Will Remote Monitoring Ever be Widely Implemented?

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Objectives

- Identify IAEA estimates of nuclear industry growth.
- Identify IAEA use of monitoring technology in 2015.
- Identify what makes remote monitoring technology “novel”.
- Discuss concerns regarding wider use of remote monitoring.
- Identify favorable impacts of remote monitoring.
- Summary
IAEA Estimates of Nuclear Industry Growth

• From 2011 to 2015 Worldwide:
  ► 5% Increase in Number of nuclear facilities
  ► 17% increase in amount of nuclear material
• 2030: Nuclear capacity will grow 2% - 70%
• Nuclear trade is increasing
• Nuclear technologies are changing
• Facility modernization
• Process sophistication
IAEA Use of Monitoring Technology in 2015

• 23,300 seals were verified
• 1,106 portable and resident NDA systems were prepared for inspection use
  (2,237 separate pieces of equipment)
• 162 unattended monitoring systems were in operation
  ► 136 measure radiation
  ► 10 monitor thermo-hydraulics
  ► 16 measure solution volume
• 863 video surveillance systems were operating
  ► 1,416 individual cameras
  ► At 266 facilities
  ► In 35 nations
• 210 cameras were used jointly with Regional/State authorities
• 820 unattended safeguards data streams
  ► 255 from surveillance systems
  ► 109 from unattended monitoring systems
  ► 456 from electronic seals
  ► At 136 facilities in 25 nations
What makes remote monitoring technology “novel”? 

- Local Onsite Multiple Sensors
- Unattended Sensors
- Local Onsite Transmission
- Real Time Transmission
- International Two-way Communication
- Communication Center
- Secured Web Application User Interfaces
- Sensor Data Fusion and Analytics*
- Acceptance and Cooperation

*Data analytics refers to qualitative and quantitative techniques and processes used to enhance productivity and business gain. Data is extracted and categorized to identify and analyze behavioral data and patterns, and techniques vary according to organizational requirements.
Key Elements of a Remote Monitoring System

• Material(s) Control and Accountability (MC&A)
• Safeguards
• Non-proliferation

Nuclear Safety Security Safeguards

• Chain of custody
• Continuity of knowledge
• Trust, completeness, and timeliness

Continuous, unattended with automatic alert/alarm capabilities
Concerns Regarding Wider Use of Remote Monitoring (1/2)

- Growing demands on IAEA safeguards.
- Increasing complexity of IAEA safeguards.
- IAEA Regular Budget needs to grow.
- Need to continue finding ways to increase efficiencies.
- Need to continue to improve effectiveness.
- Maintain overall cost-effectiveness.
- Consider safeguards early in the design stages of facilities.
- Strong government policy to support technology development.
- Strong government policy to support safeguards implementation.
Concerns Regarding Wider Use of Remote Monitoring (2/2)

• More States need to allow greater use of monitoring technology.
  ▶ Cooperation arrangement  ▶ Cost sharing  ▶ Access

• States need to cooperate with necessary authority, resources, technical capabilities, and independence from operators.
  ▶ procurement  ▶ maintenance
  ▶ acceptance testing  ▶ use
  ▶ training  ▶ secure transmission
  ▶ installation

• IAEA actively implement the Long Term R&D Plan.
  ▶ remote monitoring in particular

• IAEA actively implement near term Support Program.
  ▶ unattended remote monitoring in particular
Favorable Impacts of Remote Monitoring

• High level of assurance without the need for inspector presence.

• Reduce impact of inspections on facility operators.

• Reduce impact on IAEA by reducing no. of inspector visits and costs.

• Reduce radiation exposure to inspectors and operator personnel.

• Enable a variety of sensors (radiation, motion, seals, cameras, etc.).

• Not necessarily require additional capability of State or operator.
Example of a remote monitoring system: ARG-US “Watchful Guardian” RFID/CommBox/RAMM/Traveler*

Summary

• Allow greater use of remote monitoring to provide Continuity of Knowledge over nuclear material and facility activities between inspections by preventing undetected access and undeclared operation.

• Remote monitoring can reduce infield inspection activities and cost-effectively reduce impact on operators.

• Without further improvements and optimization, it will be increasingly difficult for the IAEA to guarantee an effective, reliable, and credible safeguards system.

• It is essential that the IAEA continue to improve its productivity by striving for greater efficiency without compromising the effectiveness of its work and its ability to continue drawing soundly based conclusions.
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Questions?