

CULTIVATING EFFECTIVE STATE AUTHORITIES RESPONSIBLE FOR SAFEGUARDS IMPLEMENTATION

Frederic A. Morris
Seattle WA USA

ABSTRACT

State authorities responsible for safeguards implementation (State Authorities) are essential to the application of International Atomic Energy (IAEA) safeguards in a State. Through administration of the State's System of Accounting for and Control of Nuclear Material (SSAC), State Authorities provide the critical link between safeguards activities at the facility and national levels and verification activities conducted by the IAEA. The more effectively the State Authority performs its role, the more robust the implementation of safeguards. While effectiveness is difficult to define, it clearly includes at least three aspects: (1) the State Authority's organizational effectiveness generally, (2) its effectiveness as a regulatory body, and (3) its effectiveness in performing the other functions of SSAC administration. Effectiveness also depends on the individual State's circumstances, including the size and composition of its nuclear sector, the type of safeguards agreements in force (e.g., Small Quantities Protocol, Additional Protocol), and its population and level of economic development. Further, effectiveness typically grows over time, as the State Authority builds capacity and gains experience. The paper identifies some characteristics of effective State Authorities and suggests several approaches for measuring and cultivating effectiveness. It is intended to provide a starting point for discussion among State Authority management and staff about how well they are doing and how they could do better.

INTRODUCTION

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) requires each Non-nuclear weapon State Party to accept safeguards as set forth in a safeguards agreement with the International Atomic Energy Agency (IAEA). In turn, such agreements require the State to establish and maintain a State System of Accounting for and Control of Nuclear Material (SSAC). To administer the SSAC, States designate one or more organizations to serve as the State authority responsible for safeguards implementation (State Authority). (For simplicity, the remainder of the paper assumes that the State Authority is a single organization although that is not always the case).

State Authorities vary greatly in their level of experience, the scope of responsibilities, and size. Some are over fifty years old, while others are recently created. In States with a nuclear energy sector, the State Authority is most often the nuclear regulatory body. In States with limited nuclear material used for non-nuclear energy purposes, the State Authority may be the regulatory body overseeing radioactive material and radiation safety or in some cases a related ministry, such as that for environmental protection or public health. Some State Authorities may employ hundreds of staff, while others may consist of a handful of individuals.

Regardless of their maturity, overall responsibilities, and size, State Authorities provide the critical link between safeguards activities at the facility and national levels and verification

activities conducted by the IAEA. An effective State Authority contributes powerfully to effective safeguards implementation.

While effectiveness is difficult to define, it clearly includes at least three aspects: (1) the State Authority's organizational effectiveness generally, (2) its effectiveness as a regulatory body, and (3) its effectiveness in performing the other, non-regulatory functions of maintaining an SSAC.

The effectiveness of a State Authority also depends on the individual State's circumstances, including the size and composition of its nuclear sector, the type of safeguards agreements in force (e.g., Small Quantities Protocol [SQP], Additional Protocol [AP]), and its population and level of economic development. Further, effectiveness typically grows over time, as the State Authority builds capacity and gains experience.

The remainder of the paper identifies some characteristics of effective State Authorities and suggests several approaches for measuring and cultivating effectiveness. It is intended to provide a starting point for discussion among State Authority management and staff about how well they are doing and how they could do better. While the paper reflects experience gained in support of the U.S. Department of Energy's National Nuclear Security Administration (NNSA) Office of Defense Nuclear Nonproliferation (DNN), including its International Safeguards Engagement Program (INSEP), the opinions expressed are the author's own.

ORGANIZATIONAL EFFECTIVENESS

By definition, a State Authority is an organization. Regardless of mission, effective organizations share certain characteristics. These characteristics include a robust organizational culture; an appropriate organizational structure; a management system with well-defined systems and processes; and sufficient human, technical, and financial resources.

Organizational Culture

Organizational culture embodies the extent to which the values, attitudes, beliefs, and behaviors of management and staff support achievement of the organization's mission. An organization with a strong, mission-focused culture is more likely to be effective than one in which management and staff are concerned with matters unrelated to its success, such as internal politics, personal advancement, or the avoidance of challenges.

An effective State Authority exhibits:

- A robust organizational culture overall, such that management and staff are committed to organizational excellence and continuous improvement
- A robust regulatory culture, such that regulatory decisions and actions are taken in a rigorous, impartial, technically sound, and transparent manner
- A robust safeguards culture, such that the safeguards mission is accorded high priority throughout the organization and is not treated as less important than other missions, such as safety or security

Organizational culture is critically important because it underpins all other aspects of State Authority effectiveness.

