

Recent Developments of **Uranium Exploration in Jordan**



الدكتور نضال الزعبي

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Uranium is a Strategic Resource

- Lack of conventional energy resources, Jordan Imports over 95% of its energy fuel
- Development of secure alternative energy supply is a top priority for Jordan
- Uranium is a strategic resource
- Uranium exploitation policy is to maximize sovereignty while creating value from resource
- No Concessions to foreign companies
- Assurance of nuclear fuel supply for Jordan's Nuclear Power Plants



Legal Framework

- Nuclear Energy Law (Law No. 42 of 2007) and its Amendments of 2008
- Jordan Atomic Energy Commission (JAEC), was established early this year
- JAEC is entrusted with the development and execution of the Jordanian nuclear power program
- The exploration, extraction, and mining of all nuclear materials (Uranium, Thorium, Zirconium, Vanadium ...) is now under the authority of JAEC
- The Natural Resources Authority (NRA), is no longer responsible for nuclear material resources

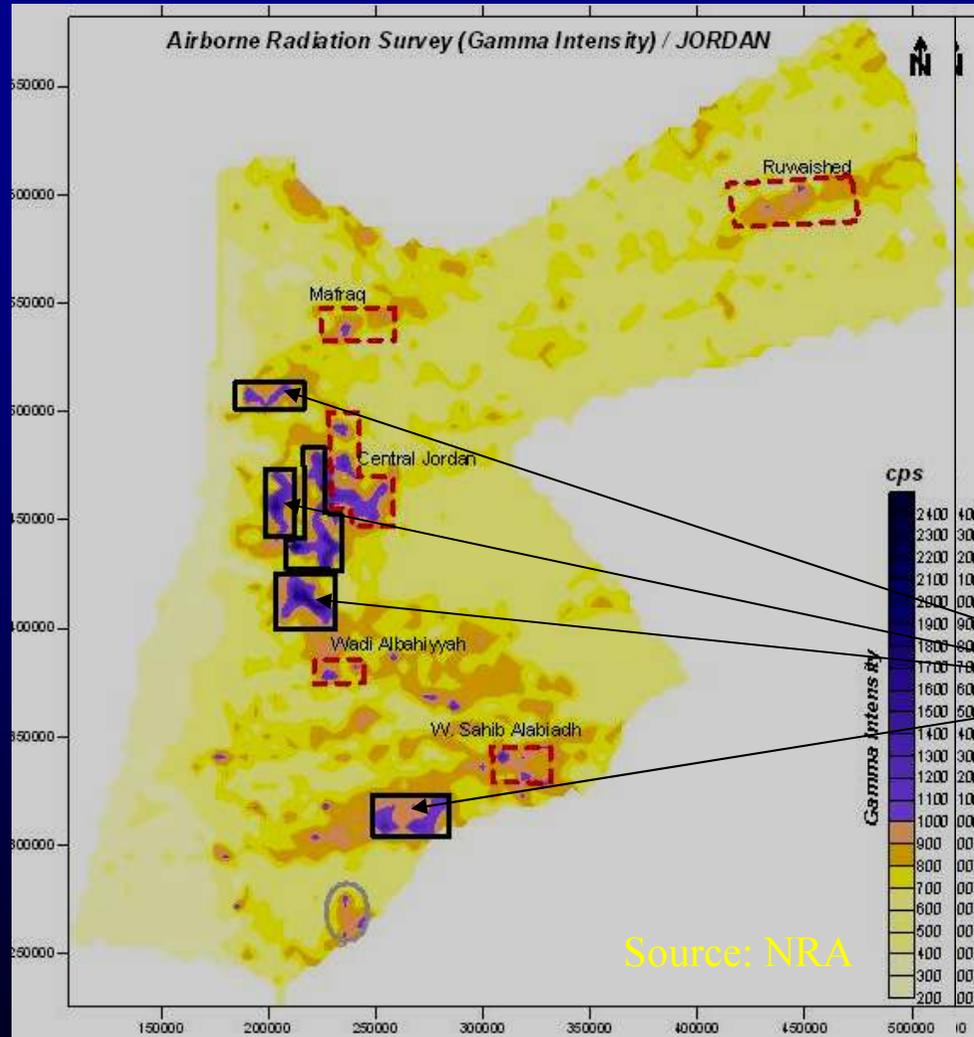


Jordan Energy Resources Inc

- Jordan Energy Resources, Inc (JERI) was founded for the purposes of exploring, mining and exploiting uranium resources in Jordan
- JERI is the commercial arm of JAEC
- JERI is a private shareholding company wholly owned by JAEC
- Foreign Investors ?
- Joint Ventures with foreign companies interested in investing and developing Uranium resources in Jordan



