AUTORIDAD REGULATORIA NUCLEAR

Autoridad Regulatoria
Nuclear
Presidencia de la Nación Argentina

Emergency Preparedness and Response System for Nuclear Accidents in Argentina

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EMERGENCY PREPAREDNESS

INTRODUCTION

- The 24.804 Act, “The National Law On Nuclear Activities” establishes that the Nuclear Regulatory Authority (ARN) is the responsible of preparedness and response in case of nuclear and/or radiological emergency.

REGULATORY FUNCTIONS

- The Regulatory Body request to the Responsible Organization an Internal and External Emergency Plan.
- This plan comprises aspects related to the strategy required to control and limit the accident consequences. It is required by the Regulatory Body to license the nuclear power plant operation.

NUCLEAR EMERGENCY RESPONSE SYSTEM

The Nuclear Emergency Response System is the organizational scheme that the Regulatory Body uses to respond in cases of nuclear emergencies and interact with the national, state and local response organizations to manage effectively nuclear emergencies at preparedness, intervention and recovery stages.

SIEN

- Operatively 24 hours, 365 days.
- Convened by NPP licensee, civil organisations and IAEA.

PROTECTIVE ACTIONS

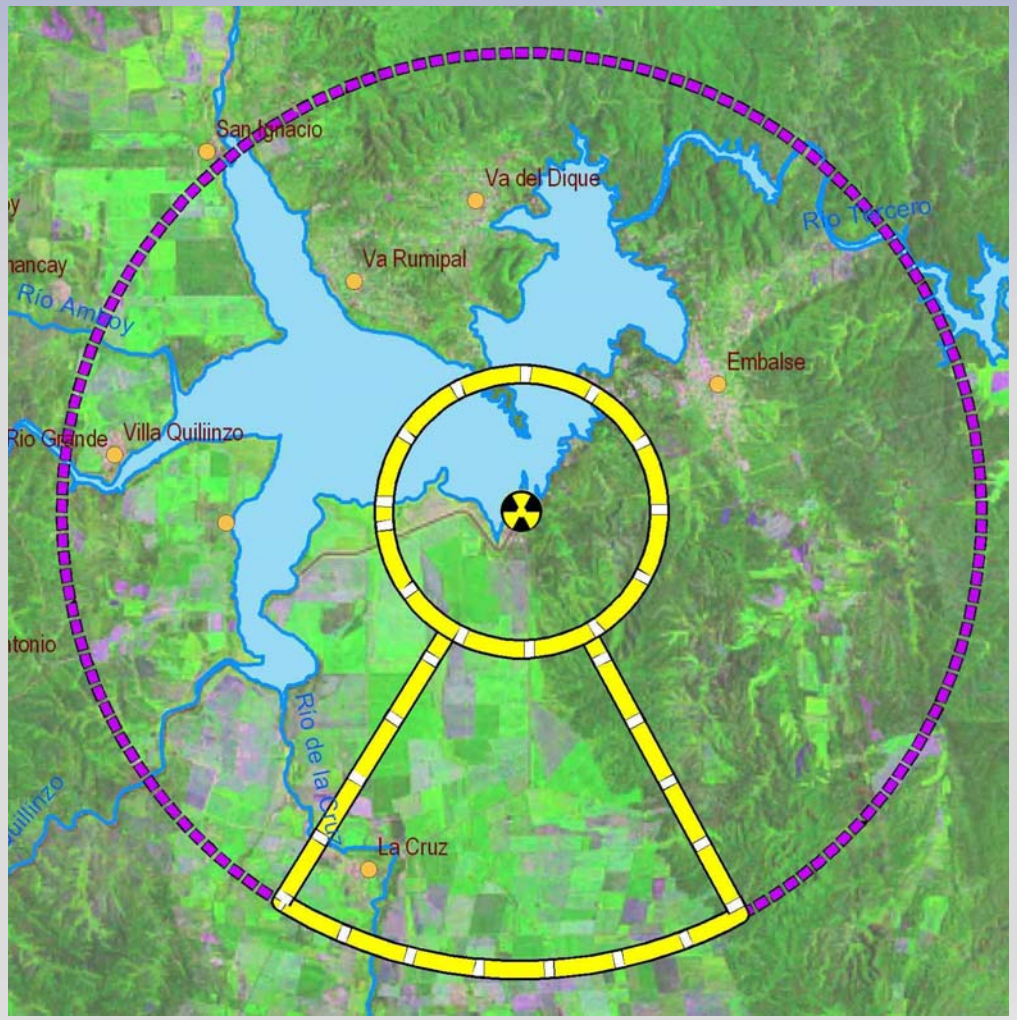
- The **urgent protective actions** are carried on the basis of **plant situation** and **meteorological conditions** without waiting for environmental monitoring data.

- The **goal** is to avoid the occurrence of **deterministic effects** in individuals and to reduce the occurrence of **stochastic effects** in the population.

EMERGENCY ZONES

The **Precautionary Action Zone (ZAP)** defined as the area enclosed in a 3 kilometers radius in all directions around the NPP as well as an area up to 10 km within an angle of 60 degrees in the direction of the wind.

The **Urgent Protective Action Planning Zone (ZPU)** extends to the rest of the area of 10 kilometers.



