OPERATIONAL PERSPECTIVE ON SAFEGUARDS ISSUES (U)

by

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Following the requirements of the DOE Orders that pertain to material control and accountability (MC&A) or, more broadly, to safeguards has both positive and negative impacts on facility operations. For instance, one of the largest positive impacts is in the area of measurement control. Improving the accuracy and precision of measurements taken for the primary purpose of determining the nuclear material inventories on hand also improves your knowledge of and ability to optimize the process. In addition, strong measurement control programs reduce the amount of rework that has been traditionally experienced in a process.

On the other hand, safeguards requirements can reduce the efficiency of an operation. The two man rule surveillance technique is costly and increases radiation exposure to personnel because it requires two people to do the job that one person is capable of performing. Another example of safeguards requirements hindering operations is the time spent on improving a safeguards system which can often be equated to time spent away from producing material. For instance, to calibrate an accountability tank you must drain and flush the tank, isolate it from the process if the process is not shutdown, perform the calibration, dispose of the large quantities of liquid waste generated, and return the tank to normal operating conditions.

The main concerns of operational facilities when trying to achieve compliance with the DOE Orders are the same old questions..."When is enough enough?" and "Where are we going to get the resources necessary to comply?"

Several factors need to be considered in order to answer these questions. For instance, in several areas at LANL and SRS, the two man rule can be eliminated by use of alternative material surveillance systems. We encourage physical systems that take the human factor out of the equation; however, there are problems associated with installation of physical systems.

- Operations and safeguards personnel at many facilities are not knowledgeable of material surveillance systems. They must rely on the research and development organizations for information.
• Research and developers of material surveillance systems are not familiar with the operating facilities and other site specific requirements such as safety, health physics and quality assurance. They must rely on facility personnel for information.

Both of these situations lead to miscommunications and misunderstandings that can result in the failure of a system to function as intended if not detected early in the design stages.

Budgets are another important consideration. Funding must be available for safeguards projects. Sometimes, operational needs take precedence and lack of up-front funding delays or eliminates a facilities' ability to replace costly, human dependent systems with more cost effective, physical systems. A cost/benefit analysis must be done taking into account manpower, radiation exposure reduction, safeguards effectiveness and other factors to determine the advantages of installing such a system over traditional use of the two man rule.

There is one other very important point that must be made. The safeguards community needs clear guidance and direction on the long range plans for safeguards compliance and performance requirements. A lack of DOE vision coupled with a lack of clear guidance makes it very difficult for those charged with meeting Order requirements to determine the best solutions. Several examples can be cited where more guidance is needed. One example that has been especially bothersome is Daily Administrative Checks (DACs). DOE Order 5633.3 requires that DACs be performed in facilities possessing Category I quantities of items. No guidance is given as to the level of assurance they must provide, whether other safeguards elements can be taken advantage of, or even what the real intent of the DAC is. The end result is very different programs throughout the complex and even throughout a site. If more guidance, including specific objectives, were available, it would be easier to determine for each specific facility whether a daily inventory, statistical sampling plan, or material surveillance system is more cost effective and more effective in providing the desired level of protection.

Still another bothersome example pointing to the need for additional DOE development support and guidance is the entire area of safeguards performance requirements. Rarely, if ever, has a safeguards issue been more hotly debated. Though there is a general consensus that performance requirements can improve safeguards systems and that performance objectives should be issued, there are major concerns over existing draft performance guides and guidance. Central to these concerns is that it is
not yet possible to defend or independently validate a facility's performance because a technically defensible, quantitative measure of total system performance does not yet exist. This fact will compel facilities to request exceptions and time extensions if performance requirements and associated guides/guidance are issued prematurely, because of the enormous time and resources required to perform actual field tests and develop valid probabilities of detection. Once again, a clear DOE vision coupled with practicable and cost-effective guidance is essential.
**Introduction**

Today's S&S regulatory environment is best characterized as dynamic and turbulent. As a result, S&S programs, policies and procedures are rapidly undergoing change, sometimes major, to withstand internal and external scrutiny. Currently the Material Control and Accountability (MC&A) DOE Order 5633.3 forms the basis of the MC&A programs throughout the DOE complex. Although these requirements can be and often are made more restrictive by the field office and/or the site contractor, this order establishes the minimum standards that programs must meet. The present policy makes exceptions to this order difficult, if not impossible, to be granted. Therefore, strict compliance is expected, and enforced through audits.

