ING REVIEW. THE STATEMENT CONTAINED IN PARAGRAPHS
GH 11 TOGETHER WITH THE REFTELS, ARE OUR CURRENT
ND ARE TO SERVE AS GUIDANCE FOR USG PERSONNEL IN
IONS ON TECHNICAL MATTERS CONCERNING IAEA SAFE-

FYI THIS GUIDANCE DOES NOT ADDRESS THE QUESTION
TYPES OF NUCLEAR MATERIALS OR FACILITIES A STATE
HAVE. WE ARE ADDRESSING ONLY THE MATTER OF, GIVEN
FEGUARDS ON PARTICULAR MATERIAL OR IN PARTICULAR
Y TYPES, HOW EFFECTIVE SHOULD WE WEEK TO MAKE
RDS. END FYI.

TECHNICAL OBJECTIVES OR GOALS OF THE IAEA
RDS SYSTEM SHOULD BE DERIVED FROM CONSIDERATION OF
CS OF PROLIFERATION DUE TO THE DIVERSION OF
IT TYPES, FORMS, AND QUANTITIES OF NUCLEAR
THE RISKS BEING ASSESSED IN TERMS OF THE
ES OF NUCLEAR MATERIAL WHICH COULD BE USED
, OR AFTER FURTHER PROCESSING, FOR PROSCRIBED
OR WHICH MIGHT INDICATE PREPARATION FOR

PROSCRIBED USES, AND IN TERMS OF THE TIMES REQUIRED TO USE MATERIALS FOR PROSCRIBED PURPOSES. THE DEGREE TO WHICH THESE OBJECTIVES OR GOALS CAN BE ATTAINED AT ANY TIME WILL BE A FUNCTION OF SUCH FACTORS AS THE RESOURCES AVAILABLE TO THE IAEA SAFEGUARDS SYSTEM AND THE STATE OF DEVELOPMENT OF SAFEGUARDS TECHNOLOGY. WHILE THE PLANNING OF ANY PARTICULAR SAFEGUARDS OPERATION WILL PERFORCE TAKE INTO ACCOUNT THESE FACTORS, THE GOALS OF THE IAEA SAFEGUARDS SYSTEM SHOULD NOT BE REDEFINED MERELY TO REFLECT CURRENT CAPABILITY LIMITATIONS. RATHER, THE DEGREE TO WHICH GOALS ARE NOT ACHIEVED WITH CURRENT CAPABILITIES PROVIDES THE BASIS FOR DEFINING INCREASED RESOURCE REQUIREMENTS AND RESEARCH AND DEVELOPMENT NEEDS.

3. ALTHOUGH ATTAINMENT OF SOME OF THE GOALS IN THE FOLLOWING PARAGRAPHS WILL REQUIRE ADDITIONAL SAFEGUARDS RESOURCES AND FURTHER ADVANCEMENTS IN SAFEGUARDS TECHNOLOGY, WE BELIEVE THAT SIGNIFICANT PROGRESS IS POSSIBLE NOW TOWARD ATTAINMENT OF ALL OF THE GOALS. IMPEDIMENTS TO THE ACHIEVEMENT OF THESE GOALS SHOULD BE AVOIDED. SUBSIDIARY ARRANGEMENTS, THEREFORE, SHOULD NOT CONTAIN PROVISIONS WHICH WOULD PREVENT ATTAINMENT OF THE GOALS BUT RATHER SHOULD PROVIDE SUFFICIENT FLEXIBILITY FOR THE IAEA TO CONTINUE PROGRESSING TOWARD ATTAINMENT OF THESE GOALS AS INCREASED RESOURCES AND IMPROVEMENTS IN TECHNOLOGY ALLOW. WE BELIEVE THESE GOALS AND THEIR ATTAINMENT ARE FULLY CONSISTENT WITH SAFEGUARDS AGREEMENTS CONCLUDED PURSUANT TO ARTICLE III.4 OF THE TREATY ON THE NONPROLIFERATION OF NUCLEAR WEAPONS.

