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**APPENDIX F**

**COST ANALYSIS**

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## COST ANALYSIS

### INTRODUCTION

Cost estimates for a complex activity still in the scoping and conceptual planning stage, such as monitoring of warhead dismantlement under an international arms control treaty which has yet to be negotiated, are by necessity approximate. All costs reflected in this analysis are projections of costs associated with warhead dismantlement monitoring options that have been generally defined. The cost estimates given in this Appendix are therefore not budget-quality numbers. However, the study group found them useful in discussing the financial impact of the four warhead dismantlement monitoring options discussed in the study report. As a warhead dismantlement monitoring regime becomes better defined and specific procedures are developed, the cost estimates will become more definitive.

For monitoring of warhead dismantlement in the United States, most of the dismantlement monitoring activities would occur at the Pantex and Y-12 plants, with a significant majority of the activities, and costs, occurring at Pantex. For the purposes of this study, therefore, only the costs estimated to be incurred at Pantex have been studied in detail. Facilities represented in the graphics in this report are included for cost estimating only. The actual magazines, bays, cells, etc. used in a warhead dismantlement monitoring regime may differ from these illustrated.

### COST BREAKDOWN

- The cost estimates for each option reflect a projection of all costs associated with:
  - preparing for and hosting a first-time inspection, including the cost of site and procedure modifications (including construction costs).
  - preparing for and hosting each of the routine inspections which follow the first-time inspection.
  - the annual cost of routine inspections, which will be the cost per routine inspection times the number of routine inspections per year, plus miscellaneous costs not attributable to individual inspections.

An additional cost factor, the cost of lost productivity due to monitoring activities, was considered by the study group, but it was decided to include lost productivity in evaluating the "Impact on Operations" of the four monitoring options, rather than including it as a dollar cost.

#### Initial Inspection Cost

The first inspection under a given warhead dismantlement monitoring option would be more costly than the routine regularly recurring inspections which follow, due to one-time site and facility modification costs and preparation costs. Preparation activities include all tasks the facility must complete prior to the arrival of inspectors at the site.

#### Cost of Each Routine Inspection

The routine inspections which follow the initial inspection will also involve preparation costs, but these in general will not involve construction costs, major facility modification costs, etc. This cost category represents the routine cost of preparing for and hosting each individual inspection after the initial modifications have been completed.

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## Annual Cost

Annual inspection costs for the routine regularly recurring inspections under an ongoing arms control treaty include the preparation activities that the facility must complete prior to the arrival of inspectors at the site, hosting activities that the facility must accomplish while the inspectors are at the site, and recovery activities to return the site to normal operations after the inspectors depart the site.

## COST ESTIMATE ASSUMPTIONS

The basic assumptions used in structuring the cost analysis follow.

### Caveats

The following assumptions are intended for use in generating cost estimates for the four monitoring options. They represent current thinking within the Department of Energy concerning a possible warhead dismantlement monitoring regime at Pantex. An actual warhead dismantlement monitoring regime under a START III treaty would result from extensive interagency discussion within the U.S. Government and intergovernmental negotiations with the Russian Federation, and may differ considerably from the assumptions presented in this Appendix.

The study group assumed that the Department of Energy will work with the Pantex operating contractor to put in place a set of procedures and regulations fully consistent with cost-effective operations under a future arms control treaty requiring transparency or verification measures for monitoring of the warhead dismantlement process, while maintaining the high standards of security and environmental, safety, and health responsibility currently in effect at Pantex and continuing to fulfill the Department's responsibility to maintain a safe, secure, reliable nuclear weapons stockpile. Without such changes in the Pantex procedural and regulatory guidelines, the cost of implementing any of the warhead dismantlement monitoring options discussed in this report would be considerably higher than the cost estimates given in this Appendix.

