State Provided GIS Data Sources for Treaty Verification

CTBT: SCIENCE AND TECHNOLOGY 2017 CONFERENCE

J. Rutkowski[1], A. Keskinen[2], J. Idinger[2], I. Niemeyer[1] and A. Rialhe[2]

[1] *Forschungszentrum Jülich GmbH, Institute of Energy and Climate Research, IEK-6: Nuclear Waste Management and Reactor Safety, Jülich, Germany*
[2] *International Atomic Energy Agency, Department of Safeguards, Division of Information Management, Vienna, Austria*

JÜLICH FORSCHUNGSZENTRUM

IAEA 60 Years Atoms for Peace and Development

Introduction

GIS – *Geographic Information Systems* – is the general term used to describe information systems incorporating the storage, operation, analysis and display of data in a geographic context. GIS applications are widely used by governments, NGOs and different industrial sectors.

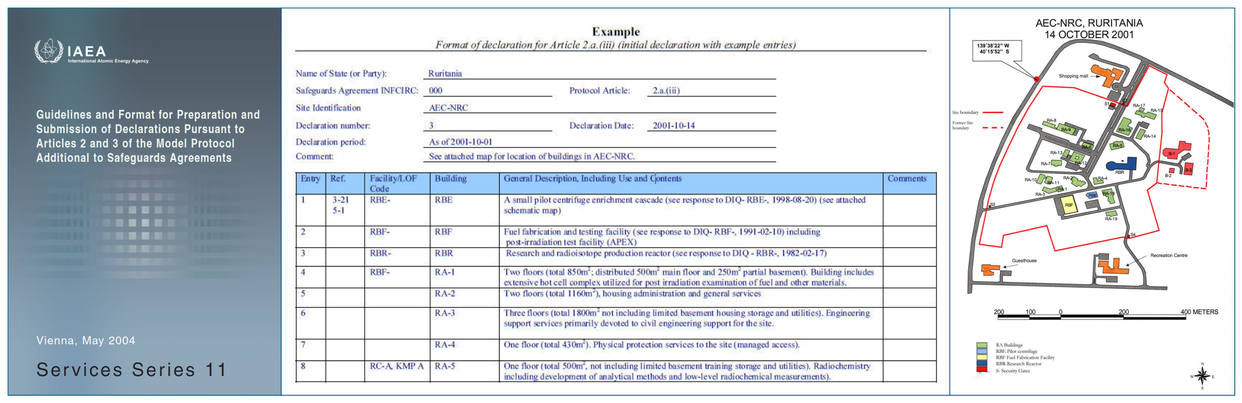
GIS supports international agreements and treaties by establishing clearer communication among participants as well as increasing the efficiency of treaty verification by providing accurate geographic information. The IAEA's Department of Safeguards makes use of GIS in support of the verification of Safeguards agreements including the Model Additional Protocol (AP).

This poster illustrates the existing and future use of GIS for AP verification process at the IAEA's Department of Safeguards.

GIS for Additional Protocol 2.a.(iii)

The IAEA's Department of Safeguards and its Division of Information Management (SGIM) particularly is collecting, processing and evaluating all safeguards relevant information necessary to independently draw credible safeguards conclusions.

GIS is a useful tool to contribute to the effective evaluation of State declared information. AP site declarations and attached maps for Article 2.a.(iii) are verified through analysis with geospatial data and other safeguards relevant sources of information.



IAEA International Atomic Energy Agency

Guidelines and Format for Preparation and Submission of Declarations Pursuant to Articles 2 and 3 of the Model Protocol Additional to Safeguards Agreements