4. THE SPECIFICATION OF TECHNICAL OBJECTIVES AND PERFORMANCE CRITERIA FOR IAEA SAFEGUARDS SHOULD BE IN TERMS OF THE FOLLOWING MATERIAL CATEGORIES:

A. PLUTONIUM, REGARDLESS OF ISOTOPIC COMPOSITION, THE ONLY EXCEPTION BEING PLUTONIUM WITH AN ISOTOPIC CONCENTRATION OF PLUTONIUM-238 EXCEEDING 80 PERCENT, WHICH CAN BE EXEMPTED FROM SAFEGUARDS.

B. URANIUM, THE FISSILE CONTENT (SUM OF THE ISOTOPIC CONCENTRATIONS OF URANIUM 233 AND 235) OF WHICH EQUALS OR EXCEEDS 10 PERCENT, REFERRED TO HEREIN AS HIGH FISSILE CONTENT URANIUM (HFCU). WE WOULD BE PREPARED TO ACCEPT CATEGORIZATION BASED ON 20 PERCENT URANIUM-235 BUT UNDERSTAND THAT THE IAEA HAS PRACTICAL PROBLEMS WITH MAKING DISTINCTIONS AT THE 20 PERCENT VALUE. WE DO NOT SUPPORT AN INTERMEDIATE CATEGORY FOR 10 TO 25 PERCENT URANIUM 235.

C. URANIUM, THE FISSILE CONTENT OF WHICH IS LESS THAN 10 PERCENT, (OR 20 PERCENT), I.E., LOW FISSILE CONTENT URANIUM (LFCU). THIS INCLUDES NATURAL AND DEPLETED URANIUM.

D. THORIUM (TH).

5. THE AMOUNT OF NUCLEAR MATERIAL WHICH, IF MISSING WITHIN A STATE DURING A ONE-YEAR PERIOD, IS TO BE DETECTED BY THE IAEA SAFEGUARDS SYSTEM SHOULD NOT EXCEED:

A. EIGHT (8) KG OF PLUTONIUM (PU).

B. AN AMOUNT OF HIGH FISSILE CONTENT URANIUM (HFCU) CONTAINING EIGHT (8) KG OF URANIUM 233, TWENTY-FIVE (25) KG OF URANIUM 235, OR IN THE CASE OF MIXTURES, AN AMOUNT FOR WHICH THE SUM OF THE WEIGHT OF URANIUM 233 PLUS 8/25 TIMES THE WEIGHT OF URANIUM 235 IS EIGHT (8) KG.

AN AMOUNT OF LOW FISSILE CONTENT URANIUM (LFCU) FOR
CH THE SUM OF THE WEIGHT OF URANIUM 235 PLUS 3 TIMES
WEIGHT OF URANIUM 233 IS 75 KG. (A VALUE OF 100 KG,
EAD OF 75, WOULD ALSO BE ACCEPTABLE.) IN EITHER
THE TOTAL WEIGHT OF THE URANIUM SHOULD NOT EXCEED 20
IC TONS, WHICH IS THE AMOUNT OF DEPLETED URANIUM THAT
BE EXEMPTED FROM SAFEGUARDS.

TWENTY (20) METRIC TONS OF THORIUM.

ANY COMBINATION OF THE ABOVE.

A AND B INCLUDE QUANTITIES OF DIRECT UTILITY IN AN
OSIVE DEVICE; C AND D ARE OF INDIRECT UTILITY, I.E.,
D REQUIRE FURTHER PROCESSING. END FYI.