1979/1980 Airborne Survey

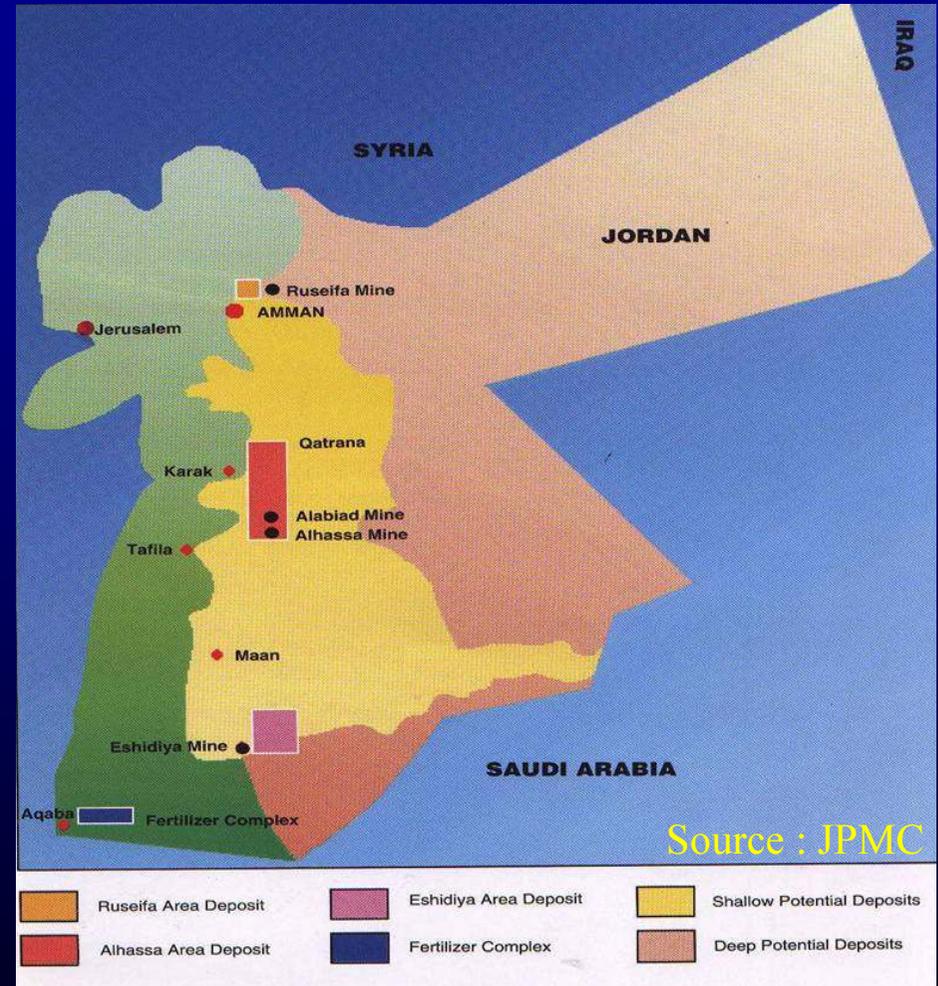
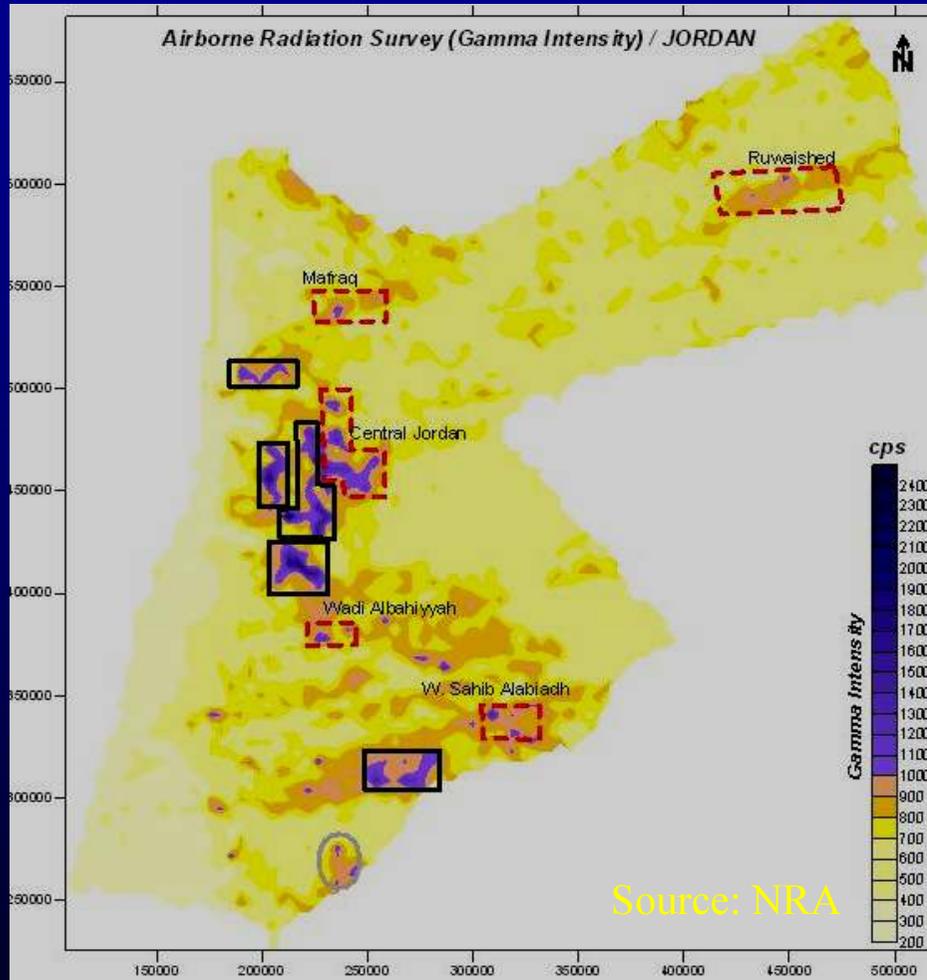


