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ABSTRACT

Various organizations at Los Alamos have used tamper indicating devices (TID) to help control nuclear materials for several years. During the past year a formal documented TID program has been developed to be implemented throughout the Laboratory. Special needs of all organizations have been incorporated into the program. Applications vary from waste containers to unique configurations of special nuclear materials (SNM). Several examples of these applications will be discussed.

INTRODUCTION

The Laboratory conducts many activities involving nuclear materials other than processing and storage. Activities include experimentation, research and development of assay techniques, analytical chemistry assay, SNM parts certification, and routine nondestructive assay of SNM. All of these activities have different problems associated with the application of tamper indicating devices (TIDs) or seals to provide some assurance that the material is not tampered with. Traditionally seals have been used by processing personnel to control the activity associated with material in process. It has been recognized for some time that a safeguards credit for TIDs is possible if the proper procedures are incorporated in the TID program. The Laboratory has been designing a comprehensive TID program for over a year, and is currently in the final stages of implementing this program. Much is to be learned about the application of TIDs and how much safeguards credit can be given to this program throughout the Laboratory.

THE REAL PURPOSE OF SEALS

There are many instances in the Laboratory when it is very important for operations to know when unauthorized access to critical material has occurred. This is true whether we are talking about a processing plant, a storage vault, or some experimentation. If the situation is extremely critical the material needs to be secured in a manner to prevent any access to it. This means a locked container or a locked repository of some kind. From a safeguards perspective, detection of unauthorized access to material is one element of an overall safeguards program to help maintain control of the nuclear material. With various systems such as material surveillance, physical protection, secure vaults, and secure operations areas TID programs provide another element of assurance that everything is in

control. It must be understood that seals are designed to detect unauthorized access not to prevent it. A sealed container itself may be a TID.

The DOE Orders provide guidance to implement seals as an element of the overall safeguards system. One of the principle benefits of a good TID program is a reduction in the requirement to remeasure material at regular intervals. This alone may be viewed as a cost savings to operations.

APPLICATIONS

With the wide variety of operation activities at the Laboratory, implementation of a Laboratory wide TID program requires a review and evaluation of each activity to determine the appropriateness of the use of TIDs. Operations in the R&D environment are quite different from those in a processing environment for example. Several typical applications are:

1. Material in storage
2. Material in process
3. Material in experiments
4. Material undergoing assay
5. Classified parts
6. Waste management
7. Material in shipment

Material located in storage is usually packaged in a safe container configuration that can easily be sealed with a paper tape type seal which will detect any opening of the container. This is one of the most typical applications of seals to containers. When one of these sealed containers is selected for inventory a confirmation measurement is performed. This measurement is much less stringent than a verification assay. This can result in a significant cost and time savings if you have a large quantity of material in storage that is subject to a statistical sampling plan for the inventory.

Material located in processes can be solid, liquid, or gas. Very often it is not practical to seal this material for safeguards purposes. Material inside a glove box is afforded a certain degree of protection without any additional seals. Careful evaluation is performed on all such material in process. In general very few TIDs are used with this category of material.

Materials associated with experiments provide a very different problem for safeguards. Very often the experiment is outside of a secure vault for long periods of time. Each experimental arrangement is reviewed and evaluated for potential application of seals. If it is not practical to utilize seals on such a configuration of material other safeguards element(s) are incorporated to give the same level of assurance. Sometimes a TID can be located on a portion of the experimental apparatus to provide a certain degree of assurance that material is not moved or disturbed

in any way. A good example is an experiment using solutions. The solution typically will be located in a system of vessels, tubing, and other apparatus. If the application of a TID (or several TIDs) to the system is practical then they will be used to provide the assurance that a TID would provide in another application.

Materials undergoing assay fall into two basic categories. The first is chemical assay. Usually the quantity of material is very small and the use of seals is not appropriate. The second category is nondestructive assay where the entire item is placed in an instrument designed to perform the assay. Normally these items are sealed to provide the assurance that no one has tampered with the item during the assay process. This can be very important since it may take several hours for the assay to be completed. Each case again needs to be reviewed and evaluated for appropriate TID application. If it just is not practical to utilize a seal of some kind then they are not used and some other element of a safeguards system provides the required assurance.

Very often classified parts are stored or are certified as an operation. While in storage if the parts are not placed in suitable containers then the cage or location of storage may be sealed. If located in containers then the container can be sealed. When these parts are removed from storage they usually have no need for being sealed until they are returned to storage.

In general it is Laboratory policy to place seals on all waste containers destined for removal and storage to a storage repository. This not only provides some safeguards assurance, but also helps to manage the operation of handling the waste materials. In some cases after review empty storage drums may by sealed to control the movement of waste and the drums. Sealed drums makes a lot of sense to help control waste materials in a plant environment.

There are two categories of shipments at the Laboratory. These are internal shipments within the Laboratory and external shipments to/from the Laboratory. In general all shipments require a special Department of Transportation (DOT) approved shipping container that is always sealed before the shipment process begins. The seal serves to assure the receiver of the material that unauthorized access to the material has not occurred since the seal was applied. This is a standard procedure for all handlers of nuclear materials.

CONCLUSIONS

For a Laboratory as complex as the Los Alamos National Laboratory the implementation of a comprehensive TID program is not a trivial task. Every potential application must undergo exhaustive review and evaluation to test it for the appropriate use of seals. It is usually obvious that no two applications can be addressed in the same way. Every application has its own unique features to be understood and

addressed in the safeguards arena. The TID program at Los Alamos must accommodate all the various activities and operations at the Laboratory.