

**Contribution of the Algerian NDC to the  
Session II: Challenges and Opportunities of the Establishment of the  
Verification Regime and its Relation to the Entry into Force  
of the VCDNP Event:**

**High-Level Panel on Strengthening the CTBT and its Verification  
Regime**

By:

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**January 28, 2021**

# Outline

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- 2 • Establishment of NDC-DZ
- 3 • Mission assigned to the NDC-DZ
- 4 • CTBTO Capacity building
- 5 • International Radiological Monitoring
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## 1. Algeria CTBT profile

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Algeria is one of the 44 states of Annex II to the CTBT whose ratifications are required for the entry into force of the Treaty. Algeria signed the Treaty in Oct. 1996 and ratified the CTBT in 2003.

No IMS Station in ALGERIA

## 2. Establishment of the Algerian National Data Centre NDC-DZ

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**2002 a:** Designation of two establishments for NDC operations:

- Atomic Energy Commission/ Nuclear Research Centre of Algiers (CRNA) dealing with **radionuclide** monitoring technology;
- Algeria's Centre for Research in Astronomy, Astrophysics and Geophysics (CAAG) dealing with **seismic** monitoring technology;

**2002 b:** Initial establishment of a **secure signatory account at the IDC;**

- Designation of **15 authorized** (regular and principal) **users** for access to IMS data and IDC products;

**2003:** site survey by PTS and installation of the **VSAT link** at Algerian NDC;

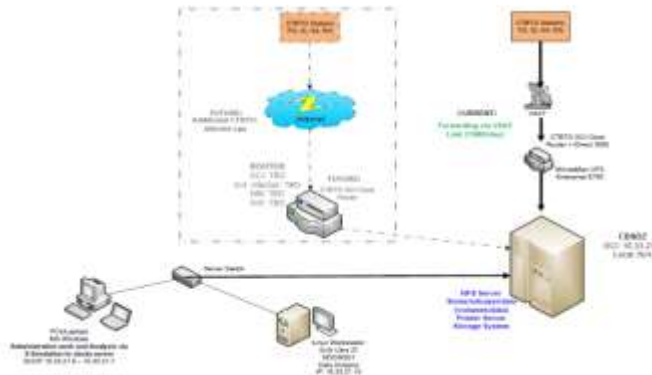
**2006:** NDC provisional operations started on a continuous mode;

**2011:** Installation of CBS, followed by a follow up visit

## 2.1. Location of NDC-DZ



The NDC-DZ is located  
at the Algiers Nuclear  
Research Center



## 2.2. Establishment of the NDC-DZ

The routine operation of the CND covers the different technical segments of the IMS, GCI and IDC related to radionuclide technology. These include the following aspects:

1. The updated status of the IMS monitoring network;
2. The availability of data from different stations and the monthly performance level of the system.
3. The distribution of the spectra on the five categorization levels defined in the relevant IDC documentation;
4. The matrix (station, date) in case of detection of artificial radionuclides of interest for the purposes of the verification regime;
5. Interpretation of results in terms of association of detected radionuclides with their possible sources.

The operating results of the CND from May 2006 feed into periodic bulletins, drawn up monthly, and regularly transmitted to the competent national authorities.

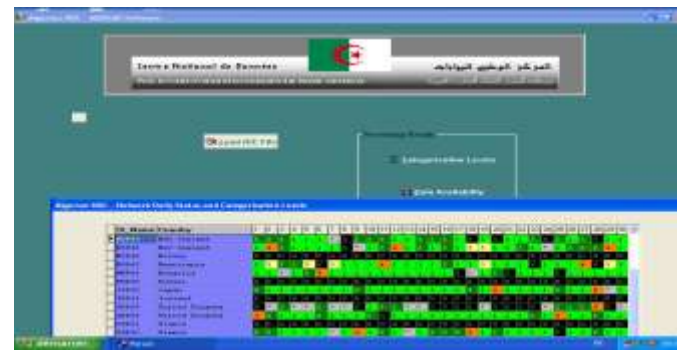
## 2.3. Development of in house Software Applications

Two in-house built software tools have been developed:

- Software Tool for Radionuclide Interactive Analysis (STORIA)
- Monthly Assessment of radionuclide System and Availability of Data (MARSAD)

These tools were designed against our specific requirements in the context of the NDC's provisional operational program.

STORIA and MARSAD allow NDC staff members to interactively display and process radionuclide raw data, as transmitted by IMS stations and archiving of CTBT relevant detections

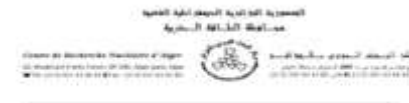


### 3. Mission assigned to the NDC

The main mission assigned to the NDC-DZ, is to advise and support the National Authority and Prepare monthly report on radionuclides events that occurred locally and in the sub-region.