It may be possible to perform inspections at the Unclassified-Confidential National Security Information level. It is assumed that the legal mechanism (a General Security of Information Agreement or Executive Order) for sharing classified National Security Information with the inspectors will be in place. If it is necessary to exchange Restricted Data/Formerly Restricted Data with the inspectors, it is assumed that an Agreement for Cooperation allowing the exchange of such information under the Atomic Energy Act of 1954, as amended, will be in place.

### Inspections

- Only Treaty Limited Items (warheads scheduled for monitored dismantlement and/or pits, canned subassemblies, and other nuclear and nonnuclear components removed from such warheads) will be subject to inspection.
  - Dismantlement of Treaty Limited Items will continue without interruption before, during, and between inspections, except as required to prepare for and recover from inspections.
- The inspectors will have the right to conduct a discrete number of routine inspections per year.
  - In order to have a definite number for planning purposes, cost estimates were prepared based on up to 12 routine inspections per year.

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- The inspections will be of two types, regular inspections and short-notice inspections, with different advance notice required for each type of inspection.
  - For the purpose of cost estimates, it was assumed that the up to 12 routine inspections per year will consist of up to 8 regular inspections, which require 30-day advance notification of arrival date at Pantex, and up to 4 short-notice inspections, which require 48-hour advance notification of arrival date at Pantex.
  - The cost estimates were based on regularly recurring monthly inspections.
  - Pantex will prepare the declared buildings/facilities/areas for inspection prior to the arrival of the inspectors.
- Each inspection will be of relatively short duration.
  - For the purpose of cost estimates, it was assumed that each inspection will last up to one week (five working days).
- For the purpose of making cost estimates, it was assumed that there will be no permanent presence of inspectors in Options 1, 3, and 4.
  - The annual cost for routine inspections for Options 1, 3, and 4 will include the cost per inspection times the number of discrete inspections per year, plus miscellaneous costs not attributable to individual inspections.
- The inspectors will have a “permanent presence” in Option 2, in order to perform Portal Perimeter Continuous Monitoring of a segregated, dedicated portion of Zone 12.
  - In Option 2 the inspectors will be permitted to perform a discrete number of Option 1 type inspections in Zone 4, in addition to permanent presence PPCM inspection in Zone 12.
    - The annual cost for Option 2 will include the annual cost for permanent presence in Zone 12, the cost per inspection for discrete inspections in Zone 4 times the number of discrete inspections per year, plus miscellaneous costs not attributable to individual inspections.
- There will be a limited number of inspectors per inspection team.
  - For the purpose of making cost estimates, it was assumed that there will be up to 10 inspectors per inspection team.
- The inspectors will have the right to divide into a limited number of inspection parties.
  - For the purpose of making cost estimates, it was assumed that the inspectors will have the right to divide into up to three inspection parties.

## Declarations

- As part of the declarations which are a part of all the options, the United States will provide to the inspectors, on an annual basis, information on Treaty Limited Item dismantlement schedules and projected Treaty Limited Item warheads and component storage activity during the coming year.
  - As part of the annual declarations, the United States will declare which Pantex storage areas (and dismantlement areas if applicable for a given option) will be used for Treaty Limited Items during the coming year.

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- The inspectors will receive periodic updated declarations of activities involving Treaty Limited Items. For the purpose of making cost estimates, monthly declaration updates were assumed.
- The inspectors may choose to visit any of the buildings/facilities/areas which are declared to involve Treaty Limited Items, subject to the restrictions of the various warhead dismantlement monitoring options.
- The inspectors will not be permitted to visit additional areas.