Organizational Structure

A State Authority's organizational structure should enable its staff to meet their responsibilities in support of the organization's mission or missions. There are several sets of options that can be used in defining an organizational structure:

- Flat structure (fewer levels) versus hierarchical structure (more levels)
- Compact structure (fewer units within each level) versus granular structure (more units within each level)
- Function based (e.g., licensing, inspection, etc.) versus subject based (e.g., safety, security, safeguards) versus sector based (e.g., research reactors, power reactors, etc.)
- Matrix (subject matter experts grouped to provide their expertise in support of multiple functions)

As noted previously, most State Authorities are also a regulatory body with non-safeguards responsibilities. The overall organizational structure is thus designed to support these multiple responsibilities and is not primarily driven by safeguards considerations. Nonetheless, the organizational structure should be so defined that staff with safeguards expertise are represented in all organizational units relevant to safeguards. In smaller organizations, this representation may be achieved through a matrix organization in which a few safeguards experts are made available for multiple functions (e.g., licensing, inspection, enforcement). In larger organizations, a separate organizational unit for safeguards may be established to operate with more autonomy.

Management System

Extrapolating from IAEA safety guidance, a State Authority should establish and implement a management system for achieving organizational goals, including safeguards, through well-defined processes that are transparent and regularly assessed and improved. The management system should address exercise of the State Authority's regulatory and safeguards functions, as well as support functions, such as legal, financial, and human resources. A management system should include documented objectives; roles, responsibilities, and accountabilities; standard operating procedures; and performance metrics. Such a system enables staff to perform assigned tasks in a rigorous and consistent manner. It also enables management to track, assess, and improve operations and practices, thus enhancing the State Authority's effectiveness over time.

Human, Technical, and Financial Resources

Like all organizations, a State Authority achieves its mission through the application of resources to the performance of organizational tasks. The management system defines *how* resources are applied, but they must be present in order to be deployed. These resources include:

- Human resources: sufficient qualified, well trained, and motivated staff
- Technical resources: facilities, equipment, and instruments
- Financial resources: funds to pay for staff labor, training, and travel and for the capital and operating costs of technical resources

An effective State Authority has systems in place to ensure that all necessary resources are available. These include:

- A human resource plan that identifies the required number and competencies of management and staff, and mechanisms for recruitment, training, evaluation, career development, and succession planning
- Regular identification of necessary technical resources, including acquisition, maintenance, and replenishment
- A detailed annual budget and long-term financial plan

Bilateral and multilateral support may be available for lower income countries. Effective State Authorities in such countries take full advantage of such opportunities. In all countries, effective State Authorities engage with the government and legislature to demonstrate the need for adequate financial support and the responsible use of resources.

REGULATORY EFFECTIVENESS

Most State Authorities are also nuclear regulatory bodies, with broad responsibilities for regulatory oversight of nuclear and other radioactive material, associated facilities, and associated activities, generally with respect to safety and security as well as safeguards. In some cases, their jurisdiction may be more limited (for example covering security and safeguards only). Regardless, the State Authority must exercise regulatory control to require that persons and entities with nuclear material conduct safeguards activities and provide information and access necessary for the State Authority to ensure that the State meets its safeguards obligations.

An effective State authority is independent of entities and persons that use or promote nuclear material and rigorously exercises its regulatory functions of gaining and maintaining regulatory control; licensing nuclear material, facilities, and activities; developing safeguards regulations; inspecting licensee facilities and activities; and taking enforcement action in the event of non-compliance.

(State Authorities do not typically exercise all regulatory functions with respect to the AP because some persons and entities do not use nuclear material but must still provide information and access for AP implementation. In such cases, the State Authority typically does not issue a license, but does establish enforceable AP requirements.)

Independence

Independence helps ensure that the State Authority's regulatory decisions are impartial and not affected by considerations other than its regulatory mandate. An effective State Authority establishes and maintains three types of independence:

- **Structural independence**: the State Authority's responsibilities and place within the governmental structure provide it with autonomy in exercising its regulatory functions (e.g., is not part of a ministry or department that promotes or uses nuclear energy)
- **Operational independence**: the State Authority exercises its regulatory functions without external interference (e.g., has well defined and transparent decision processes and measure to prevent and manage conflicts of interest)
- **Cultural independence**: the attitudes and behaviors of State Authority management and staff are highly supportive of effective regulatory oversight uncompromised by extraneous considerations

In some cases, such complete independence may not be possible, for example when primary legislation places the State Authority within a ministry that uses nuclear energy. In such cases, an effective State Authority establishes mitigating measures to prevent compromise of its regulatory decisions.

