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THE DEVELOPMENT OF THE SHADOW ANALYSIS TEAM CONCEPT

Dr. Raymond R. McGuire
Arms Control and Treaty Verification Program
Lawrence Livermore National Laboratory

In Support of The US Army Material Command Treaty Laboratory

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1. Introduction:

Part II, Section E, Paragraphs 52-55 of the "Verification Annex" (Annex 2) of the Chemical Weapons Convention (CWC) provides the general rights and obligations of both the Inspected State Party (ISP) and the Inspection Team (IT) as to the collection and analysis of samples. In summary, the inspection team has the right to request the collection of samples which will be collected by the ISP unless the decision is made by the ISP to allow the inspectors to collect them. Samples will, if possible, be analyzed at the inspection site, with the assistance of the ISP if requested by the IT. The ISP has the right to retain portions all collected samples. Samples may be sent off-site for independent analysis if deemed necessary.

These rights are modified in the case of "Challenge Inspections" by the "Managed Access" Provisions of Part X, Section C, Paragraphs 46-48 which specifies that sample collection is to be negotiated between the Inspection Team and the Inspected State Party.

In order to assist the ISP in fulfilling its obligation to assist the IT in determining compliance, and in preserving its rights to protect sensitive information not relevant to the CWC, we propose to establish the Army Material Command Treaty Laboratory (AMCTL) Shadow Analysis Team.

2. Function:

The primary function of the Shadow Analysis Team (SAT) is to assist the leader of the Inspected State Party (ISP) site team to assure that sensitive information, not relevant to the legitimate aims of the inspection, is protected. This will be accomplished by:

a. Collecting inspection samples;

b. Performing detailed analysis, including non destructive evaluation if needed, to

i. Determine, independently, the results that inspectors are getting to assure there are no surprises;

ii. In some cases, determine if samples may be taken to an off-site laboratory if requested; and

c. Verify decontamination / sanitation of inspection equipment before leaving the inspection site.

3. Deployment:

The SAT will be deployed to the site of Challenge inspections at DOD facilities under the CWC. Deployments will also be made to all in country bilateral inspections. Crisis deployments may be requested by ISP host site team chiefs during CWC routine inspections if questions of compliance arise. It is expected that the cost of responding to these crisis deployments will be reimbursed to the AMC Treaty Laboratory.

4. Team Make-up:

The SAT should consist of 6-7 team members and the team leader, depending on the type and number of instruments to be deployed. Only a partial SAT may be mustered for a given inspection. A full team would consist of the following personnel.

a. The SAT Leader and Senior Scientific Advisor.
b. One or two instrument operators/analysts.
c. Two chemists for sample preparation.
d. Two experts in non destructive evaluation (NDE)
e. One logistics expert

Sufficient and appropriate back-ups to each of the above would need to be available to assure timely deployment and to respond to two concurrent inspections. For example, a register of about four SAT Leader/Scientific Advisors will be needed to ensure availability at any time an inspection might occur.

The SAT leader will be the first deployed. He/She will arrive at the site of the inspection before the inspection team to consult with site personnel about potential concerns and determine what SAT deployment will be needed. Based on that site appraisal, the SAT leader will call out the appropriate elements of the SAT.

The SAT leader will then act as an advisor to the ISP site team as required. One particular aspect of this advisory role will include where and how samples should be collected if requested. He/She will be responsible to the ISP team leader for the results of the shadow analysis and will assign team member responsibilities as needed.

The instrument operators/analysts will perform the chemical analytical measurements. At present it is envisioned that the primary instrument will be the gas chromatograph with a mass spectrometric detector(GC-MS). Additional instruments may consist of a gas chromatograph with a flame photometric detector (GC-FPD) and a Fourier transform infra red spectrometer (FTIR). These analysts will operate the instruments of choice and assist in the interpretation of the results. It will also fall to these analysts to observe any screening tests to be made by inspectors with hand held detectors, and to observe the inspectors as they perform instrumental analyses.

The chemists will collect the inspection samples as requested by the inspection team. If the inspectors are to be permitted to collect these samples, the chemists will observe that the samples are properly collected and handled prior to accepting the ISP's sample portions. The chemists will then prepare the samples for analysis as necessary. The chemists will observe any screening tests performed by inspectors with detection kits and the preparation of analytical samples by inspectors.