PROTECTIVE ACTIONS

Once the emergency is declared, protective actions consist in:

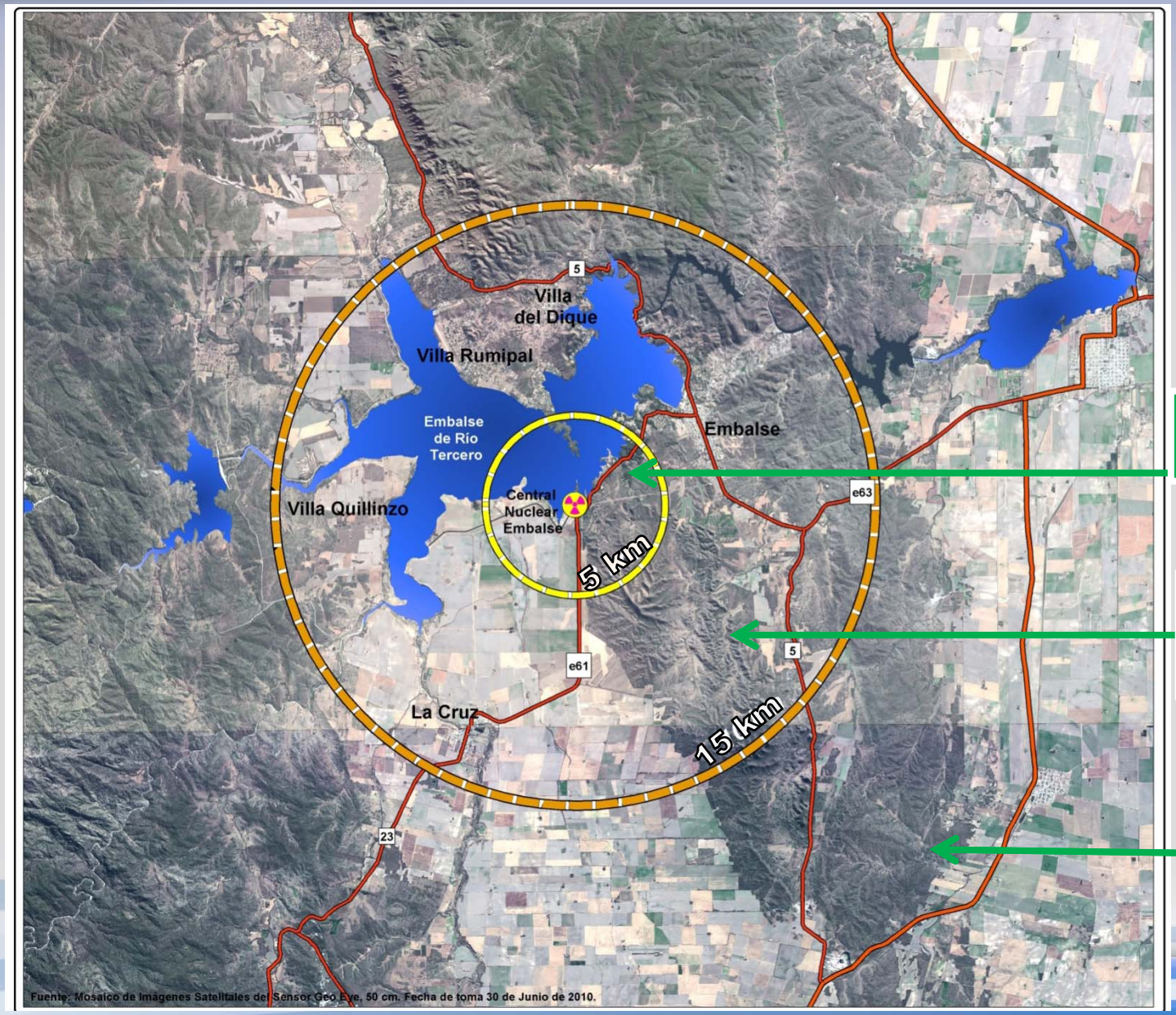
- Early evacuation of population in the area enclosed in a 3 km radius in all directions around the NPP;
- Access control in the 10 km radius area from the reactor site;
- Sheltering preparedness is implemented in both the ZAP and the ZPU, but only performed in ZAP;
- Iodine prophylaxis in the ZAP and the ZPU.
- Environmental monitoring is undertaken after the passage of the cloud to identify where longer term protective actions may be needed based on predefined intervention levels.

PROTECTIVE MEASURES

Longer Term Protective Actions

- Temporary relocation of the population due to high dose rates caused by radioactive deposition;
- Resettlement of evacuated areas;
- Restrictions on the consumption of foodstuffs in the affected areas;
- Soil decontamination (Only if largely justified).