## Adding and Removing Facilities From Eligibility for Inspection

- It may be possible to occasionally add facilities to or remove facilities from the list of facilities eligible for inspection in order to balance the treaty-related and non-treaty-related components of the Pantex workload.
  - It was assumed for the purpose of making cost estimates that during the regular declaration updates, facilities can be added to (promptly) or removed from (following a waiting period) the list of facilities eligible for inspection.
  - When a facility formerly declared to involve Treaty Limited Items is declared to no longer involve Treaty Limited Items, the inspectors will have one final "close-out inspection" opportunity to inspect that facility, to confirm that it does not contain Treaty Limited Items.
    - For the purpose of making cost estimates, it was assumed that such a close-out inspection must be completed within 60 days of a declaration that a given facility will no longer be used for activities involving Treaty Limited Items.
  - Following the final opportunity for a close-out inspection, the inspectors will no longer have access to a facility removed from the list, until such time as it is declared, as part of a subsequent declaration update, that that facility again involves Treaty Limited Items.

## Segregated, Dedicated Facilities for Warhead Dismantlement Monitoring Activities

- Activities related to U.S. responsibilities under an arms control treaty requiring transparency or verification measures for the monitoring of warhead dismantlement will be conducted in facilities segregated and dedicated to monitored dismantlement or monitored storage of Treaty Limited Items, both in Zone 4 (for all options) and in Zone 12 (for options 2, 3, and 4).
  - The construction costs and other costs involved in establishing a set of facilities segregated and dedicated to the monitored dismantlement or monitored storage of Treaty Limited Items, both in Zone 4 (for all options) and in Zone 12 (for options 2, 3, and 4), are included in the cost analysis for the initial inspection for each option, and the costs of maintaining a set of facilities segregated and dedicated to the monitored dismantlement or monitored storage of Treaty Limited Items are included in the cost of routine inspections for each option.

## Safety and Security Procedures

- To ensure that safety and security are maintained, special safety and security procedures taking into account the presence of inspectors will be in effect during inspections in the segregated, dedicated portions of Zone 4 and Zone 12 when inspectors are present.
  - Normal operations, and normal safety and security procedures, will be in effect in the remaining portions of the Pantex plant.
  - Pantex regulations and operating procedures will be changed, with the assistance of the Department of Energy, to allow this to happen.

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## Non-Treaty Limited Item Activities

- Normal Pantex operations involving non-treaty-related activities such as the Stockpile Laboratory Test and Stockpile Lifetime Extension programs will continue without interruption in the portions of Zone 4 and Zone 12 not involving Treaty Limited Items, before, during, and after the routine regularly recurring inspections conducted under the treaty.
  - Pantex operating procedures and regulations will be changed, with the assistance of the Department of Energy, to allow this to happen while maintaining the current high standards of security and environmental, safety, and health responsibility currently in effect at Pantex.
  - Structural modifications will be made to buildings, facilities, and security perimeters to allow normal operations to continue in the portions of Zone 4 and Zone 12 not related to activities involving Treaty Limited Items.
  - The cost of establishing such structural modifications should be included in the cost estimates for the initial inspection under each option, and the cost of maintaining such structural modifications should be included in the annual cost estimates for each option.

## Zone 4 Modifications

- The segregated, dedicated portion of Zone 4 will initially contain at least two empty storage magazines, one suitable for the storage of Treaty Limited Item warheads scheduled for dismantlement and one suitable for the storage of Treaty Limited Item pits removed from dismantled Treaty Limited Item warheads.
  - The cost of emptying the storage magazines included in the dedicated, segregated portion of Zone 4 should be included in the cost estimate for the initial visit under each option.
- If required in order to allow normal Zone 4 operations to continue in the portions of Zone 4 not involving Treaty Limited Items before, during, and after inspections, an opaque barrier (e.g., a wall or fence) may be constructed between the segregated, dedicated portion of Zone 4 and the remainder of Zone 4.
  - The cost of establishing such an opaque barrier is included in the cost estimates for the initial inspection under each option, and the cost of maintaining such an opaque barrier, is included in the annual cost estimate for each option.
  - As the mix of work at Pantex changes over time, additional magazines can be added to the segregated, dedicated portion of Zone 4 as required by operational needs from time to time, by, for example, extending the opaque barrier to include additional empty storage magazines required for the storage of Treaty Limited Items, subject to declaration and waiting period requirements as discussed above.
  - As the mix of work at Pantex changes over time, magazines can be removed from the segregated, dedicated portion of Zone 4 as required by operational needs from time to time by, for example, modifying the opaque barrier to no longer include magazines which are no longer required for the storage of Treaty Limited Items, subject to declaration and waiting period requirements as discussed above.
- If required in order to allow normal Zone 4 operations to continue before, during and after inspections, an opaque barrier (e.g., a wall or fence) may be constructed between the portion of Zone 4 available for normal Zone 4 operations not involving Treaty Limited Items and the roads used for transport of Treaty Limited Items between the dedicated, segregated portions of Zone 4 and Zone 12.
  - The cost of establishing such an opaque barrier is included in the cost estimate for the initial inspection under each option, and the cost of maintaining such an opaque barrier, if required, is included in the annual cost estimate for each option.