Within this framework, early notifications and special bulletins are issued and sent to the competent national authorities. These bulletins include technical considerations on expected detection of CTBT relevant radionuclides at IMS stations, through IDC atmospheric transport modeling (ATM)





## 4.CTBTO- Capacity building



The Algeria has taken advantage from the CTBTO capacity building program.

- Trough the Fellow up visit to the NDC, The staff were train on some technical (IMS and IDC) activities, as well as different methods to access to these data.



## 4.1. Follow up visit of NDC-DZ-2011

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Dr. Lassina Zerbo presented the CTBTO technical activities (IMS, IDC) through lectures, including potential civil and scientific applications of IMS data and IDC products

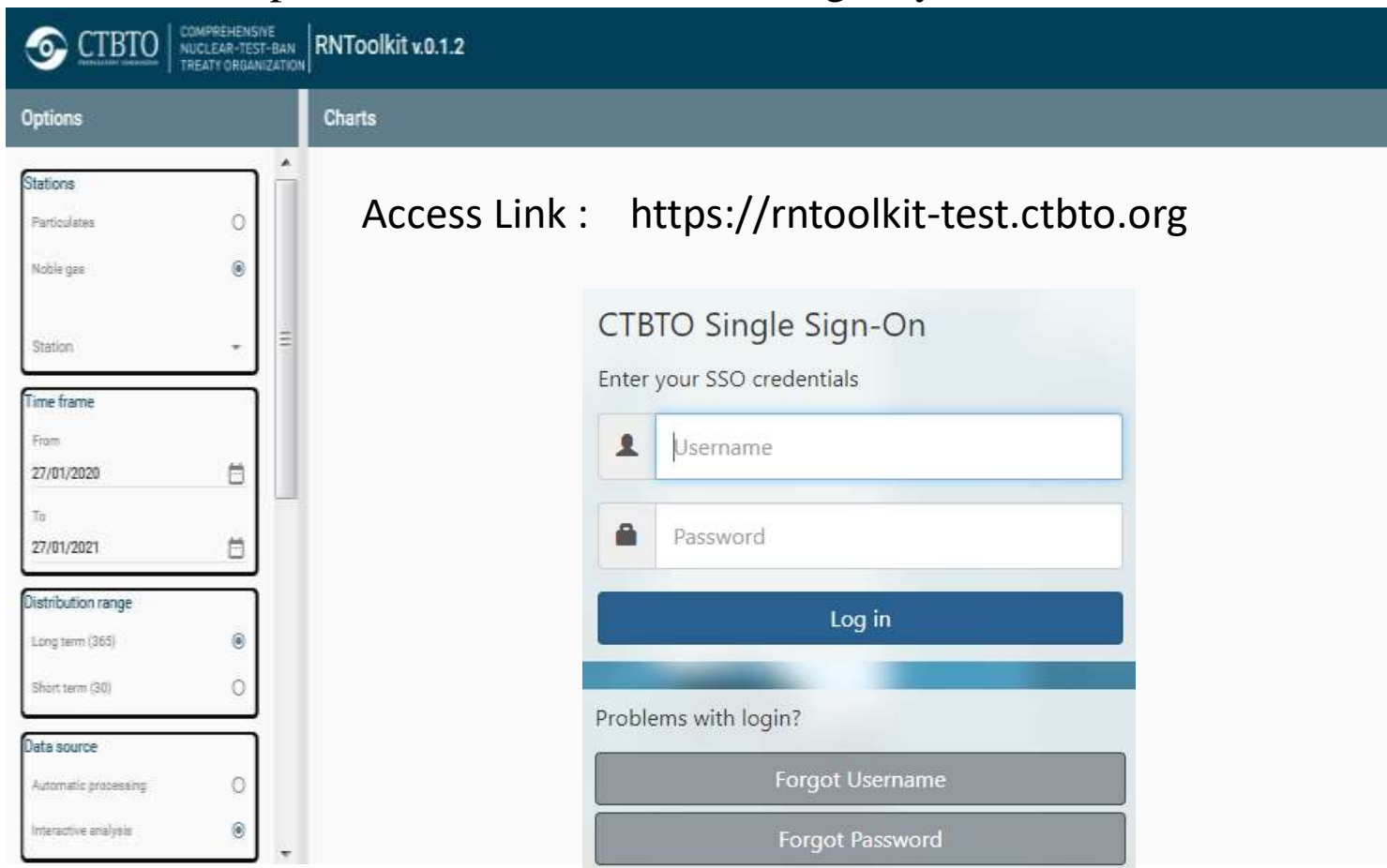


visit of the Algerian Digital Seismic Network operated by "CRAAG" by Dr. Lassina Zerbo