Vienna, May 2004

Services Series 11

Example

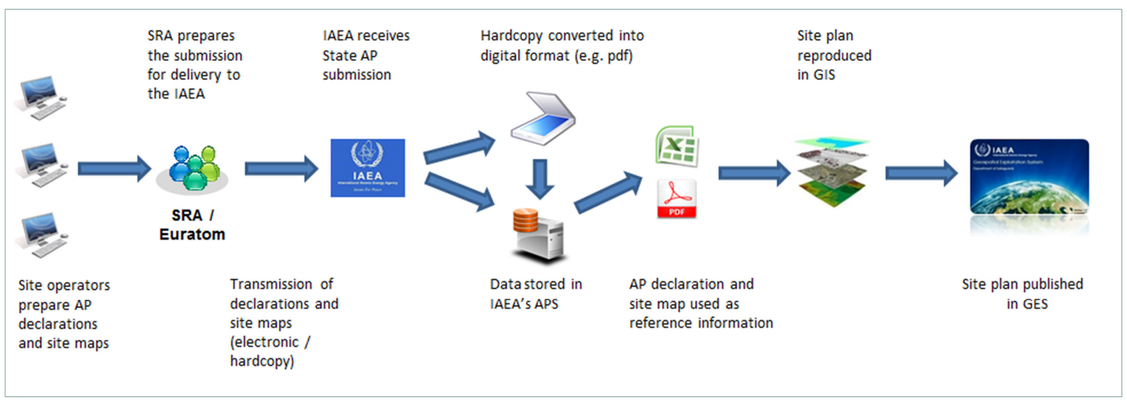
Format of declaration for Article 2.a.(iii) (initial declaration with example entries)

Name of State (or Party): Ruritania
Safeguards Agreement INFCIRC: 000 Protocol Article: 2.a.(iii)
Site Identification: AEC-NRC
Declaration number: 3 Declaration Date: 2001-10-14
Declaration period: As of 2001-10-01
Comment: See attached map for location of buildings in AEC-NRC.

Entry	Ref.	Facility/LOF Code	Building	General Description, Including Use and Contents	Comments
1	3-21 5-1	RBE-	RBE	A small pilot centrifuge enrichment cascade (see response to DIQ- RBE-, 1998-08-20) (see attached schematic map)	
2		RBF-	RBF	Fuel fabrication and testing facility (see response to DIQ- RBF-, 1991-02-10) including post-irradiation test facility (APEX)	
3		RBR-	RBR	Research and radioisotope production reactor (see response to DIQ - RBR-, 1982-02-17)	
4		RBF-	RA-1	Two floors (total 850m²; distributed 500m² main floor and 250m² partial basement). Building includes extensive hot cell complex utilized for post irradiation examination of fuel and other materials.	
5			RA-2	Two floors (total 1160m²), housing administration and general services	
6			RA-3	Three floors (total 1800m² not including limited basement housing storage and utilities). Engineering support services primarily devoted to civil engineering support for the site.	
7			RA-4	One floor (total 430m²). Physical protection services to the site (managed access).	
8		RC-A, KMP A	RA-5	One floor (total 500m², not including limited basement training storage and utilities). Radiochemistry including development of analytical methods and low-level radiochemical measurements).	

AEC-NRC, RURITANIA
14 OCTOBER 2001
136°38'22" W
40°15'52" S
Shopping mall
Guesthouse
Recreation Centre
200 100 0 200 400 METERS
RA Buildings
RBE Pilot centrifuge
RBF Fuel Fabrication Facility
RBR Research Reactor
S- Security Gates

Example of an AP site declaration and attached map for Article 2.a.(iii)



Current AP submission process with electronic data and hardcopies

States use various means (e.g. Protocol Reporter, CAPE, hardcopies) to submit AP declarations to the IAEA. Site maps are created with different standards in GIS, CAD etc. and are submitted in pdf format and hardcopies to the IAEA.

The IAEA supports States' data management and reporting by providing trainings on Protocol Reporter 3 software