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## Zone 12 Modifications

- The same segregated, dedicated portion of Zone 12 will be used for monitored dismantlement of Treaty Limited Items in Options 2, 3, and 4.
  - A continuously monitored perimeter will be established around the segregated, dedicated portion of Zone 12 in Option 2.
- For the purposes of this study, the cost estimates assume that the dedicated, segregated portion of Zone 12 will initially contain at least one loading dock, one dismantlement cell, one disassembly bay, and one LINAC.
  - It may be more cost effective to include more bays and cells in the segregated, dedicated portion of Zone 12, to balance workload between treaty-related and non-treaty-related activities and to minimize construction costs.
  - For example, the following facilities including 11 bays and 4 cells may be well-suited for inclusion in the dedicated, segregated portion of Zone 12:
    - Ramp 12-R-98.
    - A loading dock at a roll-up door in ramp 12-R-98.
    - Cells 12-98-1, 12-98-2, 12-98-3, and 12-98-4.
    - The portion of Building 12-84 west of ramp 12-R-84, including 11 bays, one LINAC, and one break room.
- For Option 2 the dedicated, segregated portion of Zone 12 will be separated from the remainder of Zone 12 by the construction of temporary opaque barriers (e.g., temporary walls) in the ramps connecting the dedicated, segregated portion of Zone 12 to the remainder of Zone 12.
  - For Options 3 and 4 the dedicated, segregated portion of Zone 12 will be separated from the remainder of Zone 12 by the posting of security personnel and the appropriate use of escorts or by the construction of temporary opaque barriers (e.g., temporary walls) in the ramps connecting the dedicated, segregated portion of Zone 12 to the remainder of Zone 12.
  - Bays or cells can be added to or removed from the dedicated, segregated portion of Zone 12 from time to time, as operational needs require, by moving the temporary opaque barriers or security personnel separating the dedicated, segregated portion of Zone 12 from the remainder of Zone 12, subject to treaty requirements concerning declarations, waiting periods, and close-out inspections as discussed above.
  - The cost of establishing the opaque barriers or security personnel is included in the cost of the initial inspection under each option requiring them, and the cost of maintaining the opaque barriers or security personnel is included in the annual cost of each option requiring them.
  - For example, the dedicated, segregated portion of Zone 12 could be established in the facilities mentioned above by installing temporary opaque barriers (for example, temporary walls) or security personnel in the following locations:
    - A temporary opaque barrier or security person in ramp 12-R-98 between Building 12-99 and Building 12-98.
    - A temporary opaque barrier or security person in ramp 12-R-104 at the north exit from Building 12-84.
    - A temporary opaque barrier or security person in the north corridor in Building 12-84, between the entrance to the break room and ramp 12-R-84.
    - A temporary opaque barrier or security person in the south corridor in Building 12-84, between the LINAC and ramp 12-R-84, chosen carefully to both allow access to the LINAC from the dedicated, segregated portion of Zone 12 and to avoid interference with non-Treaty Limited Item traffic in ramp 12-R-84.