## 4.2. Use of new tool (RNToolkit)

RNToulkit is a software tool made available to NDCs through NDC Forum on September 2020 (Webinar training). RNToulkit provides CTBTO authorized users fast and easy access to radionuclide detections of the IMS stations based on IDC analysis results. Both particulates stations and noble gas systems are available



The screenshot displays the RNToolkit v.0.1.2 interface. The top header includes the CTBTO logo and the text 'COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION' and 'RNToolkit v.0.1.2'. Below the header, there are two tabs: 'Options' and 'Charts'. The 'Options' tab is active, showing several configuration sections:

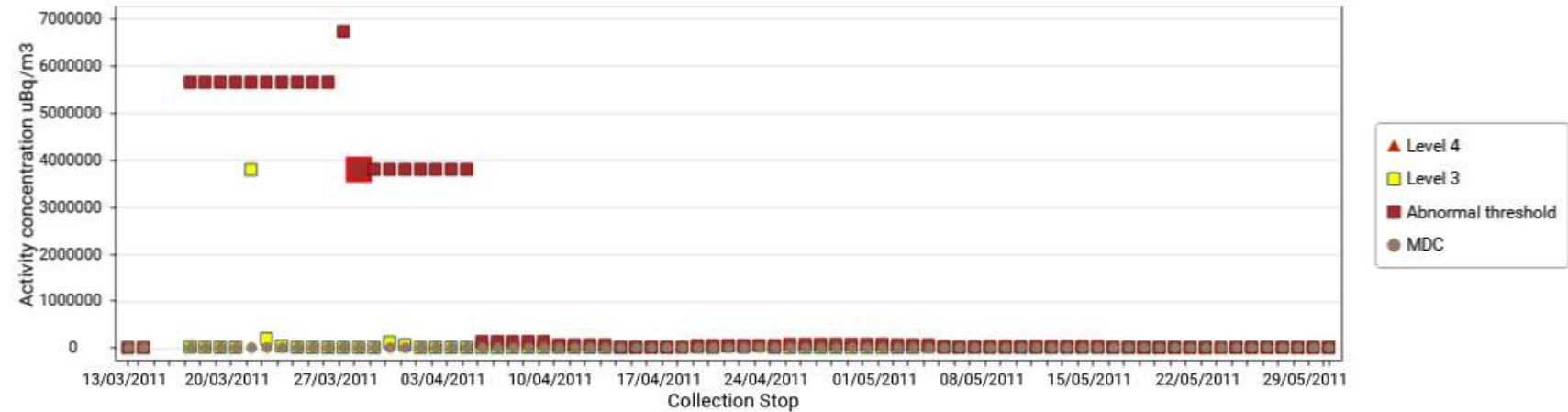
- Stations:** Radio buttons for 'Particulates' and 'Noble gas' (selected), and a dropdown for 'Station'.
- Time frame:** 'From' date: 27/01/2020, 'To' date: 27/01/2021.
- Distribution range:** Radio buttons for 'Long term (365)' (selected) and 'Short term (30)'.
- Data source:** Radio buttons for 'Automatic processing' and 'Interactive analysis' (selected).

Overlaid on the right side of the interface is a 'CTBTO Single Sign-On' form. The form prompts the user to 'Enter your SSO credentials' and includes fields for 'Username' and 'Password', a 'Log in' button, and links for 'Forgot Username' and 'Forgot Password'.