THE AMOUNT OF NUCLEAR MATERIAL WHICH, IF MISSING
A SINGLE FACILITY OF ANY TYPE DURING A ONE-YEAR
OD, IS TO BE DETECTED BY THE IAEA SAFEGUARDS SYSTEM
D EXCEED NEITHER THE AMOUNT SPECIFIED IN PARAGRAPH
10 PERCENT OF THE MATERIAL PRESENT IN OR PROCESSED
IGH (WHICHEVER IS GREATER) THE FACILITY DURING THE
THE LESSER OF THESE AMOUNTS (THAT IN PARA 5 OR 10
NT) REPRESENTS THE UPPER LIMIT FOR THE DETECTION GOAL
E IAEA AT ANY FACILITY. FYI: SOME TYPE OF FORMULA-
COMBINING THESE TWO LIMITS WOULD BE USEFUL AND ONE
POSSIBILITY IS THE RECIPROCAL OF THE SUM OF THE
ROCALS OF THE TWO QUANTITIES. IN ADDITION A LOWER
ON THE DETECTION GOAL SEEMS APPROPRIATE AS A MEANS
OIDING UNDUE SAFEGUARDS EFFORT IN FACILITIES HAVING
SMALL AMOUNTS OF NUCLEAR MATERIAL. END FYI.

HE PROBABILITY SHOULD BE VERY HIGH (95 TO 99 PERCENT)
DIVERSIONS DURING ANY ONE-YEAR PERIOD OF PU AND HFCU
E AMOUNTS GIVEN IN PARAGRAPH 6 WOULD BE DETECTED,
SOMEWHAT LOWER PROBABILITY (90 PERCENT) FOR LFCU AND
UM. THE PROBABILITY (WHERE THIS TYPE OF PROBABILITY
EVANT) SHOULD BE VERY LOW (1 TO 5 PERCENT) THAT A
CONCLUSION IS REACHED THAT DIVERSION HAS OCCURRED
N FACT IT HAS NOT, I.E., A FALSE ALARM.

E TIMELINESS WITH WHICH DIVERSION OF A SPECIFIED
OF NUCLEAR MATERIAL SHOULD BE DETECTED IS DIRECTLY
D TO THE TIME REQUIRED TO USE THE MATERIALS FOR
IBED PURPOSES. TWO MEASURES ARE USED FOR DETECTING
ION, MATERIAL ACCOUNTANCY AND SURVEILLANCE. THE
, THROUGH COMPLETELY VERIFIED PHYSICAL INVENTORIES,
INES WHETHER THE AMOUNTS OF MATERIAL WHICH ARE
ED TO BE PRESENT WITHIN A FACILITY ARE IN FACT
T. THE LATTER PROVIDES A MEANS OF DETECTING THE
REMOVAL OF MATERIALS DURING PERIODS BETWEEN
L INVENTORIES.

IELINESS REQUIRED FOR DETECTING DIVERSIONS OF LFCU
IRIUM CAN BE ACHIEVED THROUGH IAEA VERIFICATION OF
L ACCOUNTANCY WITH PHYSICAL INVENTORIES
D BY THE IAEA AT INTERVALS NOT TO EXCEED ONE YEAR.
S WHERE VERIFIED MATERIAL ACCOUNTANCY CANNOT
THE DETECTION GOALS GIVEN IN PARAGRAPH 6 FOR LFCU
RIUM BECAUSE OF LARGE MEASUREMENT ERRORS THE
L BETWEEN IAEA VERIFIED PHYSICAL INVENTORIES SHOULD
EED SIX (6) MONTHS.

R PLUTONIUM AND HFCU TIMELY DETECTION OF DIVERSION
EVED THROUGH A COMBINATION OF VERIFIED PHYSICAL
RIES AND SURVEILLANCE.

INTERVAL BETWEEN IAEA VERIFIED PHYSICAL INVEN-
SHOULD NOT EXCEED SIX (6) MONTHS, EXCEPT IN THE
CASE OF FACILITIES FOR WHICH THE INVENTORY OR ANNUAL THROUGHPUT, WHICHEVER IS GREATER, IS LESS THAN THE AMOUNT GIVEN IN PARAGRAPH 5, E.G., 8 KG OF PLUTONIUM. IN THIS CASE THE INTERVAL BETWEEN IAEA VERIFIED PHYSICAL INVENTORIES SHOULD NOT EXCEED ONE (1) YEAR. IN CASES WHERE VERIFIED MATERIAL ACCOUNTANCY CANNOT ACHIEVE THE DETECTION GOALS GIVEN IN PARAGRAPH 6 FOR PLUTONIUM AND HFCU THE INTERVAL BETWEEN IAEA VERIFIED PHYSICAL INVENTORIES SHOULD NOT EXCEED THREE (3) MONTHS.