Gamma intensity of up to 2000 cps

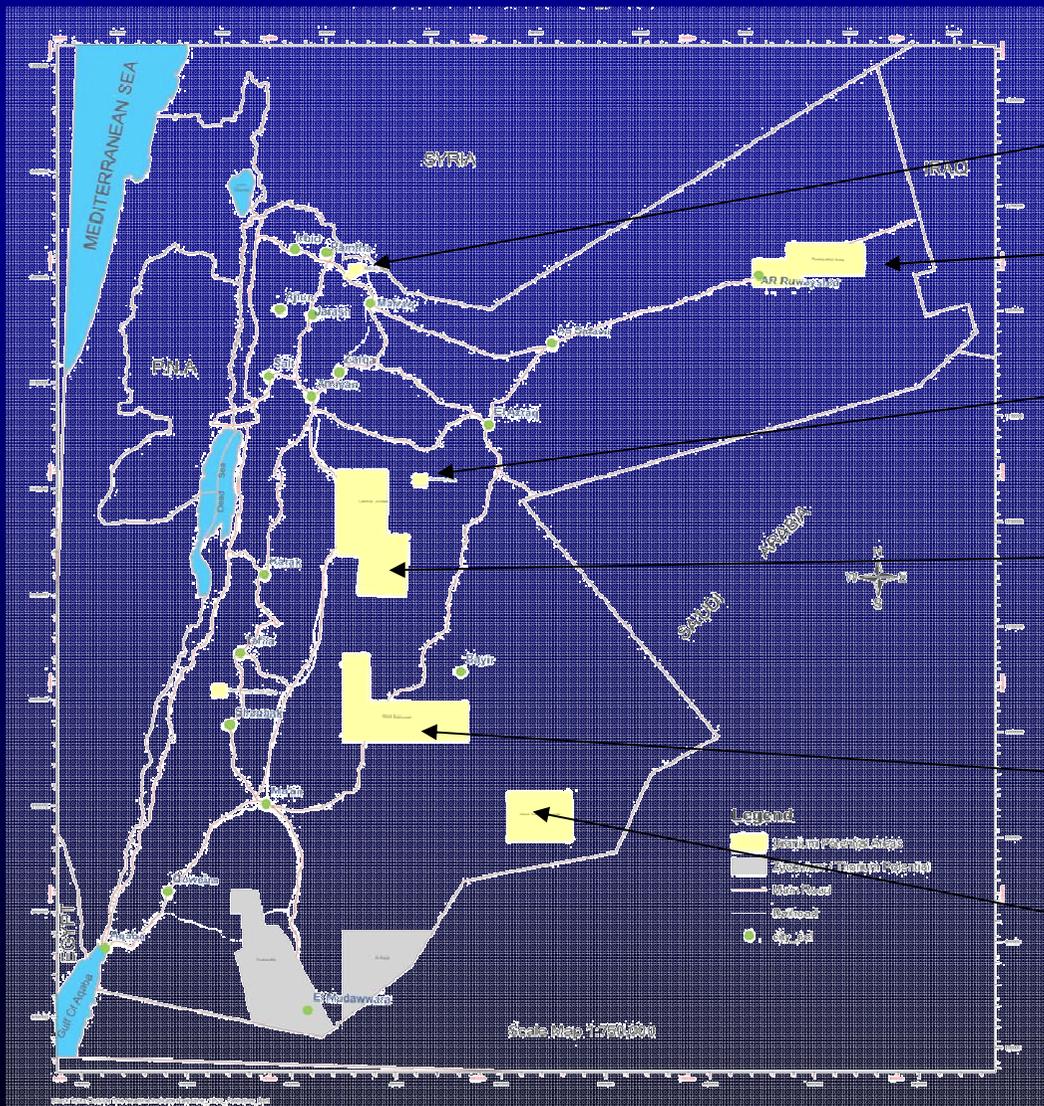
12 Areas with high radiation intensity were identified

Mostly related to Areas with Phosphate rock formations

Phosphate Mines Locations