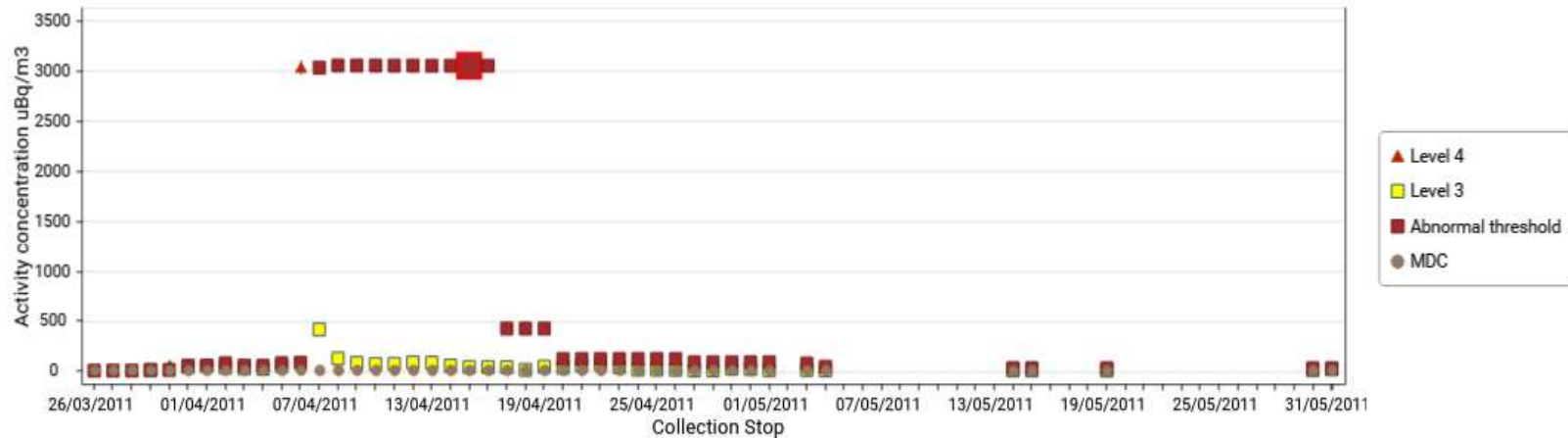
Access Link : <https://rntoolkit-test.ctbto.org>

# Cs-137 History at JPP-37 and JPP-38 stations (Example of RNToulkit application)

CS-137 history at JPP38 - Automatic processing



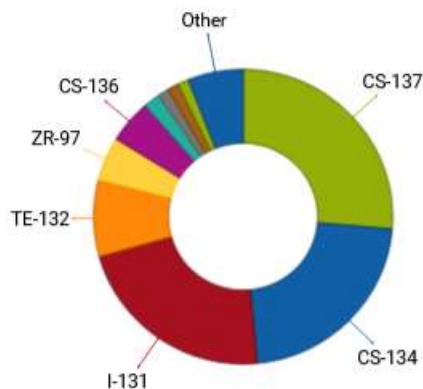
CS-137 history at JPP37 - Interactive analysis



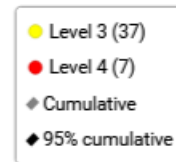
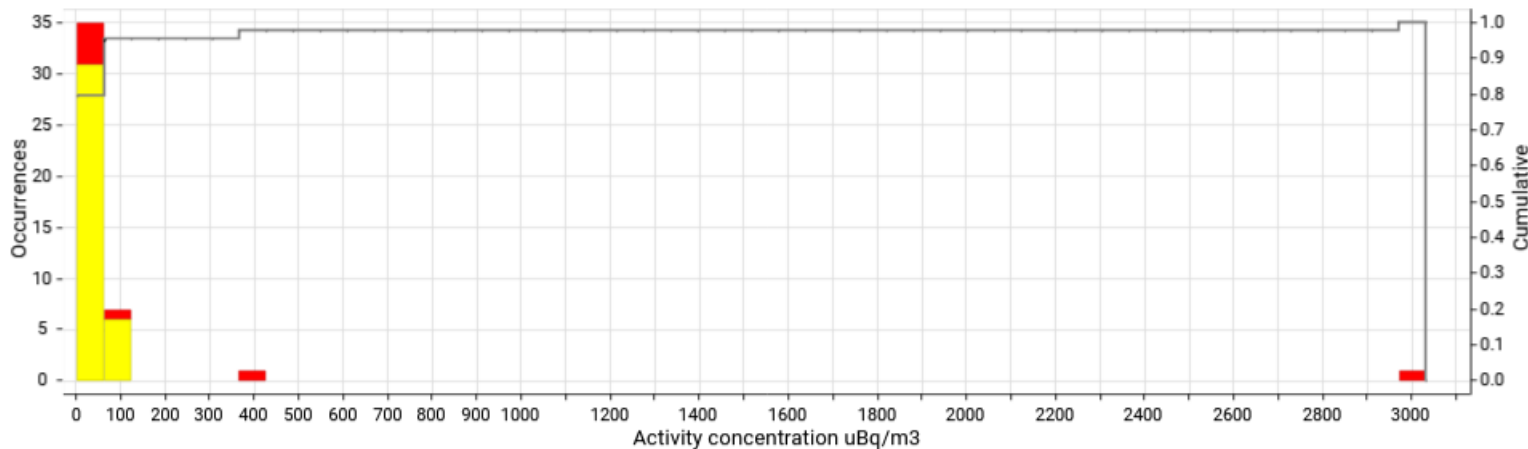
# Frequency Distribution of CTBT radionuclides detection at JPP-37 station (Example of RNToulkit application)

The distribution of CTBT detected radionuclides at the chosen station during the time frame of interest are displayed in order sorted by their detection occurrences.