PROTECTIVE ACTIONS



Early evacuation in the 3 km radius

Access Control, sheltering, and Iodine prophylaxis in 10 km

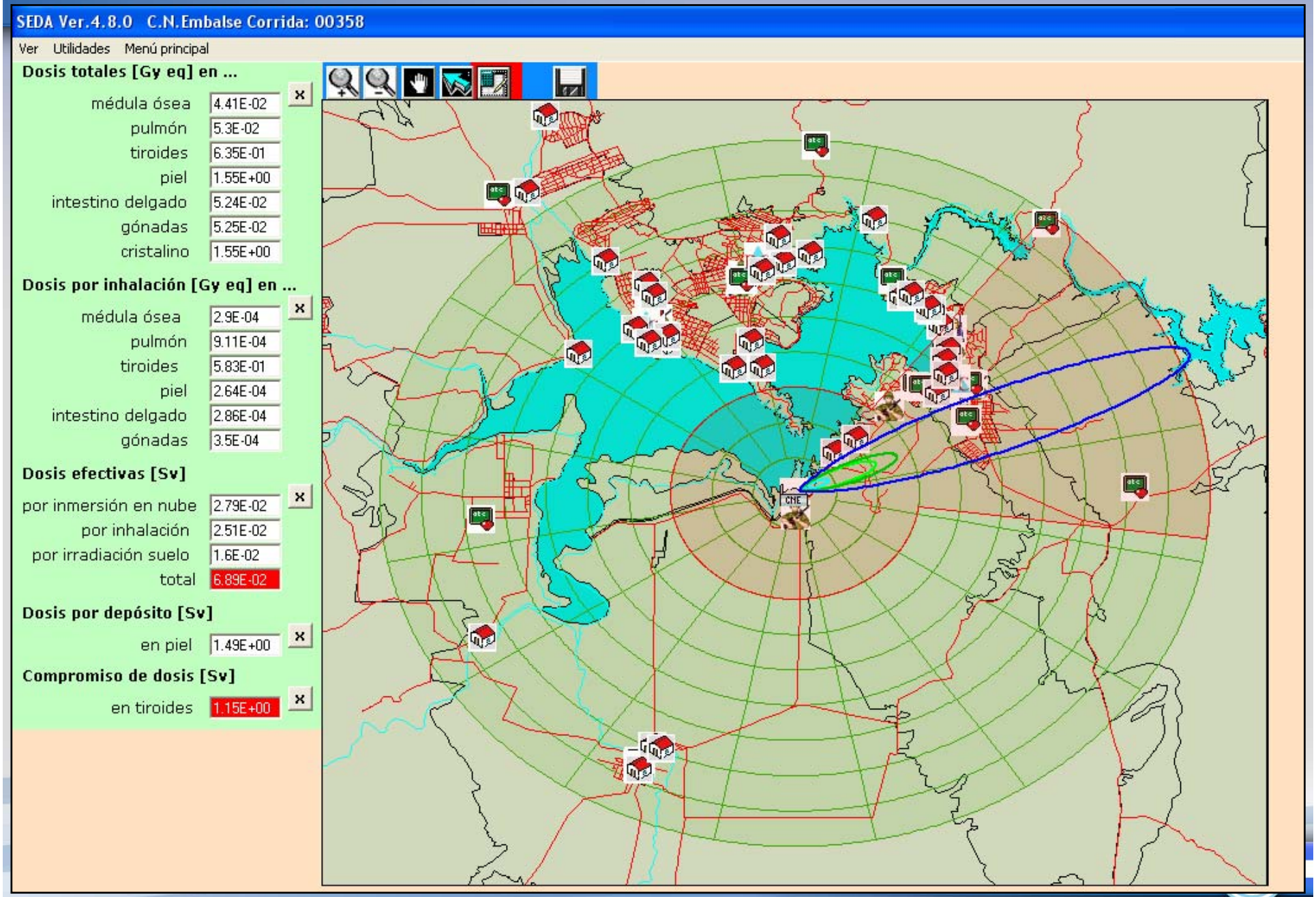
Another protective actions (mitigation measures, restrictions on foodstuffs etc)