The NDE experts will perform non destructive measurements as required by the ISP team chief. They will analyze the results of such measurements. They will also observe all such measurements to be made by the inspectors.

The logistics expert will be responsible for getting the SAT equipment to and from the inspection site. He/She will also be responsible for maintaining all support equipment

in the field and for assisting the instrument operators in maintaining the analytical instruments.

5. Team Personnel:

The SAT leader will probably be the senior ISP technical person at the inspection site. It is expected that he/she will be competent in all aspects of the relevant analytical and NDE procedures and, especially, in the interpretation of the data generated. A good understanding of the rights and obligations of the ISP and the inspection team is also necessary.

The instrument operators should be expert in the operation and maintenance of the analytical instruments; including hand held detectors. They should have the capability to perform field repairs on SAT instruments. They should also be highly qualified in the interpretation of the data generated. They should be qualified on the equipment to be used by the inspection team as well as their own equipment, if different.

The chemists should be expert in the preparation of samples for analysis by whatever instruments may be used. In addition, they should be well versed in the proper methods for collecting, handling, dividing and preserving of samples. They should be qualified on the equipment to be used by the inspection team as well as their own equipment, if different.

The experts in non destructive evaluation should be qualified, as a team, in both acoustic methods and in neutron activation analysis. They must be capable of both collecting and interpreting data. They should be qualified on the equipment to be used by the inspection team as well as their own equipment, if different.

The logistics expert should be well versed in the packaging and transportation rules pertinent to the SAT equipment; especially those related to hazardous good's shipment. He/She must be capable of maintaining all the SAT support equipment during field deployment.

6. Team Equipment:

The Shadow Analysis Team should be capable of operating in the field independent of the host site. In most inspections it will not be necessary to deploy the full equipment suite as the host site will be able to supply varying degrees of support; e.g., power, laboratory hood space, or compressed gases.

The SAT should have equipment to perform any kind of measurement that an inspection team might make. The equipment should have performance characteristics at least as good as that of the inspection team. It is not necessary that the SAT equipment be identical to the inspectors'.

The SAT should maintain sufficient equipment and spare parts to respond to two concurrent inspections. With certain equipment, including GC-MS, this will require three items: two for deployment and one for maintenance. For other items such as generators or

hoods, only a duplicate capability will be required. A detailed inventory status should be available to the SAT leaders at any time.

The SAT Leader should have the authority to purchase emergency replacement parts and supplies while in the field.

7. Team Basing:

The Shadow Analysis Team will be based within the AMC Treaty Laboratory at the Coordinating or Collaborating Laboratory sites where the requisite expertise resides and where the equipment can be most efficiently maintained and upgraded.

For efficiency of maintenance, inventory and upgrading capability, all deployable equipment of a given type should be based at the same site. For example, all analytical instrumentation and mechanical support equipment could be at the AMCTL-Edgewood, the Coordinating Lab, while all sample collection, and sample preparation kits could be at the Lawrence Livermore National Laboratory, a Collaborating Lab. This equipment basing should not be taken to indicate that the AMCTL will not have staff expert in performing sample preparation or that LLNL will be devoid of qualified analysts. Although primary personnel deployment will come from the equipment centers, backup staff and particularly talented personnel should be enlisted from wherever they reside.

It should be noted that a continuing level of support will be needed to maintain the availability and readiness of SAT personnel. When no inspection or training exercise is in progress, effort should be devoted to maintaining and upgrading both equipment and procedures.

Non destructive evaluation presents a special case because of the non-commercial status of the equipment and the paucity of expertise that currently exists. It is recommended, therefore, that two sets of each of three NDE equipment items be procured; i.e., Ultrasonic Pulse Echo (UPE), Acoustic Resonance Spectrometry (ARS) and Neutron Activation Analysis (PINS). The PINS should be maintained at and deployed from the Idaho National Engineering Laboratory where it was developed and where it is currently being used in support of other DOD missions. The two types of acoustic equipment should be based at a single site. One of the developer sites (LANL or PNL) should be selected. An alternative arrangement would be to have all of the NDE equipment delivered to and based at a site where a sufficiently broad range of expertise exists to deploy, maintain and upgrade all of the item types. Any of the three developing labs mentioned or the LLNL will qualify. (There may be some advantage in terms of both deployment and contracting to base the capability at the LLNL).