CTBT detections at JPP37 - Automatic processing



CS-137 frequency distribution at JPP37 - Automatic processing



## 5. International Radiological Monitoring

The NDC ensures a permanent survey on all IMS radionuclide operational stations located on the five continents of the globe.

Any new monitoring station is systematically integrated into the NDC's operating system immediately after its commissioning by the IDC.



72 certified particle stations



25 certified noble noble gas stations

## 6.National Radiological monitoring

The Environment laboratory of the Algiers Nuclear Research Center monitors the radioactivity in different compartment of environment (atmospheric, terrestrial and marine environment).

For atmospheric compartment, we analyze aerosols, rainwater and dusts using gamma spectrometry.

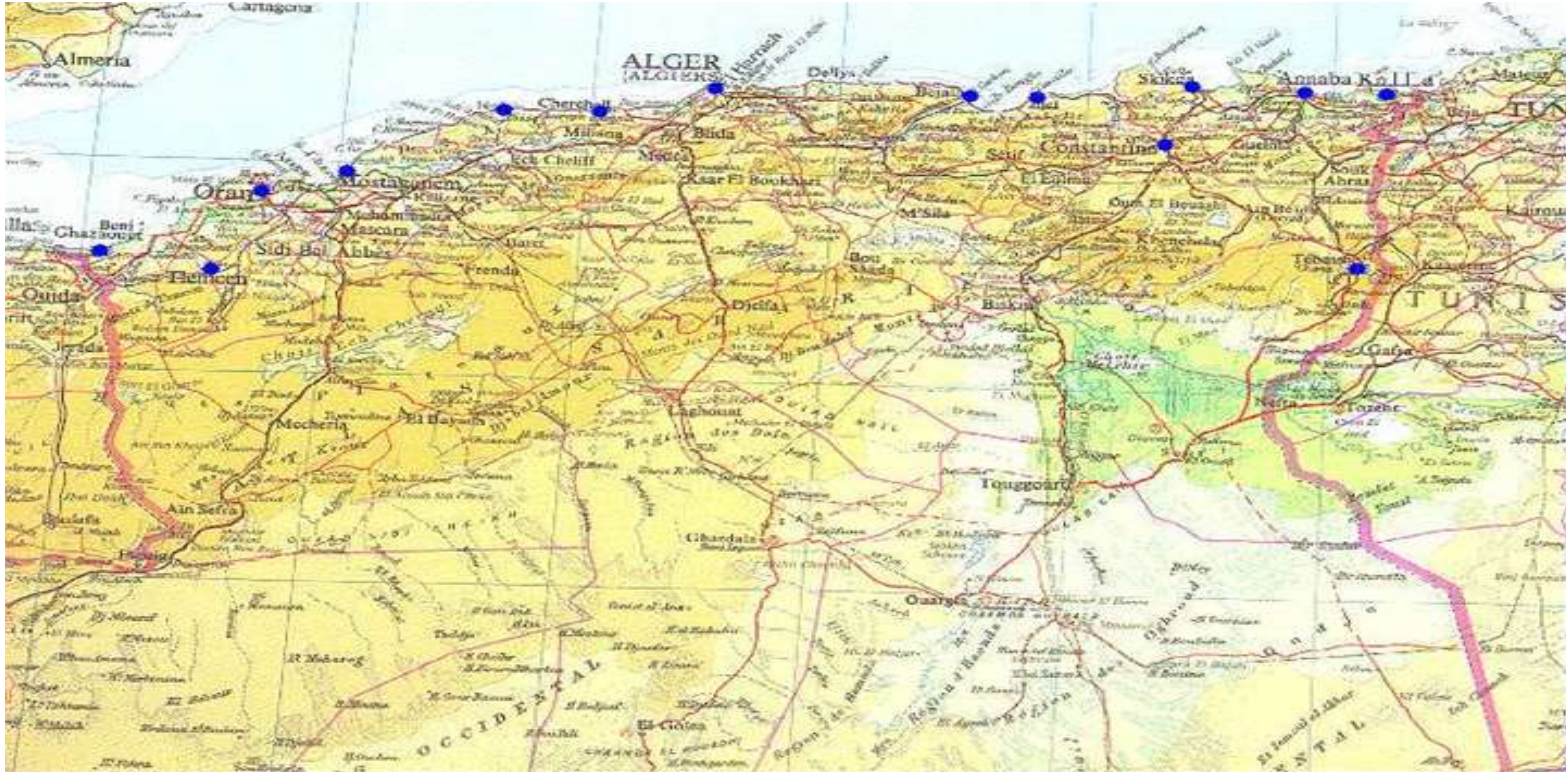
Also, Algeria has a radiological early warning monitoring system operating since 1999.