Regulatory Control

Establishing and maintaining regulatory control is an essential precondition for exercising regulatory oversight of nuclear material subject to safeguards. An effective State Authority ensures that persons and entities with all such nuclear material (or with information necessary for AP implementation) are known to the State Authority and subject to regulatory oversight. Gaining and maintaining regulatory control with respect to nuclear material used for fuel cycle purposes is ordinarily straightforward. Greater challenges arise for nuclear material used for its non-nuclear properties, such as depleted uranium shielding for radioactive sources or various products containing uranium or thorium, and for persons or entities that do not use nuclear material but have AP information. In such cases, an effective State Authority pro-actively engages with governmental, industrial, and research sectors to ensure those with relevant nuclear material or AP information are aware of their regulatory obligations and are subject to regulatory oversight.

Licensing

Once the State Authority becomes aware that an operator possesses or plans to possess nuclear material, licensing is the primary means of establishing and maintaining regulatory control and ensuring that the operator meets regulatory requirements. When the State Authority is also the nuclear regulatory body, it typically issues a single, comprehensive license through a unified process that typically covers safety and security, as well as safeguards. Ordinarily there is not a separate “safeguards license,” except perhaps for nuclear material used for non-nuclear properties (which is not generally subject to safety or security requirements). An effective State Authority establishes a well-defined and transparent licensing process that includes clear criteria for issuing or denying a license. The process also ensures that safeguards is integral to the licensing process – for example by including requirements for the submission of design information, nuclear material accounting and control (NMAC) plans, and measures for AP implementation. (Persons and entities that do not use nuclear material but are still subject to AP requirements are not generally subject to licensing.)

Regulation Development

Safeguards requirements are usually expressed through binding regulations. The State Authority is generally responsible for developing and implementing regulations, although in some States regulations are formally adopted by the executive or the legislature. In some cases, requirements equivalent to regulations are included in licenses. An effective State Authority develops regulations through a systematic process that includes coordination with other interested agencies, a drafting team that includes all appropriate expertise, application of principles for clear and consistent regulatory drafting, and opportunity for public comment. An effective State Authority also ensures that its regulations include all relevant requirements necessary for compliance with the State’s Comprehensive Safeguards Agreement (CSA), including the AP if

applicable. While such regulations should be consistent with the terminology and requirements in the State's regulations for licensing, safety, and security, a useful starting point is provided in the model regulation included in the IAEA Safeguards Implementation Practices Guide on Establishing and Maintaining State Safeguards Infrastructure (IAEA Services Series 31).

Inspection and Enforcement

The State Authority conducts inspections to verify compliance with safeguards-related regulatory requirements and license conditions. In cases of non-compliance, the State Authority takes enforcement action. Inspections and the prospect of enforcement for non-compliance serve as an incentive for licensees to meet their obligations and also demonstrate that the State Authority is meeting its obligation to exercise regulatory oversight. In smaller States, safeguards may be covered in safety and security inspections. State Authorities in larger States may conduct dedicated safeguards inspections. While State Authority inspections are focused primarily on compliance with safeguards requirements, such inspections may also include activities to help ensure that the operator is prepared for IAEA inspections.

An effective State Authority establishes an inspection program that specifies the inspections to be conducted each year and follows an inspection plan for conducting inspections on a consistent and comprehensive basis. An effective State Authority also establishes an enforcement process for identifying violations, assessing their seriousness, and imposing enforcement actions according to a graded approach. While enforcement actions for safeguards violations are rare, the possibility of enforcement in appropriate cases helps preserve the integrity of the regulatory process.

EFFECTIVENESS IN PERFORMING SAFEGUARDS FUNCTIONS

By definition, the State Authority's core mission is administering the SSAC. Organizational effectiveness and regulatory effectiveness are important enablers, but ultimately the effectiveness of a State Authority depends on its performance of this mission. Safeguards functions include ensuring the establishment and correct application of appropriate NMAC measures by operators, collecting and maintaining records of safeguards information, providing required information and reports to the IAEA, supporting the IAEA in the conduct of verification activities, and responding to questions from the IAEA. If an AP is in force, the State Authority must also ensure that all relevant persons and entities provide required AP information and access.

Operator NMAC

An effective State Authority ensures that operators develop and correctly implement NMAC systems. These include:

- Recruitment or training of staff with sufficient safeguards expertise on the practical application of NMAC measures in the types of facilities present or planned in the State, such as the expertise necessary to conclude subsidiary arrangements and facility attachments
- Engagement with operators to ensure that they have staff with sufficient expertise to establish and correctly apply NMAC measures, as well as the necessary authority and resources for NMAC implementation

- Facility visits beyond compliance inspections to ensure operators are prepared for IAEA inspections

National Safeguard Information

The State Authority maintains a national nuclear material inventory and records of other safeguards information, including:

- NMAC records for all nuclear material, including inventory, movements, production, consumption, and losses
- Tracking of imports and exports of nuclear material
- Reconciliation of nuclear material inventories
- Records of information required for AP declarations, if applicable

An effective State Authority employs a dedicated safeguards information system for this purpose based on suitable software, either nationally developed or purchased commercially, and ensures the availability of staff with an appropriate combination of information technology and safeguards expertise to establish, operate, review, and improve this system. It also develops and uses written procedures for collecting information and preparing and submitting reports and AP declarations to the IAEA.