Having the MC&A requirements commonly understood by those that enforce compliance and educating the contractors and DOE field offices in the standards they will be audited against would offer definite advantages. However, the requirements are not always commonly understood because some are ambiguous and leave room for interpretation. A further complicating factor is the different nature and mission of the facilities in the DOE complex, which forces many DOE requirements to be ambiguous or not applicable.

**Discussion**

Savannah River Site (SRS) and Los Alamos National Laboratory (LANL) have aggressively attempted to be in compliance with the DOE order requirements as written and as interpreted by the respective field offices. A great deal of effort has been expended by both the contractors and DOE field offices to meet the letter and intent. Examples of some of the resulting advantages and disadvantages follow.

DOE Order 5633.3 does not establish a frequency for recalibration of transfer and inventory tanks used to establish inventory values. The SRS interpretation of this requirement is to (1) establish a baseline by recalibrating these tanks and (2) analyze calibration data collected on a routine frequency to determine when verification or recalibration is necessary. DOE-SR has provided guidance to SRS to recalibrate transfer tanks every three years and inventory tanks every five years. Because the DOE Order requirement is not specific, the other field offices in the
complex may interpret this requirement differently resulting in different levels of effort.

At SRS, most accountability tanks were last calibrated when installed; twenty five to thirty years ago. In many cases the calibration data is not complete and the records that have been maintained are even less complete. As the saying goes, "If it is not documented, it hasn't been done." Compounding this problem is the fact that configuration control was not as strong as it has been recently and, therefore, changes to the tank structure have not been documented and recalibrations have not been performed. The SRS currently has 37 transfer tanks and 78 inventory tanks that contribute to the inventory measurements made each month.

There are positive and negative aspects of calibrating 115 tanks to establish a baseline. Calibrating tanks is a time consuming process especially when they are remote and/or contaminated with radioactive materials. Our experience indicates that it takes approximately 1020 man hours to calibrate a tank depending on its location and configuration. At SRS, monthly inventories are performed using an inventory plan that specifies optimum locations for sampling material at inventory time. Since the facility operates continuously, tank calibrations must be scheduled within several constraints, such as other work in the facility, processing conditions, and manpower availability.

On the positive side there are benefits gained by having calibrated tanks - not only for accountability measurements but for process control as well. Recalibration of tanks at SRS has resulted in a reduction in calibration errors by 30 to 90%, with a corresponding decrease in the facility limit of error for the inventory difference (LEID). It has also reduced a large potential contributor to inventory difference trends and inventory differences exceeding control limits. Documentation of the calibration process for these tanks is now up to standards.

Another benefit is the ingenuity sparked by this process. A group of engineers from the measurement control group developed an automated tank calibration program whereby the data is collected on a personal computer. (This methodology was presented at recent INMM meetings.) This system has reduced data collection errors, ensures that each step of the calibration process is completed before the operator can move to the next step, reduces rework, and reduces the manpower required. All of these benefits may allow a reduction in the number of runs needed to provide the data needed for analysis.
Another example of a DOE Order requirement that has caused much consternation is material surveillance. The old DOE orders defined material surveillance as the so-called "two-man rule". This methodology is still in place at many facilities. The two-man rule, although easy in concept, is hard to enforce because it is an administrative means of material surveillance. It is manpower intensive, increases radiation exposure to personnel, which conflicts with ALARA principles, and is very difficult to quantify its effectiveness for input into vulnerability analyses, such as for MSSAs.

Due to the inefficiencies and other problems associated with the two-man rule, both sites are pursuing alternatives including combinations of process monitoring, waste monitoring, daily administrative checks, and material surveillance systems. Our collective opinion, from the operating perspective, is that mature technology is not here yet. For example, hard wired surveillance systems are difficult to install in existing vaults due to design retrofit problems and radiation exposure during installation. Tag systems such as the Sandia WATCH system and the Westinghouse container surveillance system are showing a lot of promise for these applications, but more development is needed. These systems may ultimately justify a reduction in requirements for two-man rule, daily administrative checks, inventories and verification/confirmation measurements. They may also alleviate some of the concerns associated with the two-man rule by reducing radiation exposure, providing technically defensible numbers for vulnerability analyses, and reducing manpower. In addition, they may become more efficient and cost effective, and reduce the risk associated with colluding insiders.

This brings us to the same old questions:
- When is enough enough?
- How far and fast must we go to achieve compliance?
- How do MC&A priorities fit in with other ESH&QA priorities?
- Where do the resources for compliance come from?