**The IMS data are very useful for our National monitoring program.**



# National Network for Radiological Monitoring of the Environment

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The national network is composed by a series of radiological stations which are installed northern Algeria and are continuously measuring the gamma dose rates. These stations are connected, by a VPN to a central unit at Algiers laboratory.



## Atmospheric Monitoring

The main purpose for the atmospheric radiological monitoring is to detect any artificial contamination due to a nuclear accident or incident and to use natural radionuclides as tracers ( such as  $^7\text{Be}$  and  $^{210}\text{Pb}$ ). This IMS data, are very useful for our laboratory research.

The cosmogenic radionuclide Beryllium-7, is one of radioactive isotopes measured on a daily basis by IMS particulate stations. These IMS data, are very useful for our laboratory research.



High volume sampler (Hi-Q  
Environmental Products)



GAMMA Spectrometry chains with  
high purity germanium detectors  
(CANBERRA)

## **7.EXPERIENCE OF ALGERIAN NDC WITH SPECIAL RADIONUCLIDE EVENT ANALYSIS**

Following any suspicious or special event attributable to a nuclear explosion a special plan of support was implemented by the NDC with the support of the environmental radioactivity laboratory at the Algiers Nuclear Research center, in order to notify and assist the national authority:

1-Reaction to the DPRK events (2006, 2009, 2013 and 2016)

2- Reaction to Fukushima Dai-chi NPP Accident in 2011

3- Reaction to Ru-106 Detections at IMS Stations- October 2017

# 7.1. Reaction to the DPRK events (2006, 2009, 2013 and 2016)

Following the (declared) nuclear test conducted by North Korea on its territory on October 9, 2006, a special plan of support was implemented by the National Data Center, A special bulletin was sent to the competent national authorities.

الصورة الجزائرية الديمقراطية الشعبية  
محافظة الطاقة النووية

CONFIDENTIEL

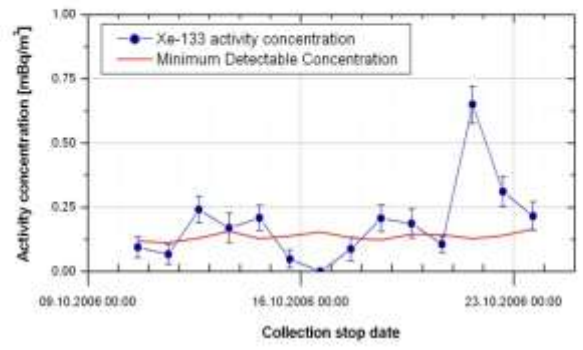
Centre de Recherche Nucléaire d'Alger  
 03, Boulevard Frantz Fanon, BP 200, Alger 16000, Algérie  
 ☎ +213 (0) 21 43 43 43 43 ☎ +213 (0) 21 43 43 43

المركز الوطني للبيانات  
National Data Center

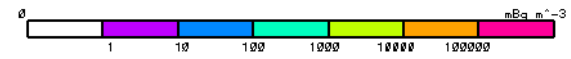
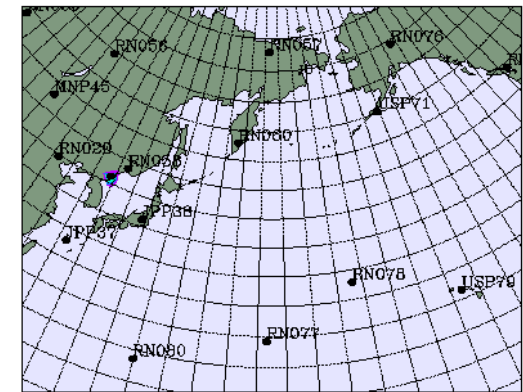
Bulletin Spécial N° 1 du CND  
sur l'essai nucléaire effectué par la Corée du Nord en date du 9 octobre 2006

**LEGENDA:**

1. Ministère de la Défense Nationale	5. Ministère le Chef de Service de Sécurité de l'OSNNA
2. Ministère des Affaires Étrangères	6. Ministère le Conseil des Affaires de Sécurité Interne de la Présidence de la République
3. Ministère de Commerce et l'Énergie Atomique	7. Autorité de l'Énergie Nucléaire d'Algérie
4. Ministère le Directeur Général de Centre de Recherche Nucléaire d'Alger	8. Autorité de l'Énergie Nucléaire de Québec