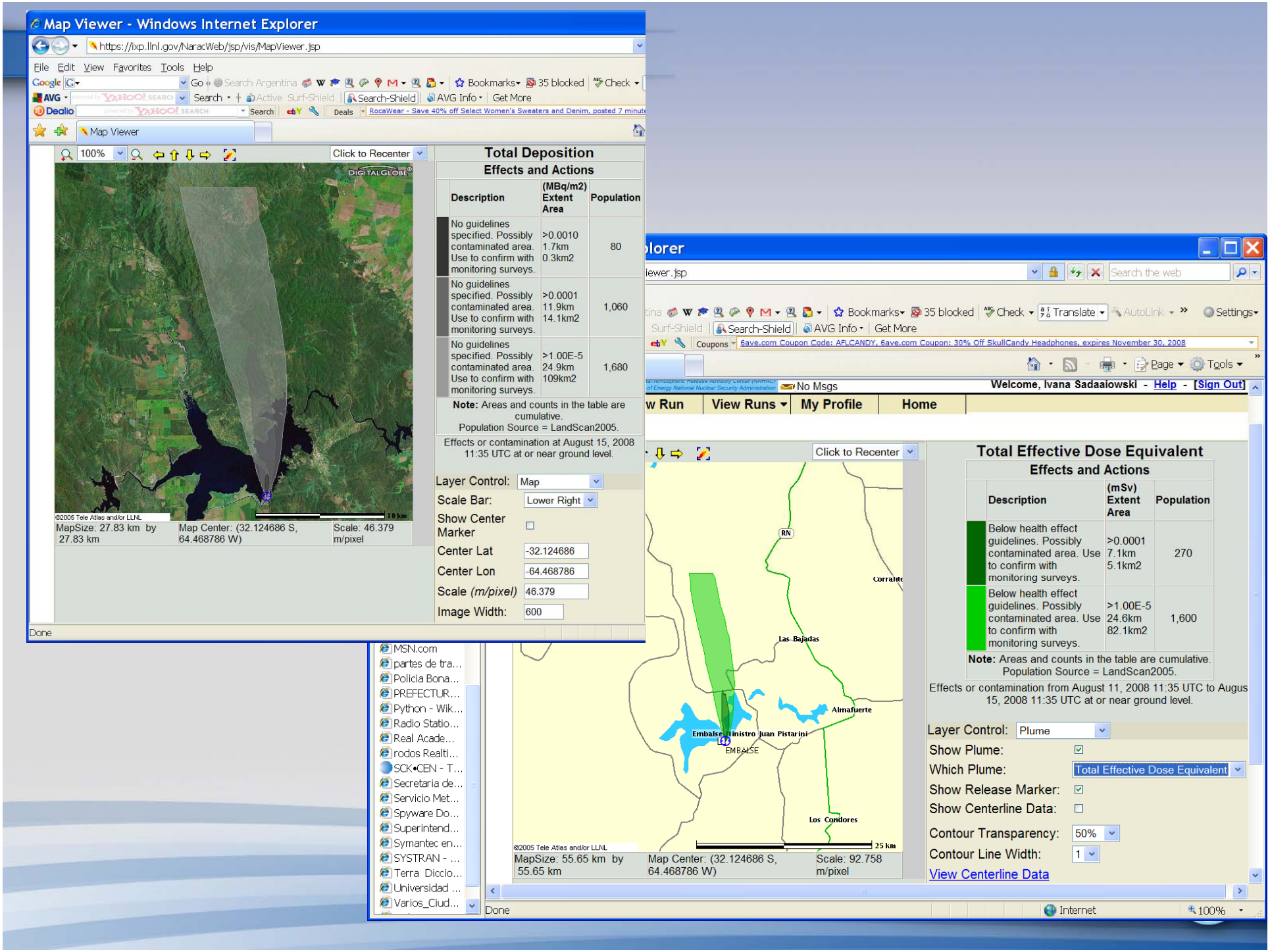
ATMOSPHERIC DISPERSION MODELS

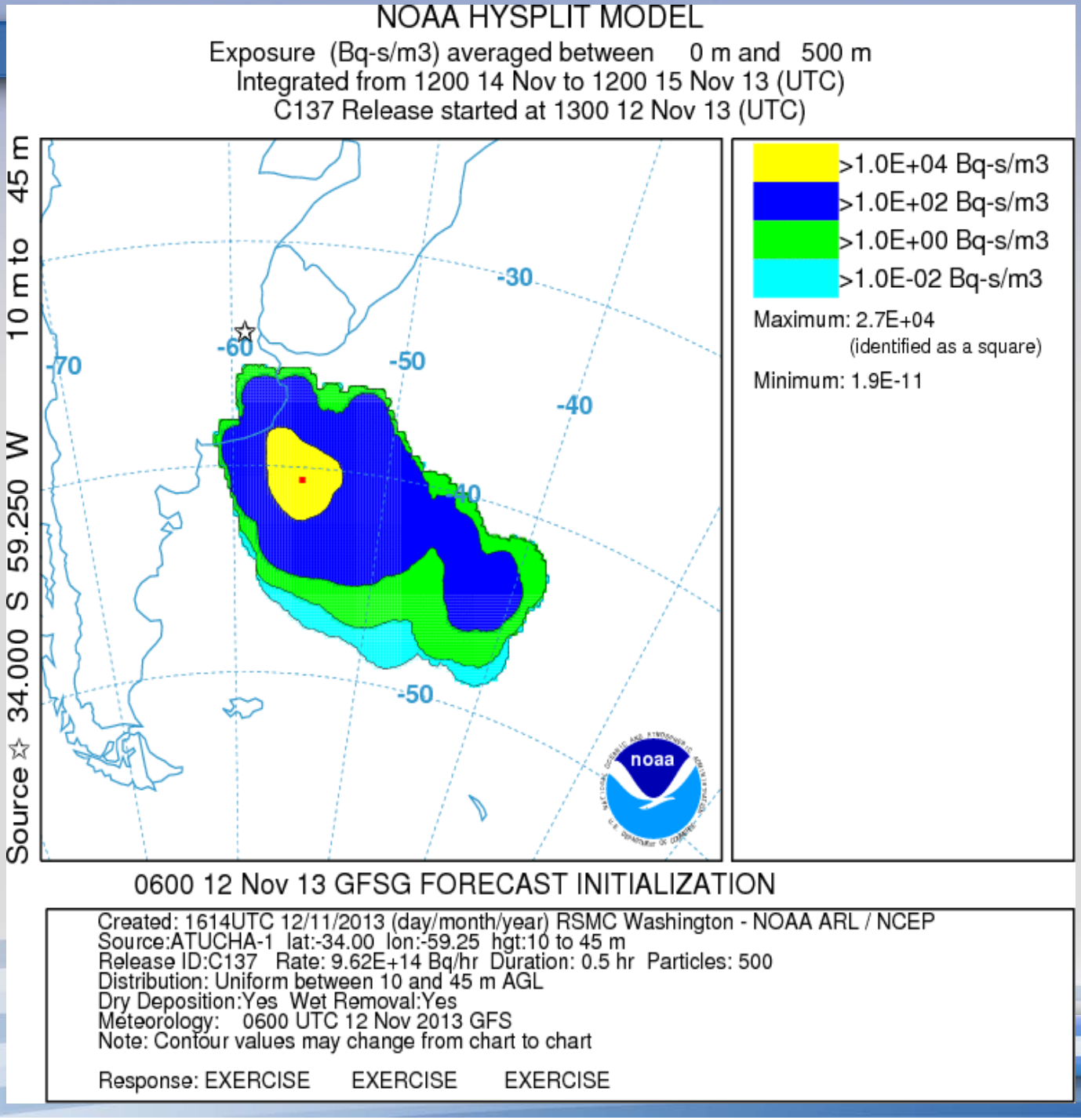
Are able to predict the evolution of radionuclides in the environment and the resulting dose to the public.
Input parameters for these models include source characteristics, release composition, and meteorological conditions at the moment of the emergency.

Tools:

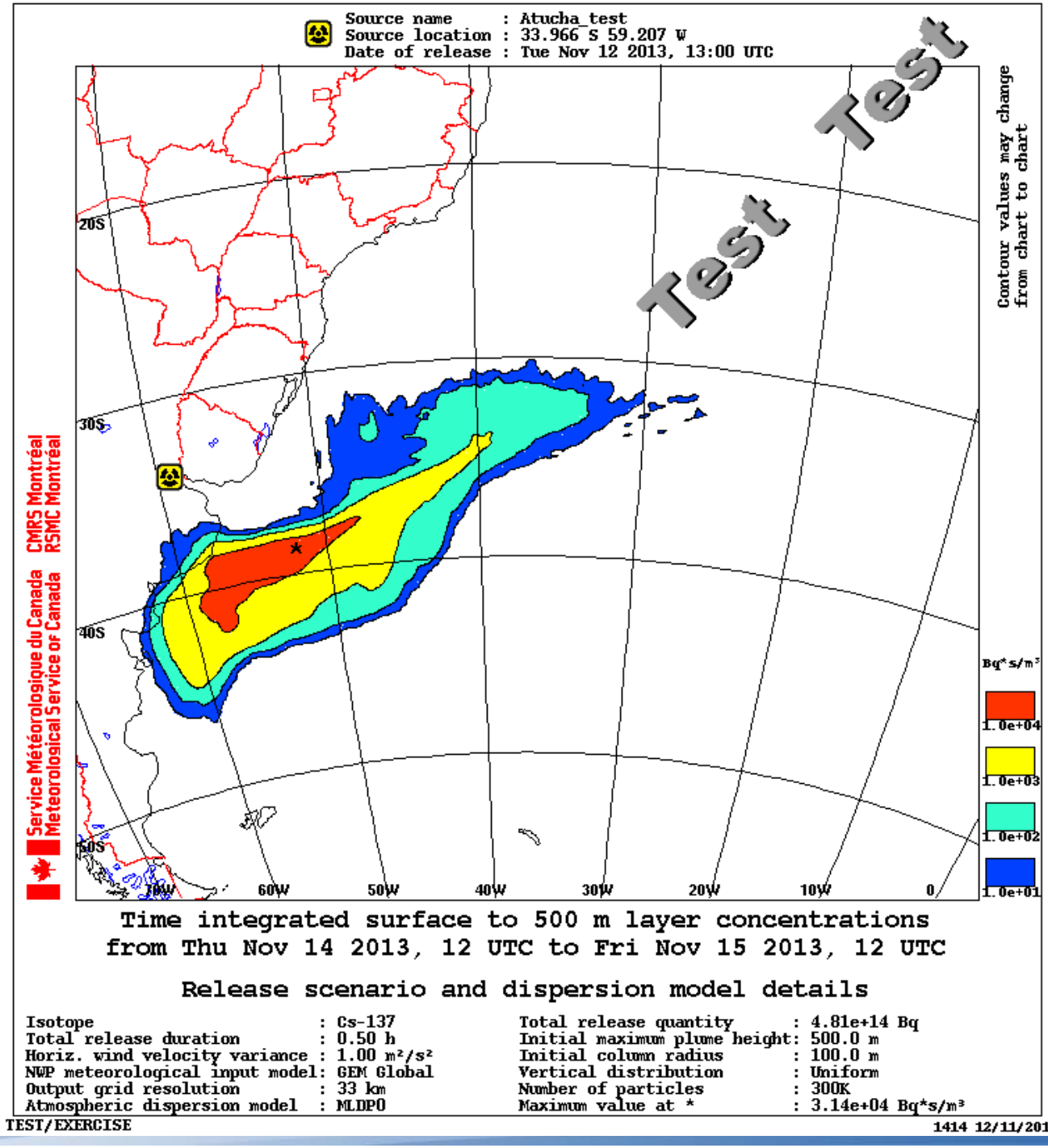
- SEDA code: can calculate isodose and isoconcentration lines at a local scale (within 20 km);
- IXP (the International Exchange Program - NARAC). The IXP system provides rapid, three-dimensional, time-dependent computer model predictions of the concentrations, dose and health effects, caused by atmospheric releases of radioactive materials;
- WMO (World Meteorological Organization), to run models in several Regional Specialized Meteorological Centers (RSMC) around the world in case of global dispersions.


SEDA Ver.4.8.0 C.N.Embalse Corrida: 00358
Ver Utilidades Menú principal
Dosis totales [Gy eq] en ...
médula ósea 4.41E-02
pulmón 5.3E-02
tiroides 6.35E-01
piel 1.55E+00
intestino delgado 5.24E-02
gónadas 5.25E-02
cristalino 1.55E+00
Dosis por inhalación [Gy eq] en ...
médula ósea 2.9E-04
pulmón 9.11E-04
tiroides 5.83E-01
piel 2.64E-04
intestino delgado 2.86E-04
gónadas 3.5E-04
Dosis efectivas [Sv]
por inmersión en nube 2.79E-02
por inhalación 2.51E-02
por irradiación suelo 1.6E-02
total 6.89E-02
Dosis por depósito [Sv]
en piel 1.49E+00
Compromiso de dosis [Sv]
en tiroides 1.15E+00
CNE


Map Viewer - Windows Internet Explorer
https://lxp.llnl.gov/NaracWeb/jsp/vis/MapViewer.jsp
Map Viewer
Click to Recenter
Total Deposition
Effects and Actions
Description
(MBq/m2) Extent Area
Population
No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.
>0.0010 1.7km 0.3km2
80
No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.
>0.0001 11.9km 14.1km2
1,060
No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.
>1.00E-5 24.9km 109km2
1,680
Note: Areas and counts in the table are cumulative.
Population Source = LandScan2005.
Effects or contamination at August 15, 2008 11:35 UTC at or near ground level.
Layer Control: Map
Scale Bar: Lower Right
Show Center Marker
Center Lat -32.124686
Center Lon -64.468786
Scale (m/pixel) 46.379
Image Width: 600
MapSize: 27.83 km by 27.83 km
Map Center: (32.124686 S, 64.468786 W)
Scale: 46.379 m/pixel
Done
Welcome, Ivana Sadaaiowski - Help - [Sign Out]
View Runs
My Profile
Home
Total Effective Dose Equivalent
Effects and Actions
Description
(mSv) Extent Area
Population
Below health effect guidelines. Possibly contaminated area. Use to confirm with monitoring surveys.
>0.0001 7.1km 5.1km2
270
Below health effect guidelines. Possibly contaminated area. Use to confirm with monitoring surveys.
>1.00E-5 24.6km 82.1km2
1,600
Note: Areas and counts in the table are cumulative.
Population Source = LandScan2005.
Effects or contamination from August 11, 2008 11:35 UTC to August 15, 2008 11:35 UTC at or near ground level.
Layer Control: Plume
Show Plume:
Which Plume: Total Effective Dose Equivalent
Show Release Marker:
Show Centerline Data:
Contour Transparency: 50%
Contour Line Width: 1
View Centerline Data
Las Bajadas
Almafuerte
Los Condores
EMBALSE
MapSize: 55.65 km by 55.65 km
Map Center: (32.124686 S, 64.468786 W)
Scale: 92.758 m/pixel
Done
Internet
100%