B. FOR FACILITIES WHOSE INVENTORY OR ANNUAL THROUGHPUT (WHICHEVER IS GREATER) OF PLUTONIUM OR HFCU EQUALS OR EXCEEDS THE AMOUNTS GIVEN IN PARAGRAPH 5 SURVEILLANCE SHOULD BE EMPLOYED CAPABLE OF DETECTING REMOVAL OF MATERIAL OR OTHER ACTIVITIES WHICH MAY INDICATE DIVERSION OF SUCH AN AMOUNT WITHIN ONE (1) WEEK OF THE DIVERSION FOR MATERIAL IN ALL FORMS OTHER THAN IRRADIATED FUEL AND WITHIN TWO (2) TO THREE (3) MONTHS, BUT PREFERABLY TWO MONTHS, FOR IRRADIATED FUEL. THE INTERVAL BETWEEN SUCH DETECTION AND A REPORT TO THE BOARD OF GOVERNORS SHOULD BE SHORTER THAN THE DETECTION TIMES. THE DETECTION PROBABILITY TO BE ACHIEVED BY THESE SURVEILLANCE MEASURES WITHIN THESE TIME LIMITS CAN BE LESS THAN THAT GIVEN IN PARAGRAPH 7 AS LONG AS THE CUMULATIVE PROBABILITY OVER THE INTERVAL BETWEEN IAEA VERIFIED PHYSICAL INVENTORIES EQUALS THAT IN PARAGRAPH 7.

11. IN ADDITION TO THE ABOVE REQUIREMENT FOR SURVEILLANCE THERE ARE TWO OTHER TYPES OF CIRCUMSTANCES IN WHICH A COMPREHENSIVE SYSTEM OF SURVEILLANCE, BOTH HUMAN AND INSTRUMENTAL, TO COMPLEMENT FACILITY CONTAINMENT FEATURES AND IAEA VERIFIED MATERIAL ACCOUNTANCY IS REQUIRED.

A. SUCH A SYSTEM IS NEEDED AT POWER REACTORS, ENRICHMENT PLANTS AND REPROCESSING PLANTS TO ENSURE THAT UNREPORTED NUCLEAR MATERIAL IS NEITHER INTRODUCED INTO NOR REMOVED FROM ANY SUCH FACILITY WITHOUT THE KNOWLEDGE OF IAEA INSPECTORS. FYI: THIS IS TO PROTECT AGAINST CLANDESTINE USE OF A SAFEGUARDED FACILITY TO PRODUCE OR PROCESS UNREPORTED NUCLEAR MATERIAL. END FYI. IN OPERATIONAL TERMS THIS SYSTEM MUST PROVIDE ASSURANCE TO THE IAEA THAT (A) ALL FLOWS OF NUCLEAR MATERIAL PASS THROUGH AGREED ("KEY") MEASUREMENT POINTS AND (B) THE IAEA INSPECTORS ARE COGNIZANT OF ALL MATERIALS PASSING THROUGH THOSE POINTS IN SUFFICIENT TIME FOR THE IAEA TO BE ABLE TO IDENTIFY AND AT THE APPROPRIATE TIME TO MEASURE ACCURATELY SUCH MATERIALS. THIS REQUIREMENT ALSO APPLIES TO RESEARCH REACTORS FOR WHICH THE ANNUAL PLUTONIUM PRODUCTION CAPACITY EQUALS OR EXCEEDS ONE (1) KG.