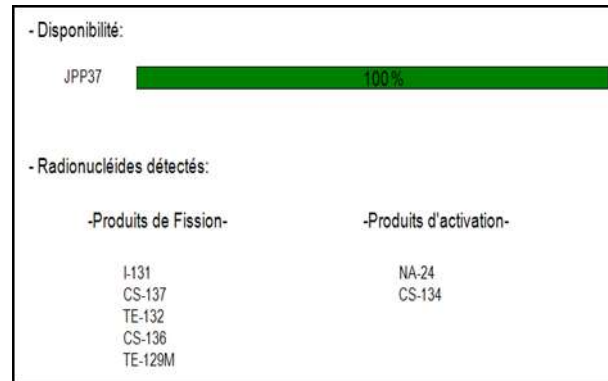
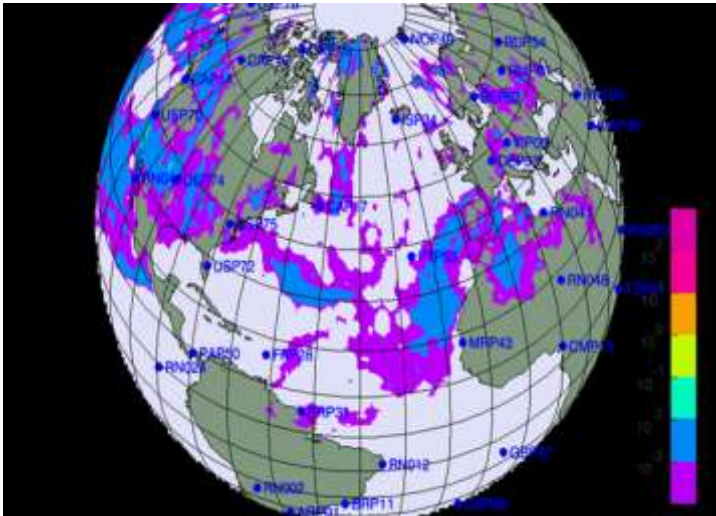


Activity concentration DPRK\_Event\_Oct09\_00UTC\_2006\_EC  
 a) Date: 20061009 030000 Release Date 20061009 00

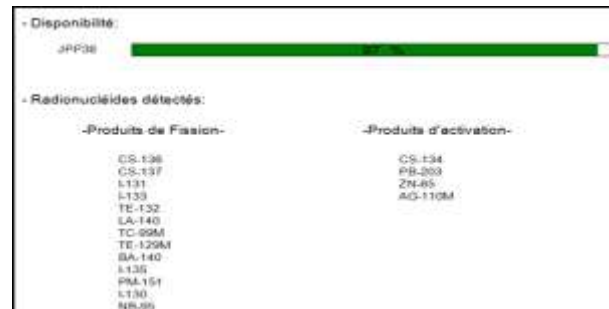


## 7.2.Reaction to Fukushima Dai-chi NPP Accident in 2011

Immediately after the nuclear accident in Japan, the NDC conducted a special plan by checking through the IMS Data, with focus on the Detections recorded by JPP37 and JPP38 IMS stations and look for ATM analysis to study the prediction period for possible detection of relevant radionuclide.