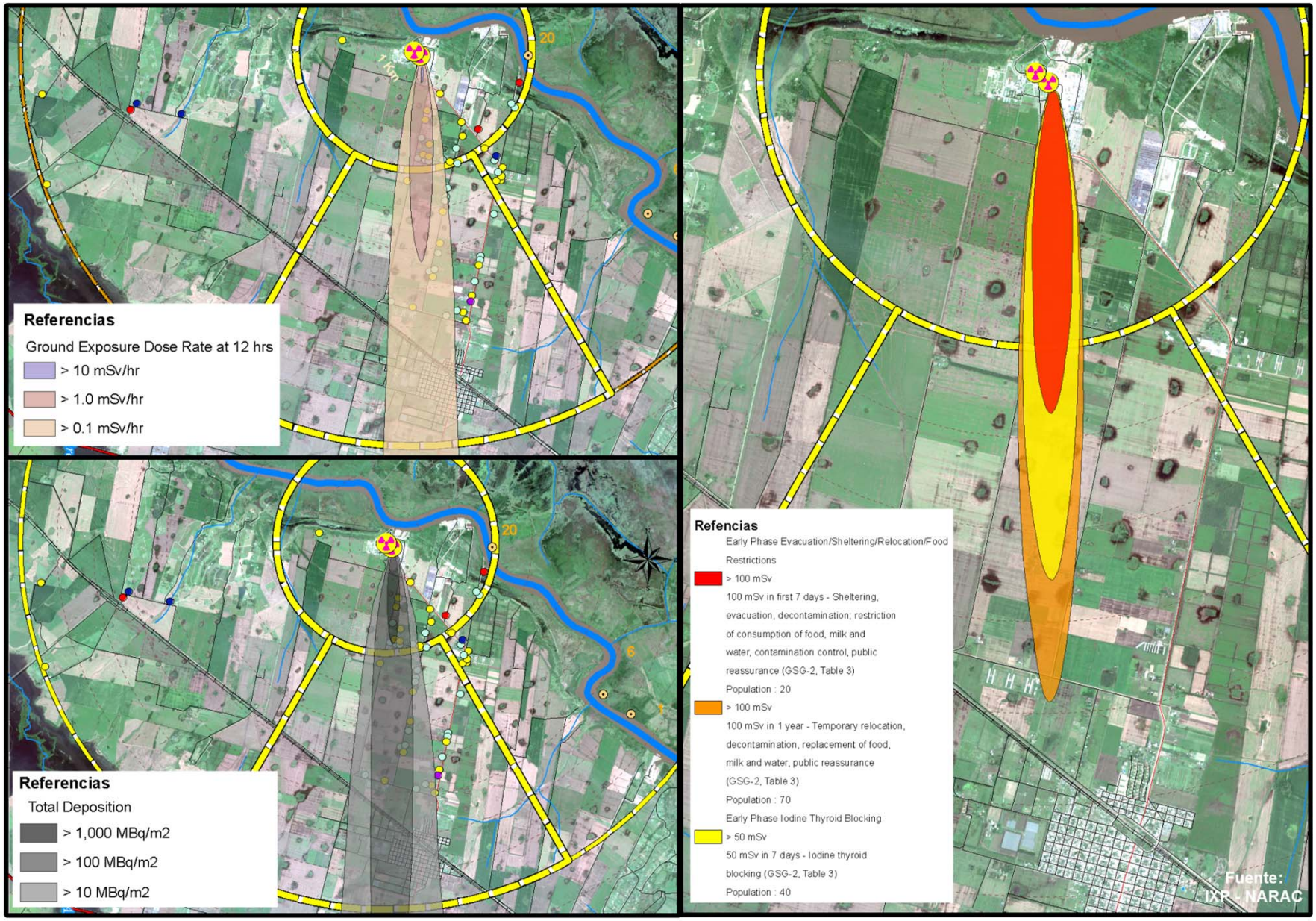
Display of RSMC Washington, CNA 2013, Exercise.