Digital Declaration Site Maps

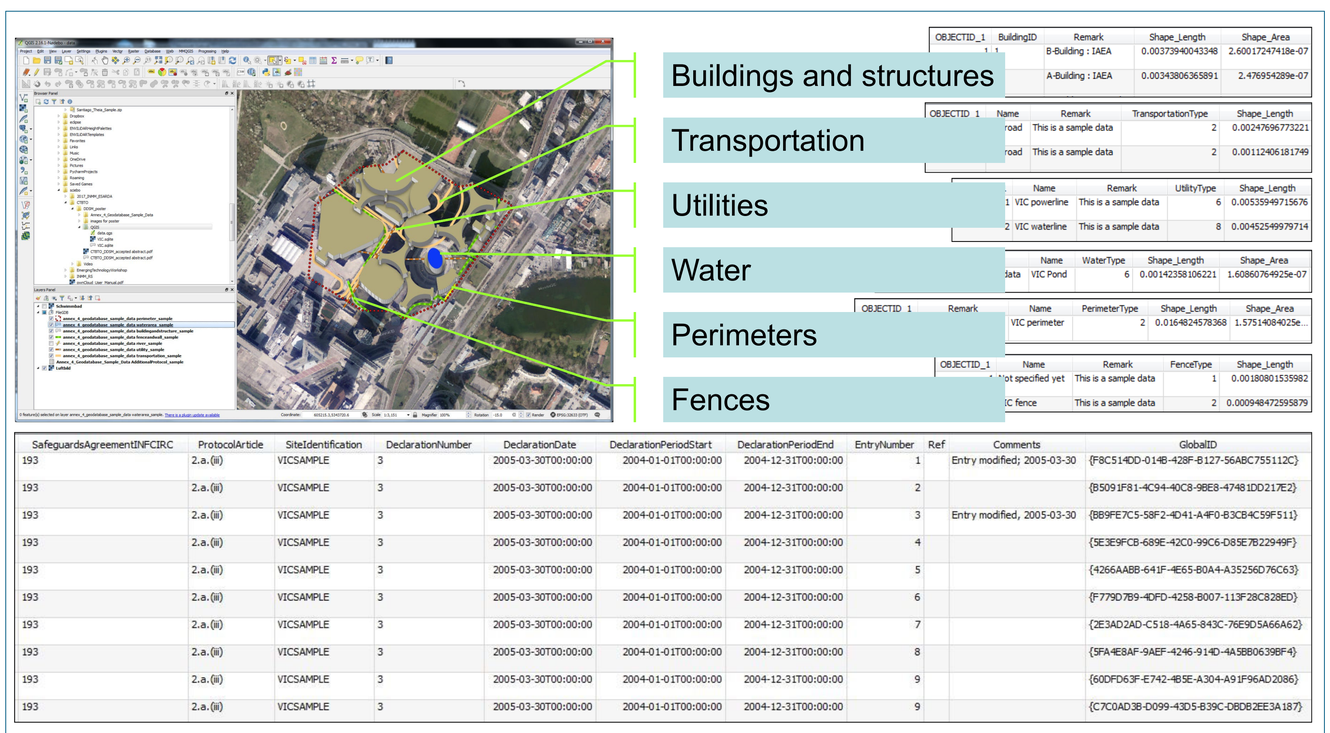
The **Digital Declaration Site Maps (DDSM)** Member State Support Programme (MSSP) task was initiated with four States to evaluate and demonstrate the provision of digital site maps on selected nuclear sites. The German MSSP has contributed to creating the framework document with GIS standards and specifications, creating digital site maps and evaluating data conversion techniques.

GIS offers users direct access to the original data content in a map. Creating GIS portals with declaration data is a proof of concept for this task and will:

- enable querying of all attribute information associated with each feature on the map
- improve communication about the location and function of buildings
- assure spatial accuracy of features' geometries
- permit integration of current and historical datasets (e.g. previous declarations)

DDSM Task Phases:

1: Review existing data, processes and methods
2: Create technical specifications for the provision of DDSM data
3: Implement case studies
4: Develop and improve DDSM workflows using GIS portals