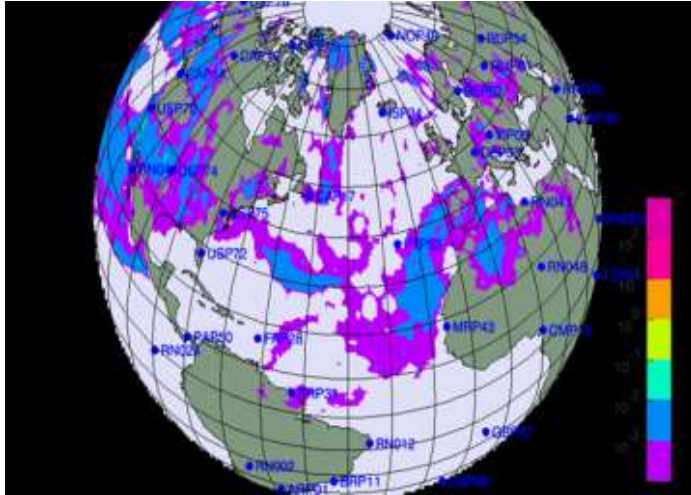


JPP37 station



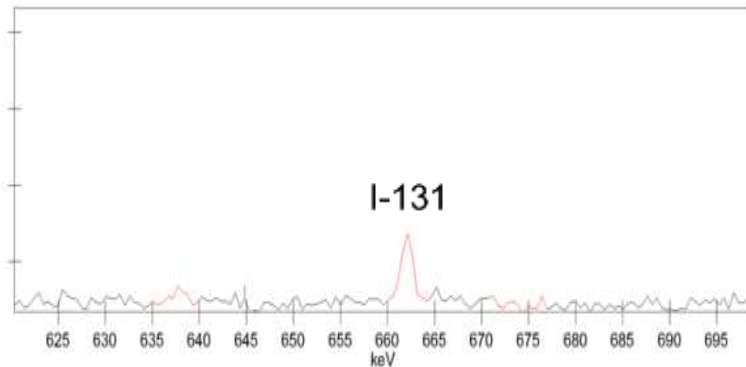
JPP38 station

## 7.2.Reaction to Fukushima Dai-chi NPP Accident in 2011 (2/2)



Based on the ATM, we sampled aerosols by using both an activated carbon cartridge specific to the fixation of iodine (I-131), and a filter for the retention of others radionuclides

Filters analysis showed the presence of fission products at very low concentrations (iodine 131, Cs-134 and Cs-137 )



### 7.3. Reaction to Ru-106 Detections at IMS Stations- October 2017

Following the detection of Ru-106 by the IMS stations, a notification was sent by the NDC to the competent authorities. A total of 38 detections of Ru-106 were confirmed at 09 certified IMS stations.

At national level, the analysis of aerosols samples showed that Ru-106 concentration was under the detection limit.

المملكة المغربية  
الجمهورية الجزائرية الديمقراطية الشعبية  
مملكة البحرين

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الهاتف: (213) 021 43 44 44 الفاكس: (213) 021 43 43 85

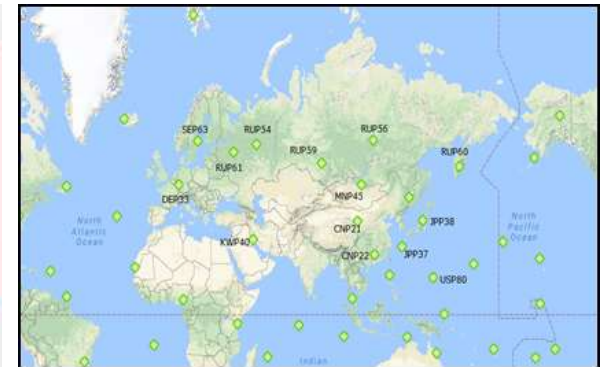
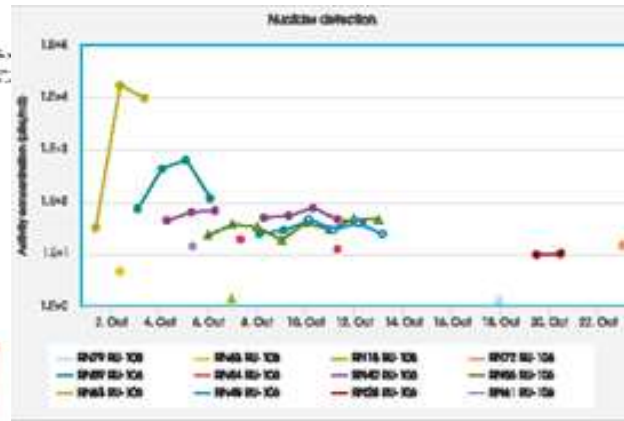
البحرين

Notification

Sur

**La détection de Ruthénium -106 en octobre 2017 par les réseaux Européens et le réseau de l'OTICE**

Période du 25 septembre au 25 octobre 2017



## 8.Participation to the CTBTO Scientifics manifestations

Algeria is an active member in the organization, participated at the various activities :

- E-learning Training course on NDC Capacity Building: Access and Application to IMS Data and IDC Products
- Training course on NDC Capacity Building: Access and analysis of radionuclide IMS data and IDC Products
- Webinar series of “RN Toolkit software (started on September 2020)
- Working Group B sessions
- Official technical meetings (Validation tests: Experiment-4)



## 8.Participation to the CTBTO Scientifics manifestations (2/2)

Algeria held the 2018 National Data Centre (NDC) Workshop co-organized by the COMENA, the Provisional Technical Secretariat (PTS) with the support of the Algerian Permanent Mission/Foreign ministry



The visit of the Algerian NDC



Representatives of the Government of Algeria, PTS and participants

A total of 82 participants attended the workshop, representing 36 Members States and the PTS staff.

The workshop drew excellent contributions with 35 oral presentations and 15 posters.



## 9.Challenges and Needs

- Training on Geant4 software, based on RadioNuclide Detectors Simulation software (GRANDSim).
- Strengthen other verification technologies (Infrasound and hydroacoustic)
- Update the list of authorized users, by designating new users from others centers of the COMENA (CRNB, CRND).
- Make available IMS data ( RN and SHI) for Algerian researchers from different universities