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- For the purpose of making cost estimates, it is assumed that a portal to the dedicated, segregated portion of Zone 12 will be constructed, including a separate, dedicated loading dock, located, for example, at a roll-up door in ramp 12-R-98.
  - Such a portal would include a covered loading dock similar to, but smaller than, Building 12-117, office space for the inspectors, and a break room with ventilation sufficient to allow smoking.
    - It would probably be necessary to have separate break rooms for inspectors and Pantex personnel to avoid fraternization.
- In Option 2, an additional opaque barrier (e.g., a temporary wall with a door) or security person would be required to separate the portal from the remainder of the dedicated, segregated portion of Zone 12.
  - For Option 2, portal monitoring will be done at the portal to the segregated, dedicated portion of Zone 12, and perimeter monitoring will be done by remote monitoring of the inner walls of the segregated, dedicated portion of Zone 12, including the temporary opaque barriers separating it from the remainder of Zone 12.
- It should be noted that additional planning and execution of rearranging of magazine contents might be required in Zone 4, depending on dismantlement status and enduring stockpile activities at the time of signing of the START III treaty.

## Traffic Between Zone 4 and Zone 12

- When they are present for an inspection, the inspectors would have the right to accompany, as a part of the convoy and with appropriate security escorts, the movement of Treaty Limited Item warheads and/or components between the segregated, dedicated portions of Zone 4 and Zone 12.
  - In Option 1 the inspectors would leave (for convoys enroute to Zone 12) or join (for convoys enroute to Zone 4) the convoy at the gate to Zone 12.
  - In Options 2, 3, and 4 the inspectors would have the right to accompany the Treaty Limited Items to and from the portal to the separate, dedicated portion of Zone 12.
- Traffic for normal Zone 12 operations not involving Treaty Limited Items will continue without interruption before, during, and after inspections, except when inspectors are present and in a position to be able to observe such traffic (e.g., when the inspectors are traveling to and from the portal to the segregated, dedicated portion of Zone 12).
  - Treaty Limited Item traffic and normal traffic not involving Treaty Limited Items will enter and leave Zone 12 through the same gate, but will proceed to and from different loading docks.

## On-Site Inspection Agency

- The On-Site Inspection Agency (OSIA) will provide and budget for escorts and linguists.
  - One OSIA escort or linguist will accompany each group of inspectors throughout each inspection.
  - OSIA will provide and budget for travel and living arrangements for the inspectors.

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## Inspection Equipment and Role of Pantex Personnel

- Equipment required for the inspections will be provided by the inspectors or by the U.S. Government, and is not included in the cost estimates.
  - Pantex personnel will move/calibrate/set-up equipment under monitoring by the inspectors.
  - Pantex personnel will take measurements under monitoring by the inspectors.
  - For the purpose of the cost estimates, it is assumed that all personnel involved in inspection activities will work regular eight-hour days, and overtime will not be required.
  - Pantex personnel will work one, two, or three shifts per day as required for workload requirements and cost-effective operations involving Treaty Limited Items.
    - The inspectors will have the right to be present when operations involving Treaty Limited Items are being performed, subject to limitations on the number and duration of inspections and the constraints of each option.
    - In the permanent presence Option 2, the inspectors would have the right to be present 24 hours per day.

## COST ESTIMATES FOR WARHEAD DISMANTLEMENT MONITORING OPTIONS

A detailed cost estimate was performed, based on the assumptions discussed above, for each dismantlement monitoring option, using the Inspection Cost Analysis Model (ICAM) developed for the DOE Office of Arms Control and Nonproliferation. These cost estimates are based on many uncertain parameter choices, since the details of an arms control treaty requiring monitoring of warhead dismantlement remain to be negotiated. The cost estimates presented here should therefore be regarded as preliminary, and are intended only to highlight differences among the four warhead dismantlement monitoring options.

The costs estimated for an initial inspection (including one-time site and facility preparation costs), a routine regularly recurring inspection, and for 12 routine regularly recurring inspections (one year) are shown in Table F1.