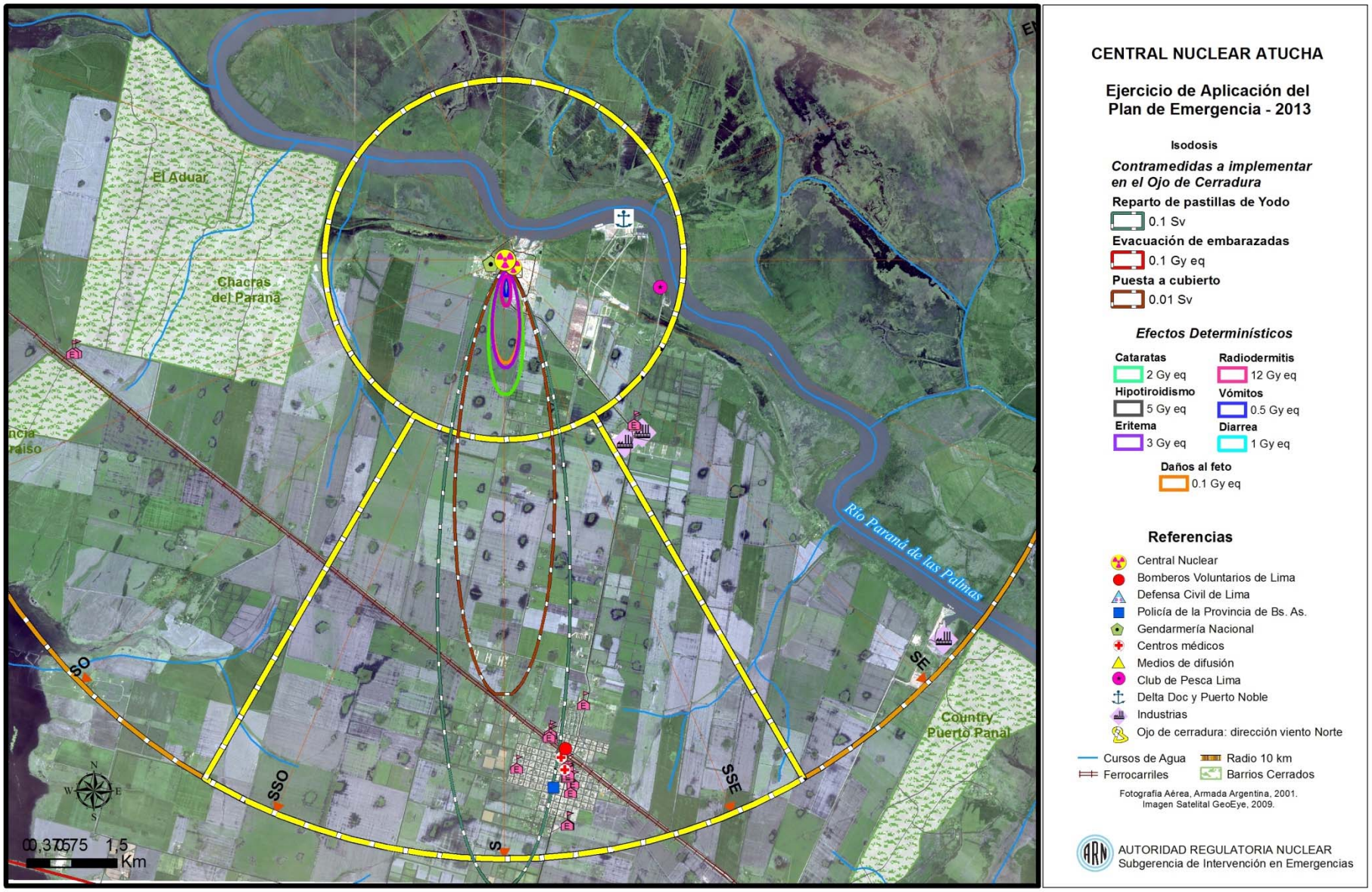
Display of RSMC Montreal, CNA 2013, Exercise.

GIS

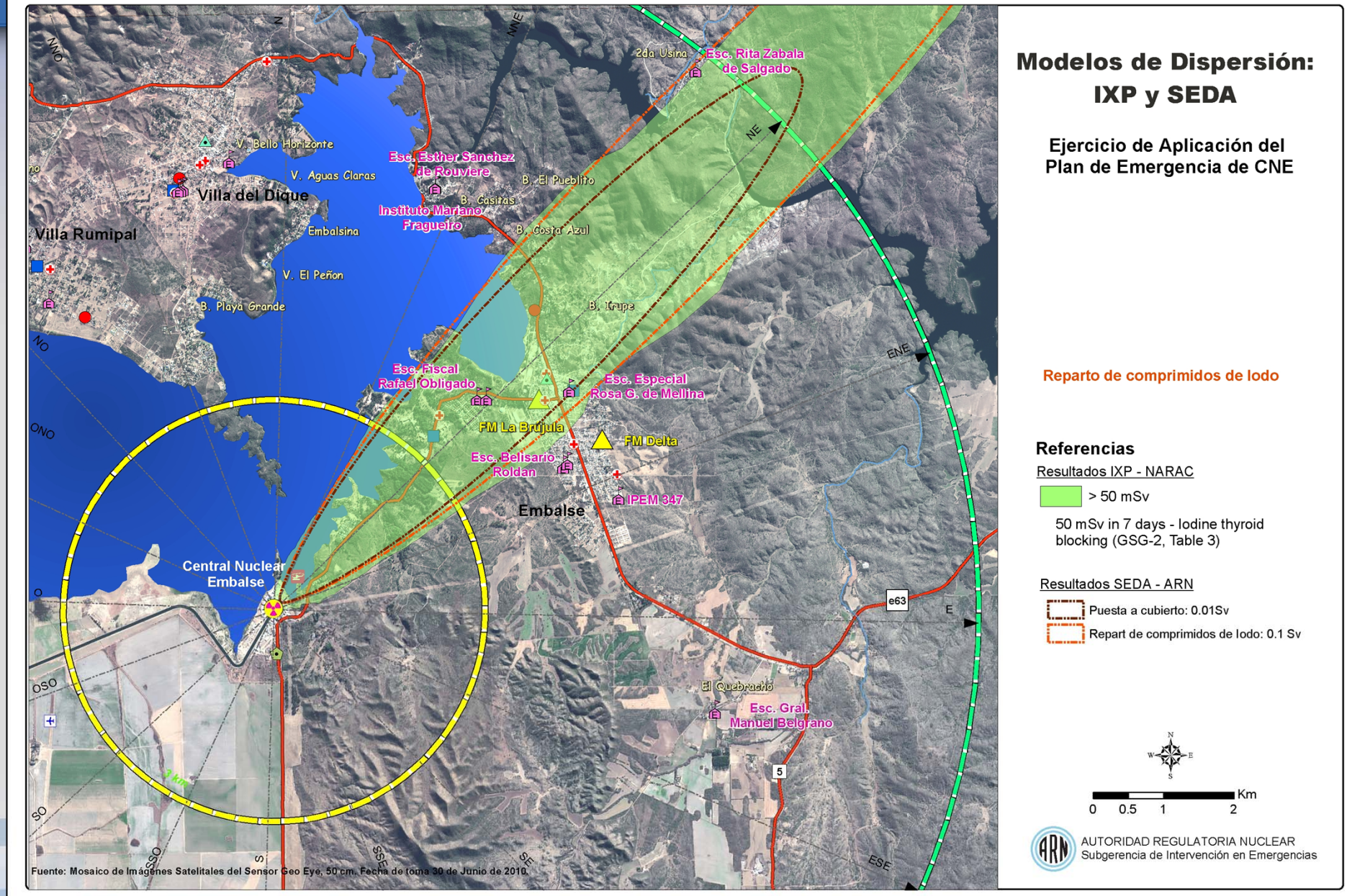
- The Geographical Information System (GIS) supports planning, training and enforcement of protection actions in case of a nuclear emergency.
  - Provides the georeferenced cartographic data;
  - Incorporates the results of forecast consequences models and environmental measurements during an emergency;
  - Allows the information analysis at real time and helps the decisions making;