Potential Areas



Northern Jordan

Ruwaished

Haranah

Central Jordan

Wadi Bahiyyah

Wadi Sahb Elabiadh

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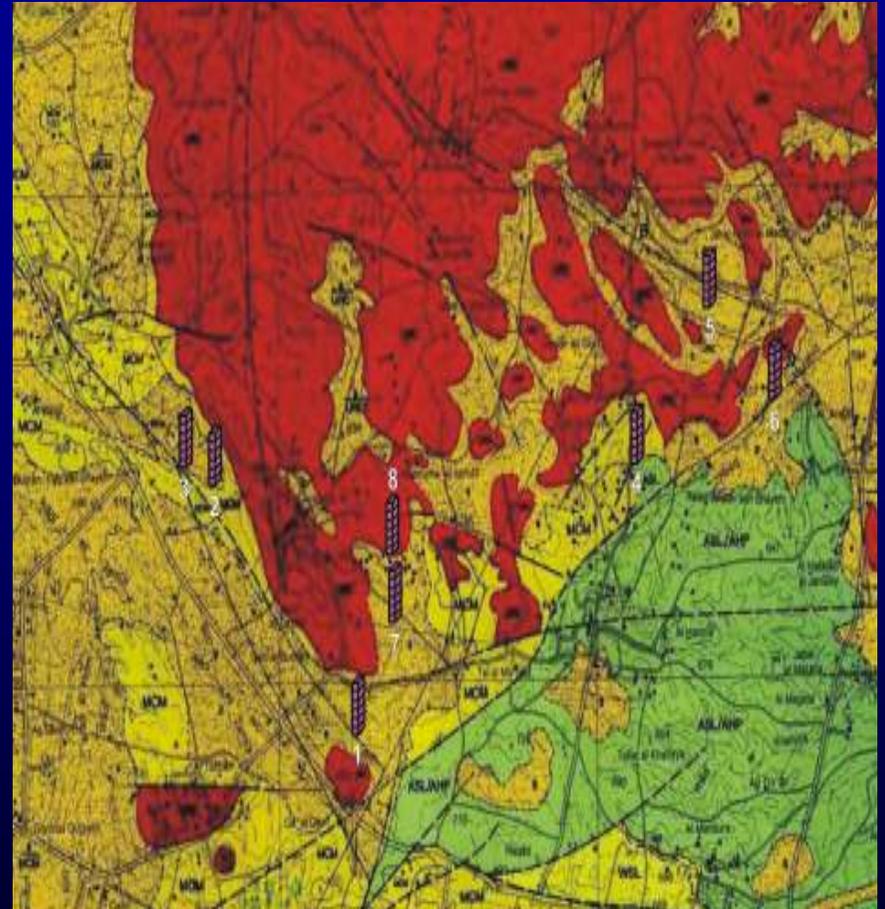
Previous Work