B. SUCH A SYSTEM IS ALSO NEEDED IN CASES WHERE VERIFIED MATERIAL ACCOUNTANCY ALONE IS INADEQUATE TO ACHIEVE THE DETECTION GOALS SPECIFIED IN PARAGRAPH 6 BECAUSE OF THE MEASUREMENT ERRORS ASSOCIATED WITH LARGE QUANTITIES OF MATERIAL. THIS REQUIREMENT APPLIES TO FACILITIES OF ALL TYPES. THE USE OF SURVEILLANCE FOR ANY REASON DOES NOT REMOVE THE REQUIREMENT FOR VERIFICATION OF MATERIAL ACCOUNTANCY INVOLVING MEASUREMENTS WHICH CONFORM TO THE LATEST INTERNATIONAL STANDARDS. VANCE

NRC COMMENTS ON STATE DEPARTMENT CABLE CONCERNING

TECHNICAL OBJECTIVES AND GOALS FOR IAEA SAFEGUARDS

NRC comments and questions concerning the technical objectives and goals contained in Department of State cable #254712 are listed below.

1. Advantages and Disadvantages of Goal Quantities

The advantages of establishing goal quantities of "missing" nuclear materials which the IAEA safeguards system is designed to detect may not outweigh the disadvantages. Goal quantities are useful to establish the frequency of IAEA inspections and in particular to identify when continuous inspection should be performed. Goal quantities are also of value to assist the IAEA in identifying countries and facilities which need to be specially reported to the Board of Governors in cases of questionable safeguards performance. Goal quantities do not appear needed, however, to establish inspection methods for verifying flows of nuclear material and inventory differences (MUFs).

The disadvantages of establishing goal quantities at this time are (1) if the goals prove to be impractical and not thought out, this could create a bias against establishing such goals in the future; and (2) the goals may be interpreted to suggest that thefts of smaller quantities may be diverted without any safeguards concern. With regard to the second disadvantage, diversion of such quantities on a continuing basis is believed to be of safeguards concern and such diversion should not be determined to be acceptable. With regard to the first disadvantage, paragraph two states that "the goals should not be redefined to reflect current capability limitations." While we agree that goals should serve as a target, we believe that any specified goals should be achievable by some perceived means in some reasonable time frame. It is not evident that the goals expressed in the cable would satisfy these criteria. In this regard, paragraph three states that "we believe that significant progress is possible now toward attainment of all the goals." However, there is no discussion of the degree to which they can be attained nor of the means of attainment.

2. Definition of "High Fissile Content of Uranium (HFCU)"

In paragraph four, section B, HFCU is defined as uranium with fissile isotopic content equal to or exceeding 10%. Although some "practical problems" are alluded to, no rationale is given

SUBJECT TO GENERAL DECLASSIFICATION SCHEDULE OF EXECUTIVE ORDER 11652 AUTOMATICALLY DOWNGRADED AT TWO YEAR INTERVALS AND DECLASSIFIED ON DEC. 31 1983 (insert year)

Classified by R G Page (name)

Deputy Director Division of [illegible] (title)

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for not pursuing a definition consistent with that used for U.S. domestic safeguards, i.e., 20% fissile isotopic content. In the absence of any additional information, we believe that the value of 20% should be advocated by the U.S.

3. Goal Quantities for State and Facilities

Paragraph five specifies goal quantities of nuclear material to be detected by the IAEA safeguards system if missing within a state during a one-year period. In paragraph six the goal quantities are specified as applying to each facility within a state. The limitation in paragraph five is more restrictive than paragraph six, and therefore, the need for paragraph six is not evident.

4. Detection Probabilities

Paragraphs five and six, together with paragraph seven attempt to define the detection probabilities. For Pu and HFCU the probabilities of detection are indicated as .95 to .99 with a false alarm rate of .01 to .05. These ranges of probabilities represent a broad spectrum of power curves, and some combinations may be virtually impossible whereas other combinations may be practical. An analysis is needed which identifies the types of measurement capabilities that would be required to satisfy various combinations of detection probabilities and false alarm rates to assure practicality of the combination selected. In addition, paragraph seven identifies a different probability of detection for LFCU and Thorium (.90) than the probability for Pu and HFCU (.95 to .99). The rationale for this difference is not evident considering that the intent of paragraphs five and six was to establish the significant quantities to be detected.