Display of IXP - GIS integration, CNA 2013 Exercise.



Display of SEDA - GIS integration, CNA 2013 Exercise.



Display of IXP - SEDA - GIS integration, CNE 2014 Exercise.

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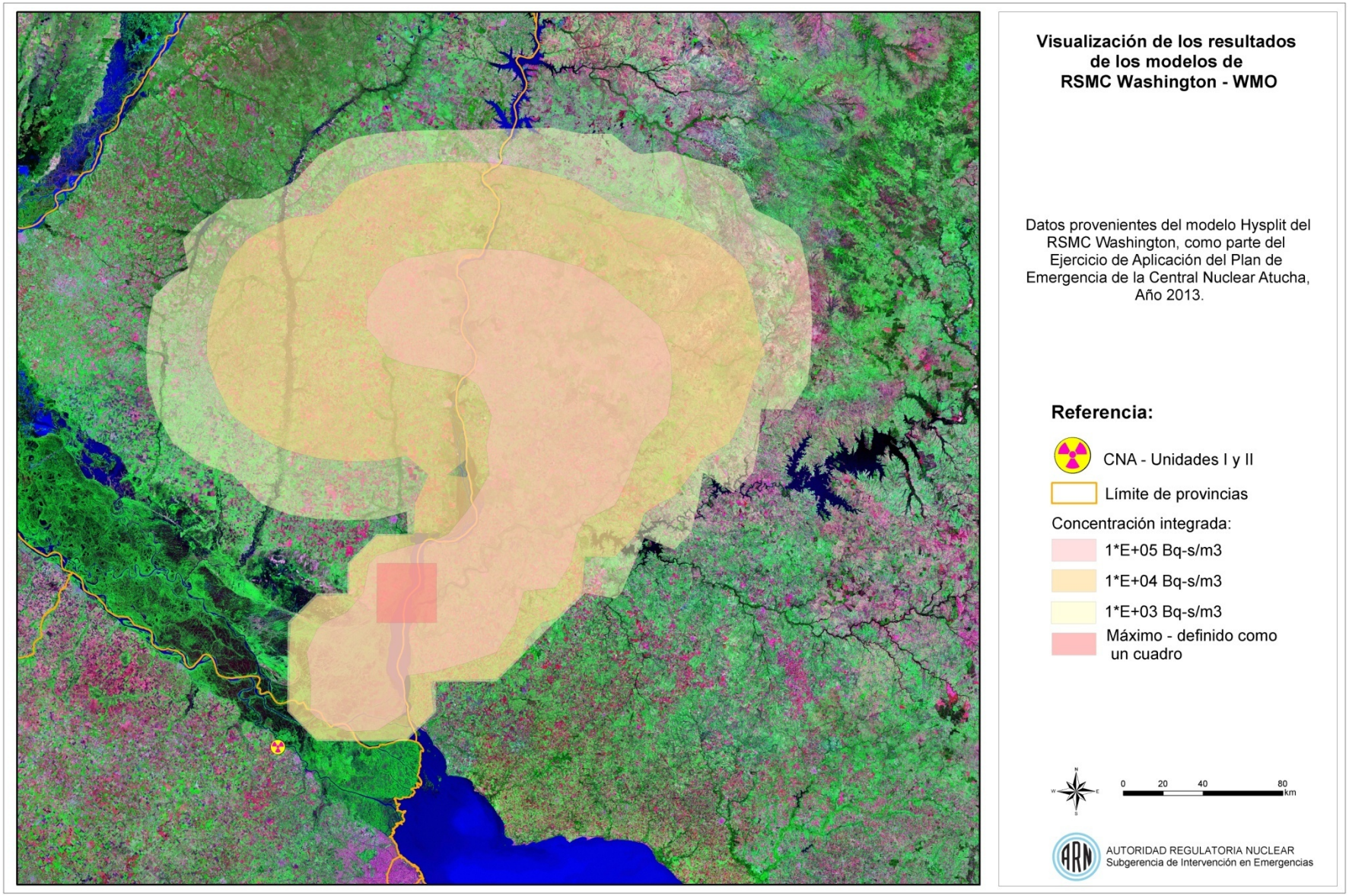

Display of WMO RSMC Washington results - GIS integration, CNA 2013 Exercise.

CONCLUSIONS

- The models used by ARN(SEDA, IXP, WMO) covers the different geographic scales (local, regional and global) which must be taken into account during emergencies response;

- The integration of the models result and GIS allows the information analysis at real time and helps the decisions making;

- The results of monitoring are key to validate the models and determine whether to modify the planned strategy;

Thank you for your attention

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