- During the 80's and 90's NRA carried out many studies in these areas
- Concentrating on Central Jordan
- 1700 trenches
- 15000 car-borne and foot gamma measuring points
- 11000 emanometry and track-etch radon gas points
- Hundreds of boreholes
- Thousands of samples were collected and analyzed



Results & Data

- Data available is preliminary
- Uranium deposits are mostly surfacial
- Overburden thickness is 0.5 - 3 m
- Uranium concentration of 200 – 2700 ppm
- Difficulty in repeating some of the measurements



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Central Jordan

NRA Estimated Uranium Ore (U₃O₈) Deposit

Central Jordan Uranium Areas	Block	Area km ²	Total Area km ²	Average Conc. ppm	Total Average Conc. ppm	Average Ore Thick. meter	Estimated Uranium Ore (U ₃ O ₈) Inventory (tones)	Total Estimated Uranium Ore (U ₃ O ₈) (tones)
Siwaqa	1	7.1	28.1	688	592	1.25	8.548	34320
	2	14.9		778		1.27	20.4	
	3	0.82		488		1.42	0.8	
	4	5.26		415		1.49	4.57	
Attarat and W. Maghar	1	7.56	22.73	405	345	1.34	5.74	14965
	2	3.5		342		1.23	2.06	
	3	4.8		263		1.31	2.315	
	4	6.87		371		1.36	4.85	
Khan Azzabib	KZ	9.18	9.18	946	948	1.28	15.595	15595
Total		60	60			1.32	64880	64880



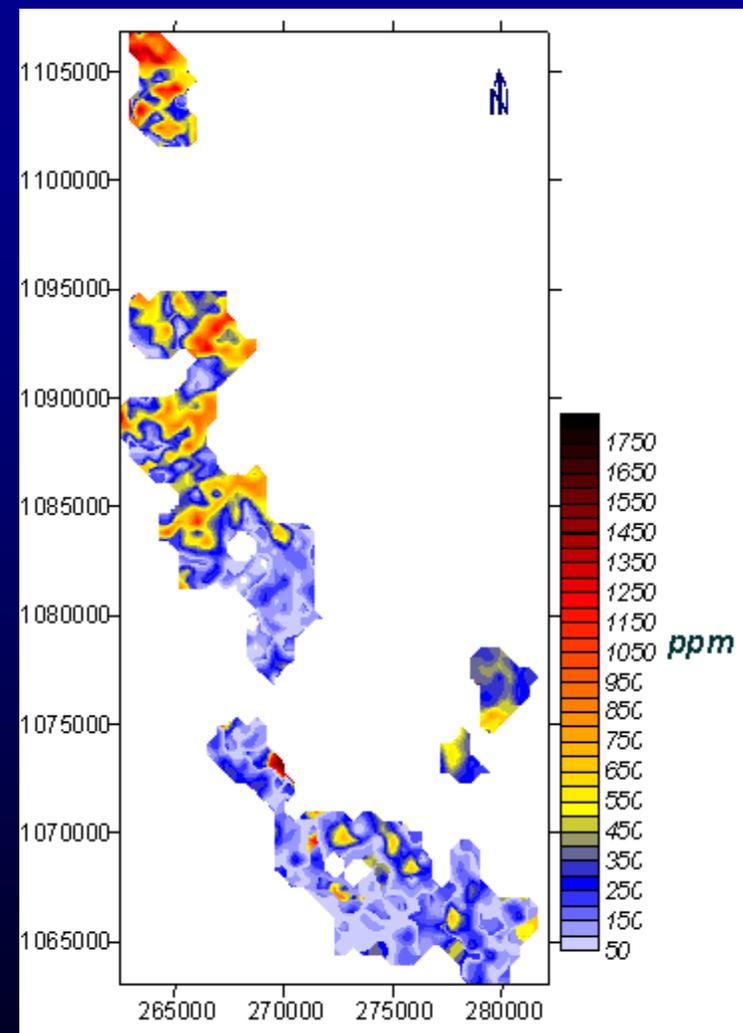
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Central Jordan