In order to achieve our overall objective, we must assure that our operational safeguards and security programs are consistent with DOE Orders and requirements and the mission of our respective site. Further, we must effectively manage these programs by identifying cost-effective improvements and by initiating enhancements, upgrades and other corrective actions, as appropriate. This requires that the community as a whole have a vision that it can aspire to. This vision must be balanced with operating efficiency and cost effectiveness. Hence, Orders should specify goals, not detailed procedures, and these goals should not conflict
with other requirements. Improvements in one system must not devalue a second system. Further, operating contractors should be formally included in the process of developing and revising orders since they must implement them and because the Price-Anderson Amendments Act includes specific provisions for criminal and civil penalties against DOE-contractor employees who violate DOE Orders covered by the Act. The goals must be specific, measurable, attainable and risk-driven.

Once the orders are carved out, each facility should then develop implementation plans to accomplish the goals as specified. These facility-specific plans should then be subjected to cost/benefit analyses before they are submitted to DOE for review and approval.

In closing - our vision within the S&S community must consider what we want and what we can live with. We, as a community, must determine what is reasonable to expect in terms of budget, technology, other requirements, and operations. Meeting this challenge requires constant awareness, constant management attention and continuous oversight. We must steer our efforts toward those value added tasks with the greatest payoff.
OPERATIONAL PERSPECTIVE ON SAFEGUARDS ISSUES

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OUTLINE

- Introduction
- Requirements
- Plusses/Minuses
- Same Old Same Old
- Vision
- Conclusion
INTRODUCTION

- DOE Order 5633.3
  - Basis for MC&A program
  - Field Office or Contractor can make more restrictive
  - Exceptions difficult if not impossible

- Strict compliance being encouraged
PLUSSES AND MINUSES

PLUSSES
- Requirements understood
- Know what have to meet
- Know what to be audited against

MINUSES
- Requirements not understood
- Don’t apply to all situations
- Interpreted differently by field office
TANK CALIBRATIONS

- Requirements in 5633.3 for measurement control
- Savannah River Site
  - accountability tanks calibrated when installed
  - calibration data not complete
  - records even less complete
  - configuration control less than desired
  - configuration changed without updating calibration
- currently have $37\over 78$ inventory tanks
TANK CALIBRATIONS (CONT'D)

- DOE Order 5633.3 does not specify frequency

- WSRC interpretation
  - establish baseline
  - verify and/or recalibrate when measurement control data indicates need or configuration changes

- DOE-SR interpretation
  - establish baseline
  - recalibrate transfer tanks every 3 years
    inventory tanks every 5 years
TANK CALIBRATIONS (CONT'D)

- Experience to date indicates
  - 1020 hours to calibrate a tank
    
    40 - procedure preparation
    180 - tank preparation, transfer piping changes
    450 - calibration runs
    120 - data analysis

- Tank calibration errors reduced 30 to 90%
  - reduces LEID
  - increases loss detection
  - reduces source of IC trends and false alarms
  - improved documentation records
TANK CALIBRATIONS (CONT'D)

- Developed automated tank calibration system
  - data collected on PC
  - reduces data collection errors
  - forces operator to complete step before moving on
  - reduces rework
  - reduces manpower
  - less runs needed
MATERIAL SURVEILLANCE

- Two Man Rule
  - easy in concept
  - hard to enforce
  - manpower intensive
  - increases radiation exposure (anti-ALARA)
  - hard to quantify effectiveness

- Engineered Systems/other Alternatives
  - can enhance operations as well as safeguards
  - reduces radiation exposure
  - reduces safeguards requirements; saving manpower
  - quantifiable probability of detection
  - cost high to implement; low to maintain
MATERIAL SURVEILLANCE (CONT'D)

- Experience at SRS and LANL
  - Two man rule inefficient
  - Aggressively pursuing alternatives (process monitoring, etc.)
  - Hard wired
    - need innovative design for existing vaults
    - radiation exposure high to install
- Tag systems
  - Sandia 'WATCH'
  - Westinghouse ESG/TSC
- More development needed
- Technology not ready
SAME OLD SAME OLD

- When is enough enough?
- How far and how fast to achieve compliance?
- How do these priorities fit in with other program and ESH priorities?
- Where do the resources for compliance come from?
VISION

- What's best for safeguards must be prioritized and balanced with what's needed for other DOE programs.

- Considerations include safeguards, security, cost, radiation exposure, and many others.

- Goals must not conflict.
  - Improving one system can devalue another.

- Requirements must be specific, measurable, attainable, and risk driven.
CONCLUSION

- A conscious decision must consider:

WHAT WE WANT AND WHAT WE CAN LIVE WITH

- Vision and subsequent requirements must be communicated to all DOE and operating contractor personnel

- Tell us, in terms of risk, what must be attained