**Table F1. Cost Estimates for Warhead Dismantlement Monitoring Options.**

Option 1: Monitored Storage

Option 2: Portal Perimeter Continuous Monitoring of a portion of Zone 12

Option 3: Chain of Custody from monitored storage to and from the dismantlement bay or cell

Option 4: Direct Observation or Remote Monitoring of the dismantlement process in the bay or cell

	<i>Cost of First Inspection<sup>1</sup></i>	<i>Cost of Routine Inspection</i>	<i>Annual Cost<sup>2</sup></i>
<b>Option 1</b>	<b>\$2.5 M</b>	<b>\$0.12 M</b>	<b>\$1.5 M</b>
<b>Option 2<sup>3</sup></b>	<b>\$12 M</b>	<b>N/A<sup>3</sup></b>	<b>\$7.0 M</b>
<b>Option 3</b>	<b>\$6.5 M</b>	<b>\$0.2 M</b>	<b>\$2.5 M</b>
<b>Option 4</b>	<b>\$6.5 M</b>	<b>\$0.2 M</b>	<b>\$2.5 M</b>

<sup>1</sup> Substantial site and facility preparation would be required for an initial inspection which would not be required again for regularly recurring routine inspections.

<sup>2</sup> Twelve routine inspections are assumed per year, of 5 days each.

<sup>3</sup> Option 2 would require permanent presence of inspectors for PPCM of a dedicated portion of Zone 12. In addition, the annual cost estimate for Option 2 includes twelve Option 1 type inspections in Zone 4 per year.

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## ON-SITE INSPECTION AGENCY COSTS

Table F1 addresses DOE costs incurred by Pantex for warhead dismantlement monitoring. In addition to these expenditures, costs would be incurred by the On-Site Inspection Agency (OSIA) in performing escorting and linguistic duties, and for logistics support for the inspectors. These costs are incurred for all four monitoring options, and are relatively similar in all the options. Based on recent Russian visits to Lawrence Livermore National Laboratory (LLNL) and to Y-12, OSIA estimated that during the preparation phase for an initial visit, the agency will spend a total of approximately \$18,000 for an initial site visit and a subsequent walkthrough site visit. During a regularly recurring inspection visit, OSIA expects to spend approximately \$8,000 in support of the inspectors' visit to Pantex for transportation, lodging, meals, etc., and approximately \$7,500 on escort activities at Pantex during the inspection. Depending on the level of involvement of Y-12 in warhead dismantlement monitoring activities, the annual cost to OSIA of supporting any of the four monitoring options at Pantex is therefore expected to be about \$200,000. OSIA activities in support of monitoring of the disassembly of canned subassemblies at Y-12 would be expected to have a similar cost.

## COST FACTORS

Several factors directly influence the cost estimate for each option. These factors are intrusiveness, production stoppage and lost production, and construction.

**Intrusiveness.** The most significant cost factor is intrusiveness. Typically, the more intrusive the inspection, the higher the inspection cost. Inspections are considered intrusive when they allow the inspectors to enter large or sensitive areas of the site. Preparation efforts then become larger in scope, more training is required of site personnel, more areas need to be safeguarded, more planning, scheduling and coordination is required, and more items need to be moved. An inspection that allows inspectors into a large number of areas within the site or involves sensitive processes is also likely to significantly impact production, unless the procedural and regulatory modifications detailed above were implemented.

At Pantex, options that are comprised of activities that allow inspectors to visit Zone 12 incur higher costs than those that would essentially contain the inspection within Zone 4 and terminate at the gate of Zone 12 (Option 1). If inspectors visit areas that are not common to visitors, such as Zone 12 South, personnel will require extra training and the area will require more preparation. Therefore, Options 2, 3, and 4 are more costly than Option 1 because they allow inspectors the most access to the site. This is particularly true for the initial visit under each option.