5. Goal Quantities Should not be Considered as Tolerable Diversion Quantities

Paragraph six of the cable is not clear and may suggest that the IAEA safeguards system need not be applied at any facility which possesses less than a goal quantity specified in paragraph five.

6. Goal Quantities not Achievable if Applied to all Nuclear Facilities Within a State

The goal quantities specified in paragraph five would be difficult to achieve for an entire country with a large nuclear industry such as the U.S. Further, the threshold quantity for plutonium may not be achievable in any country with a reprocessing plant

having a capacity of 100 or more metric tons per year. For the reasons indicated in comment (1) above, the achievability of the goals needs to be demonstrated.

7. Validity of Goal Quantities Specified

The goal quantities for low fissile content uranium (LFCU) seem to be disproportionately small in comparison with the goal quantities for high fissile content uranium (HFCU). Whereas eight kilograms of plutonium or uranium-233 and 25 kilograms of high enriched uranium-235 can be used directly to construct a nuclear explosive device, low fissile content uranium in any quantity (the goal quantity is 75-100 kilograms) cannot be used directly for this purpose. It appears that either the threshold quantities for high fissile content uranium are high or those for low fissile content uranium are low.

8. Integration of Material Accounting and Surveillance

Paragraphs five, six, and seven attempt to set out the detection goals for the IAEA system without regard to the means utilized for achieving the goals. Paragraphs nine and ten attempt to further define the detection goals through specification of timeliness, but in doing so, also identify system requirements for material accounting and surveillance. These system requirements do not reflect an integrated system that will satisfy the goals established. Paragraph nine suggests that these goals should be satisfied by material accounting alone for LFCU and Thorium, whereas paragraph ten suggests the goals for Pu and HFCU require a combination of material accounting and surveillance. The rationale for not allowing latitude with regard to surveillance for LFCU and Thorium is not evident. In addition, it is not clear why the specific material accounting requirements of paragraph ten, section A would be needed to satisfy the goals identified in paragraphs five, six, and seven. The specific surveillance requirements of paragraph ten, section B, appear to satisfy the goals, and accordingly, assuming that these surveillance provisions are considered practical, the requirements suggested in the criteria for material accounting would be unnecessary.

9. Material Accounting and Surveillance Requirements for the State

The discussion of material accounting and surveillance requirements in paragraphs nine and ten relate only to the goal quantities of paragraph six; i.e., those pertaining to each facility. There is no similar discussion as related to the goal quantities for the State, i.e., the requirements of paragraph five.

10. Timeliness of Detecting a Diversion

Paragraph ten states that surveillance methods shall be employed to assure detection within one week of a diversion of goal quantities of plutonium or HFCU. We question whether an effective surveillance system can be established by the IAEA under the provisions of INFCIRC/153 and existing safeguards agreements to achieve this objective.

11. Surveillance Requirement

Paragraph 11 states that an IAEA surveillance system is needed at certain facilities "to ensure that unreported nuclear material is neither introduced into nor removed from any such facility without the knowledge of IAEA inspectors." We do not believe that such a requirement can be effectively implemented by the IAEA under present provisions of INFCIRC/153 and safeguards agreements as stated above. Effective inspection would require IAEA inspectors to maintain continuous surveillance of all buildings in which nuclear materials are used and stored to detect unauthorized entry or removal of nuclear materials. We question whether this can be practically attained without establishing protected areas around nuclear operations, employing IAEA inspectors to maintain continuous surveillance of all such areas, and authorizing IAEA inspectors to search all individuals and packages entering or leaving these areas. While we support this objective, we question its inclusion in the cable on the grounds that it cannot be practically achieved at the present time.