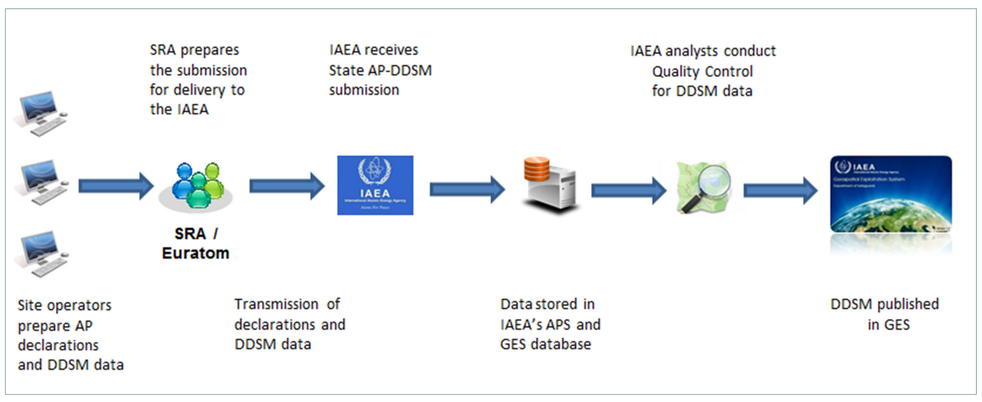
SafeguardsAgreementINFCIRC	ProtocolArticle	SiteIdentification	DeclarationNumber	DeclarationDate	DeclarationPeriodStart	DeclarationPeriodEnd	EntryNumber	Ref	Comments	GlobalID
193	2.a.(iii)	VICSAMPLE	3	2005-03-30T00:00:00	2004-01-01T00:00:00	2004-12-31T00:00:00	1		Entry modified; 2005-03-30	{F8C514DD-014B-428F-B127-56ABC755112C}
193	2.a.(iii)	VICSAMPLE	3	2005-03-30T00:00:00	2004-01-01T00:00:00	2004-12-31T00:00:00	2			{B5091F81-4C94-40C8-9BE8-47481DD217E2}
193	2.a.(iii)	VICSAMPLE	3	2005-03-30T00:00:00	2004-01-01T00:00:00	2004-12-31T00:00:00	3		Entry modified, 2005-03-30	{BB9FE7C5-58F2-4D41-A4F0-B3CB4C59F511}
193	2.a.(iii)	VICSAMPLE	3	2005-03-30T00:00:00	2004-01-01T00:00:00	2004-12-31T00:00:00	4			{5E3E9FCB-689E-42C0-99C6-D85E7B22949F}
193	2.a.(iii)	VICSAMPLE	3	2005-03-30T00:00:00	2004-01-01T00:00:00	2004-12-31T00:00:00	5			{4266AABB-641F-4E65-B0A4-A35256D76C63}
193	2.a.(iii)	VICSAMPLE	3	2005-03-30T00:00:00	2004-01-01T00:00:00	2004-12-31T00:00:00	6			{F779D7B9-4DFD-4258-B007-113F28C828ED}
193	2.a.(iii)	VICSAMPLE	3	2005-03-30T00:00:00	2004-01-01T00:00:00	2004-12-31T00:00:00	7			{2E3AD2AD-C518-4A65-843C-76E9D5A66A62}
193	2.a.(iii)	VICSAMPLE	3	2005-03-30T00:00:00	2004-01-01T00:00:00	2004-12-31T00:00:00	8			{5FA4E8AF-9AEF-4246-914D-4A5BB0639BF4}
193	2.a.(iii)	VICSAMPLE	3	2005-03-30T00:00:00	2004-01-01T00:00:00	2004-12-31T00:00:00	9			{60DFD63F-E742-4B5E-A304-A91F96AD2086}
193	2.a.(iii)	VICSAMPLE	3	2005-03-30T00:00:00	2004-01-01T00:00:00	2004-12-31T00:00:00	9			{C7C0AD3B-D099-43D5-B39C-DBDB2EE3A187}

Declarations can be analysed in GIS along with satellite imagery and other map data

Summary

AP Article 2.a.(iii) site declarations and attached maps are a critical dataset for the verification process implemented at the IAEA's Department of Safeguards.

Using GIS for the AP submission and analysis provides distinct benefits for the IAEA and States. Sharing and using DDSM, 'one common site map' through a streamlined submission process will improve the communication and overall verification process.



AP-DDSM submission process with digital declaration site maps

Supported by:
Federal Ministry of Economics and Technology
on the basis of a decision by the German Bundestag