Reporting to the IAEA

The State Authority submits reports and declarations to the IAEA as required by its CSA and AP, if applicable, including:

- Initial report on all nuclear material subject to safeguards
- Status of facilities and LOFs
- Design information
- NMAC reports
- Reports of inventory changes and changes in design information
- Information required by AP Articles 2 and 3

Through its management systems, an effective State Authority ensures that these submissions are timely, accurate, complete, and consistent with IAEA requirements. In connection with the AP, effective State Authorities make use of the IAEA-provided Additional Protocol Declaration Helper and Protocol Reporter. Effective State Authorities also have written procedures for collecting information and preparing and submitting reports to the IAEA and engage regularly with cognizant IAEA safeguards staff to ensure they are getting the information they need.

Supporting IAEA Verification Activities

The State Authority supports IAEA verification activities through several means, including:

- Providing access to the IAEA for inspections, design information verifications (DIVs), and for complementary access and access to locations requiring managed access, if applicable
- Ensuring facility operators are well prepared to support IAEA inspectors in performing verification activities
- Accompanying IAEA inspectors during verification activities
- Ensuring IAEA inspectors receive necessary logistical support (e.g., meals, transportation, escort, bathrooms, facility-specific training)

Effective State Authorities provide such support through such means as

- Written procedures for assisting the IAEA before and during in-field activities – e.g., for operator coordination, notification, and access; providing information on planned facility operations (schedules, outages, maintenance, inventory takings, holidays, etc.); providing facility-specific health and safety information
- Arranging for basic logistics for IAEA inspectors either directly or by operators
- Developing arrangements for operators to otherwise support IAEA inspections, such as operating equipment, moving items, etc.
- Facilitating IAEA shipment (import/export) of safeguards equipment and samples and coordinating with Customs as necessary
- Coordinating with operator to store or dispose of IAEA equipment
- Facilitating resolution of any questions that may arise during inspection (e.g., discrepancies and anomalies) in a timely manner

Effective State Authorities also engage with IAEA inspectors after and between verification activities to ensure that they are getting the support they need.

Responding to IAEA Inquiries

The State Authority responds to such IAEA inquiries as requests for amplification or clarification to resolve safeguards implementation issues, such as discrepancies or anomalies. An effective State Authority ensures the timely availability of staff with sufficient expertise to respond to such inquiries and address the underlying issues, in consultation with operator personnel as necessary.

MEASURING AND CULTIVATING EFFECTIVENESS

Building State Authority effectiveness is inherently a work in progress. Newer State Authorities, especially in smaller States or States with limited nuclear material, may feel somewhat overwhelmed. Such State Authorities should be reassured that no State Authority is expected to be fully effective soon after its designation. Instead they can start with the basics and then build capacity over time. As State Authorities mature, they will still find room for becoming more effective. All State Authorities can benefit from regularly assessing their effectiveness and instating measures for improvement.

Performing assessments in relation to the characteristics of effectiveness discussed above can be challenging. Several different approaches can be employed, including the following.

Binary Approach

The State Authority could apply the characteristics of effectiveness in binary terms. For example:

Effectiveness Characteristic	Yes	No
Management system with documented objectives; roles, responsibilities, and accountabilities; standard operating procedures; and performance metrics		
Detailed annual budget and long-term financial plan		
Etc.		

Numeric Scale

The State Authority could apply the characteristics of effectiveness on a numeric scale. For example:

Effectiveness Characteristic	Not Present	Partially Present	Present
Management system with documented objectives; roles, responsibilities, and accountabilities; standard operating procedures; and performance metrics			
Detailed annual budget and long-term financial plan			
Etc.			

Implementation Status

The State Authority could apply the characteristics of effectiveness in terms of progress in implementation, as used in World Institute for Nuclear Security Best Practices Guides. For example:

Effectiveness Characteristic	Minimal	Developing	Baseline	Advanced	Exemplary
Management system with documented objectives; roles, responsibilities, and accountabilities; standard operating procedures; and performance metrics					
Detailed annual budget and long-term financial plan					
Etc.					

SUMMARY

An effective State Authority enables the State to meet its safeguards obligations by:

- Building and developing an organization that provides a supportive platform for achieving the organization's goals
- Performing its regulatory functions in a professional, impartial, technically sound manner
- Performing its safeguards functions rigorously, reliably, and systematically

REFERENCES

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