**Production Stoppage and Lost Production.** For safety and security reasons, some or all production operations would be suspended during the inspection, regardless of the monitoring option, unless significant procedural and regulatory changes were made. At Pantex, for options which directly involve Zone 12, there may be competition for facility resources that could significantly affect the dismantlement program schedule. Lost production costs have been included in estimating the impact on operations of each option, assuming substantial relief from current procedural and regulatory constraints.

**Construction.** For all options, Pantex or Y-12 would need to modify one or more facilities in preparation for inspections. Construction costs have been included in the cost estimates for the initial inspection under each option.

## REMOTE MONITORING

The following assumptions were made concerning remote monitoring conceptual designs for the purpose of making cost estimates.

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## Option 1

- Start with two empty magazines, one for warheads and one for pits
- Two video cameras monitoring each magazine
  - Each camera in the field of view of the other
  - Normal operating power will be provided by basic electrical service
  - Cameras will be installed in tamper indicating housings with emergency UPS
  - Video signals will be authenticated
  - Both cameras triggered by “activity” at the magazine entrance and system will record the activity until the magazine is secured.
  - Both cameras triggered by seismic sensor detecting tunneling or other “forced entry” activities.
- System will be functional at all times
- Cameras will be mounted on existing poles if possible, otherwise poles will be installed as necessary in such a manner as to avoid the disclosure of Pantex security activities.
- Data collection and transmission system essentially the same as the Argonne West/Kurchatov remote monitoring system.
- Data transmitted to MINATOM in Russia by telephone, satellite, or a combination of both.
- All transmitted signals also recorded locally.

## Option 2

- Zone 4 remote monitoring as in Option 1
- PPCM area of Zone 12 will be segregated as described in the assumptions above
- Eight (8) CCTV cameras to be used to monitor interior of the outside walls of the ramps which constitute the perimeter of the dedicated, segregated area
  - Normal operating power will be provided by basic electrical service
  - Cameras will be installed in tamper indicating housings with emergency UPS
  - Video signals will be authenticated
- Cameras will be capable of operating at all times
- CCTV signals will be hard wired to the inspectors’ portal monitoring station
- CCTV signals will be temporarily recorded on a 24-hour cycle. No permanent record of the signals will be kept
- Alarms on the emergency exits and outside exits for equipment rooms will be received at the inspectors’ portal monitoring station

## Option 3

- Zone 4 remote monitoring as in Option 1
- No additional remote monitoring requirement

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## Option 4

- Zone 4 remote monitoring as in Option 1
- The proposed segregated area in Zone 12 will contain 1 LINAC cell, 4 dismantlement cells, and 11 dismantlement bays.
- Every cell and bay where dismantlement activities take place will be equipped with CCTV to facilitate remote monitoring of those activities
- Four (4) CCTV cameras will be used to monitor the interior of each cell as well as the equipment interlock, passages, and staging areas associated with the cell
  - Two out of the four cameras will monitor the interior of the cell where the actual dismantlement takes place. Only one will be operating; the other will be in a stand-by mode.
  - *Thus only one camera actually will be used to monitor the dismantlement operation.*
- Three (3) CCTV cameras to be used to monitor the interior of each bay as well as the equipment interlock, passages, and staging areas associated with the bay
  - Two out of each of the three cameras will monitor the interior of the bay where the actual dismantlement takes place. Only one will be operating; the other will be in a stand-by mode.
  - *Thus only one camera will actually be used to monitor the dismantlement operation.*
- For each cell and bay:
  - Field of view will be determined by dismantlement activity in the cell or bay
  - Normal operating power will be provided by basic electrical service
  - Cameras will be installed in tamper indicating housings with emergency UPS
  - Video signals will be authenticated
  - Cameras will be under the control of Pantex technicians at all times
- CCTV signals will be hard wired to the ramp outside of the individual bays and cells.
- CCTV signals will be temporarily recorded on a two-hour cycled. No permanent record of the signals will be kept

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