

# Radiation in Iraq difficulties and challenges

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## Related Institutes

- Ministry of Science and Technology ( successor of Former “Iraqi Atomic Energy Commission”).
- Ministry of Environment
- IRSRA(Iraqi Radiation Sources Regulatory Authority)
- Ministry of Higher Education and Scientific Research.

## Ministry Of Environment

- Ministry Of Environment :
  - Law No. 99 in 1980. The law, entitled “Radiation Protection from Ionizing Radiation”, established the Radiation Protection Centre (RPC) of the Iraqi Ministry of Environment as the primary regulatory body.
  - Radiation Protection Centre (RRC) The RPC was tasked with providing the legal framework for radiation protection and environmental safety based on IAEA safety regulations.
  - the Ministry of the Environment has been designated the regulatory body for all decommissioning and waste management activities.

## IRSRA

- The Iraqi Radiation Sources Regulatory Authority (IRSRA) is the regulatory body for sealed sources. (Law 72, 2004)
  - Responsible and Dealing with the radioactive sources documentation and release radioactive source lenience in use, storage and transfer radioactive resources in whole Iraq.

## MoHESR

- **MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH.**
- **19 state universities connected directly and run by the Ministry of Higher Education and Scientific Research.**
  - **The oldest and biggest : University of Baghdad**
  - **NG. Universities.**

### Orphan radioactive sources



Republic of Iraq  
 Ministry of Higher Education  
 Scientific Research  
 University of Baghdad  
 College of Science  
 Department of earth sciences



**HYDROCHEMICAL AND ISOTOPIC STUDY OF  
 WATER RESOURCES BETWEEN HADITHA  
 DAM AND SITE OF AL-BAGHDADI DAM**

A Thesis  
 Submitted to the College of Science of University of Baghdad  
 In Partial Fulfillment for the Requirement of the Degree  
 Of Doctorate of Philosophy in geology (water resource)

By:

**KAMEL BARAZAN NADIA AL-PARUANI**

M.Sc. Water Resources 2003

Supervised by:

Dr. Qasim Saadun Al-Khalaf

Dr. Kamal Kamil Ali

Professor

Assistant Prof.

1434 / 2013

**Natural radioactivity of marl as raw material for Portland cement at Kufa cement quarry in Al-Najaf Governorate . MSc. Thesis. By Al-Auweidy, M. R. A.**

**Supervised by  
 Assistance Prof. Ali, K. K.,  
 Assistant prof. Awadh, S. M**

Natural occurring isotopes behavior in water resources in Samawa Shanafia-Samawa area (S.Iraq) MSc. Thesis)(in research stage)

**Assessment of Natural radioactivity in the city of Al-Ramadi -Western Iraq.( Ph.D. Thesis in final stage)**

Radiological assessment of phosphate rock and phosphate fertilizers

Ali K.K\* and Awad Y.Dh.

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## Measuring of Radium isotopes in water

- The MnO<sub>2</sub>-impregnated acrylic fiber : is prepared by immersing the raw acrylic fiber for about 20 min in saturated KMnO<sub>4</sub> solution heated to 75°C.
- approximately 150 cm<sup>3</sup> (~25 g dry weight) of fiber is packed into a cylindrical cartridge.

## continued

- precipitate radium in sulfate form:

After acidification and filtration of the sample, is coprecipitate radium in sulfate form with a trainer which may be of the carbonate or barium nitrate . Sulfates of barium and radium are then washed , dried, weighed and measured by gamma spectrometry .

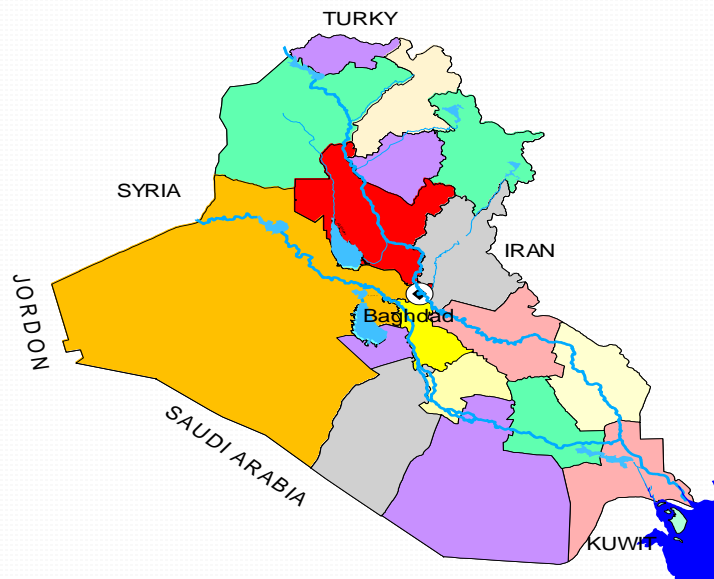


## MOST

- NLO : (THE NATIONAL LIAISON OFFICER)
- The NLO is the principal interface between the IAEA and a national authority on technical cooperation (TC) and related matters.
- INMA (Iraqi Nonproliferation Monitoring Authority) (Law 48, 2012)
- Labs Directorate
- Radiation safety Directorate