8. Team Support:

Since inspections are expected to occur with little prior notice; i.e., 12 hours before arrival of the inspection team at the POE, the SAT must be supported by a system that can implement rapid communication and deployment. Personnel must be rapidly locatable. Travel orders must be pre authorized for instantaneous implementation. Equipment must be pre positioned, packed and authorized for transport immediately as required. Such a system will require the establishment of special authorization and implementation channels within and among the coordinating and collaborating laboratories.

9. Team Training:

Much of the technical training of the SAT will be continuous because of duties other than those specifically related to SAT activities. For example, it is expected the analytical chemists and mass spectroscopists will be doing analytical chemistry and mass spectroscopy on other projects. This is a major rationale for siting the team staff and equipment as recommended. However, the entire system will need to be exercised and realistically deployed to maintain its effectiveness. Therefore, in the absence of actual inspection missions, realistic training deployments should occur at least once every six months. At least two training deployments should be planned to occur prior to entry into force so as to establish the capability and to discover and remedy deficiencies. Upgraded capabilities should be tested in limited, though realistic, local exercises prior to implementation during actual inspections.

10. Deployment Scenario:

The following is an illustration of a Shadow Analysis Exercise.

A Challenge Inspection is called under the CWC at the US Army Redstone Arsenal, Huntsville, Alabama. The challenge deals with the production and storage of chemical agent. As soon as the nature of the Challenge is known, one of the SAT Leaders will be notified by the US National Authority (NA) and will travel by quickest route to Huntsville. Once there, he/she will work with the site team to assess the technical aspects of the inspection. While this assessment is going on, other members of the SAT will be put on standby for deployment. A second SAT senior staff member may be assigned to the National Authority to facilitate communications to the SAT at the inspection site and to determine the nature of the inspection team and its equipment.

After consulting with the site personnel and the SAT staff at the NA, the SAT Leader at the inspection site will call out those assets and personnel of the SAT that he/she deems appropriate. The SAT will then deploy by quickest means to the inspection site.

This entire process must take place in no more than 48 hours from first notification to arrival of the full SAT as the inspection site.

The SAT Leader will act as scientific advisor to the ISP Team Chief on the technical aspects of request from the inspection team relative to verification of compliance with the CWC.

If samples are requested by the inspection team and the ISP Team Chief agrees, after consulting with the SAT Leader, the SAT, under observation by the inspectors, will collect the samples, split them and provide the requested sample to the inspectors for on-site analysis. A second aliquot will be analyzed by the SAT at the same time.

If NDE measurements are requested, the ISP Team Chief may wish to have SAT staff perform a measurement of the selected munitions/containers before permitting the inspectors to make their measurements. In any case, the inspectors will be closely observed by SAT staff while performing NDE.

The results of the SAT analyses will be presented to the ISP Team Chief through the SAT Leader.

Following the inspection, the SAT will prescribe sanitation procedures to be applied by the inspectors. They will also perform any measurements needed to ensure that sanitation is complete. The SAT will then advise the ISP Team Chief, through the SAT

Leader, what equipment should be released to the inspection team and what, if any, should be retained.

The SAT Leader will also advise the ISP Team Chief as to the technical aspects of the inspection report.

11. Availability of SAT Services:

At present, the SAT is viewed with respect to USG facilities only. However, it is recognized that, particularly with respect to the CWC, the US chemical industry will probably bear the brunt of inspection. The US National Authority should closely consider establishing a method whereby SAT services could be made available, on request, to industrial facilities. These services should be available on a cost reimbursable basis except where the facility to be inspected has sensitive USG information to protect.

12. Summary:

The Shadow Analysis Team is an activity of the Inspected State Party to assist the inspected site in protecting sensitive information not relevant to the legitimate purpose of an on-site inspection. The team is made up of highly qualified technical personnel and will provide non destructive evaluation and chemical analytical capabilities. The capabilities of the team personnel and equipment are discussed along with a recommended deployment strategy.

Technical Information Department • Lawrence Livermore National Laboratory
University of California • Livermore, California 94551