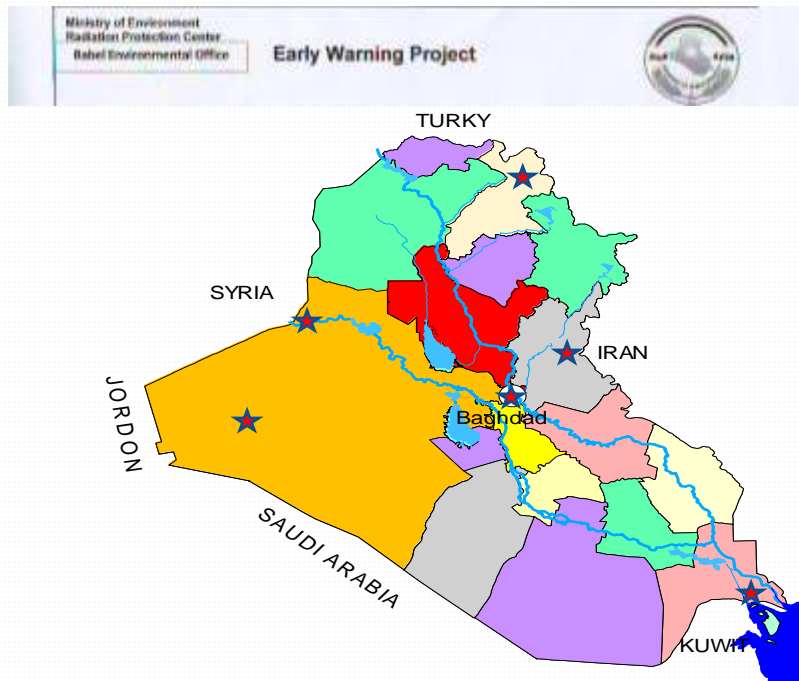
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## Difficulties & challenges

- two kinds:
  - environmental
  - ❑ The security situation
  - ❑ Support in forms of search and secure of radioactive sources (IRSRA)
  - ❑ SSDL (**S**econdary **S**tandard **D**osimetry **L**aboratories) (Calibration of portable survey meter)
  - ❑ Decommissioning of former nuclear facilities.
- Regulatory:
  - ❑ Project of merging regulatory bodies: **INMA+IRSAR+RPC**



## Locations of nuclear facilities in Iraq

(Source, [http://www-ns.iaea.org/images/rw/iraq/map-images/map\\_01.jpg](http://www-ns.iaea.org/images/rw/iraq/map-images/map_01.jpg)).



Thank you



## العربية اليوم: الرئيسية: العرب والعالم: العراق العراق: "مجموعات إرهابية" استولت على مواد نووية



## Radium precipitation

- The chemical yield is obtained by gravimetry.

Reagents

All reagents were of analytical purity

- 1 ) Solution concentrated nitric acid ( $\text{HNO}_3$ ) 68%.
- 2 ) nitric acid solution ( $\text{HNO}_3$ ) diluted to 2.28 % .
- 3 ) solution of nitric acid ( $\text{HNO}_3$ ) diluted to 18 % .
- 4 ) Solution coach  $\text{Ba}^{2+} 10 \text{ g l}^{-1}$  .
- 5 ) Dissolve 19 grams of barium  $\text{Ba}(\text{NO}_3)_2$  or 14.3 g of barium carbonate in one liter of  $\text{BaCO}_3$  solution (2) .
- 6 ) solution of concentrated sulfuric acid ( $\text{H}_2\text{SO}_4$ ) 98 % .

## Radium precipitation

- Procedure

The volume of the sample solution depends on the required detection limits , the method is commonly used to several tens of liters .

1) To avoid adsorption and algae phenomena must be acidified to pH 1 with nitric acid (1) the sample solution ( the sample can be from 1 to 100 liters). It is recommended to store the solution in the dark.

2) Add 1 ml of  $H_2SO_4$  per 10 liters of specimen .

3) Pour drop wise 50 ml of the solution (4) vigorously stirring the solution for analysis .

In the case of water rich in sulphate ions , such as sea water , it is necessary that the barium and radium are mixed before the sulfate is precipitated .

4 ) Add 20 ml concentrated  $H_2SO_4$  ( 5 ) to precipitate the sulphate .

5 ) Decant the precipitate of barium sulfate  $Ba ( Ra) SO_4$  for about 24 h .

6 ) Remove most of the supernatant with the aid of the pump and the rest to centrifuge

about  $2000 \text{ min}^{-1}$  for 5 min to recover the precipitate .

7) Wash the precipitate with nitric acid (3) in the centrifuge tube , shake and centrifuge .