- Joint Venture with Areva signed on September 30, 2008
- A total area of approximately 1400 km² (50 km² fertile zone)
- Detailed exploration program
- Bankable feasibility study (BFS)
- Uranium production in 2012
- 2000 tons per year (estimated)
- French and Jordanian geologists are currently working in the area



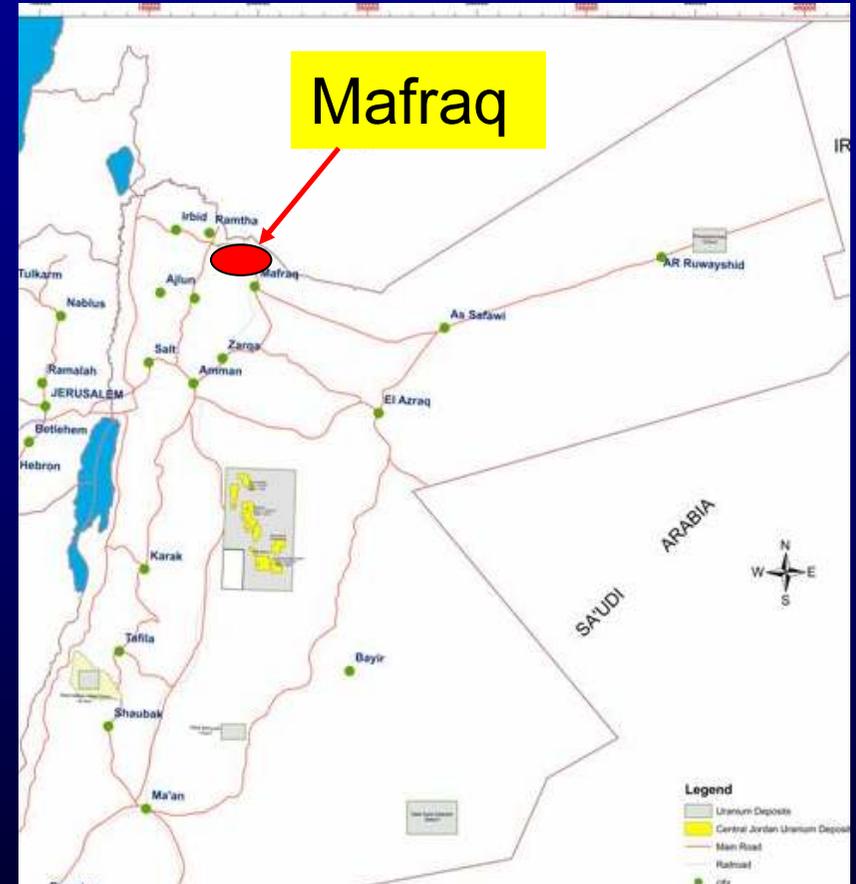
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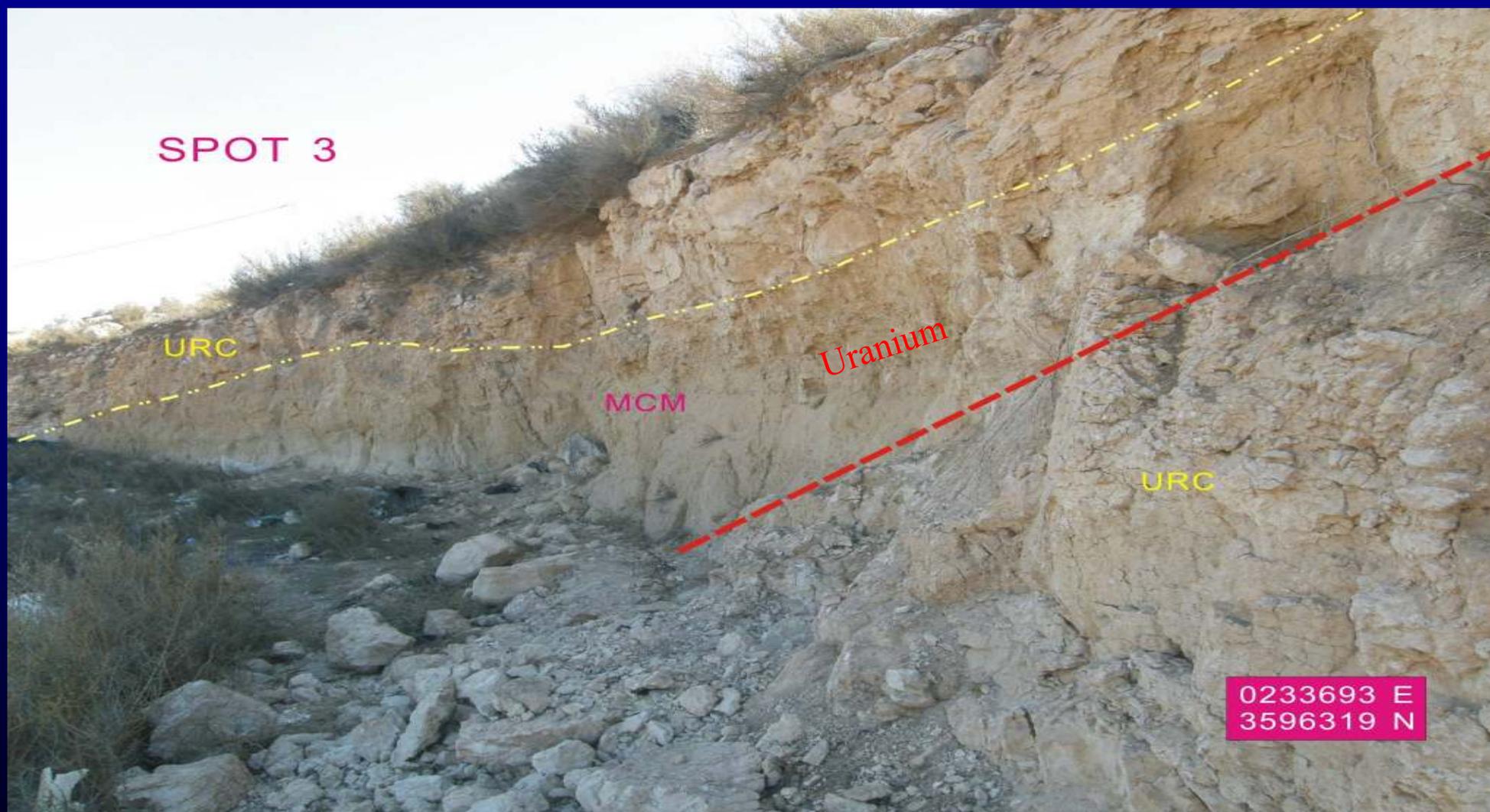
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Northern Jordan

- Includes Housha and Hamra which are located in Mafraq governant in northern Jordan
- Currently under active exploration
- An area of approximately 30 Km² maybe expandable up to 150 Km²
- Jordanian/ Chinese Joint working groups
- Chinese and Jordanian geologists are currently working in the area



Northern Jordan

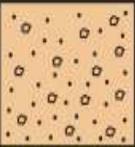
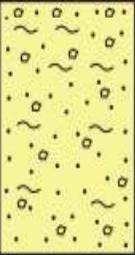
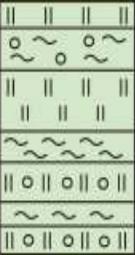
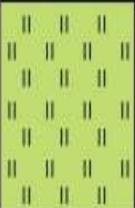


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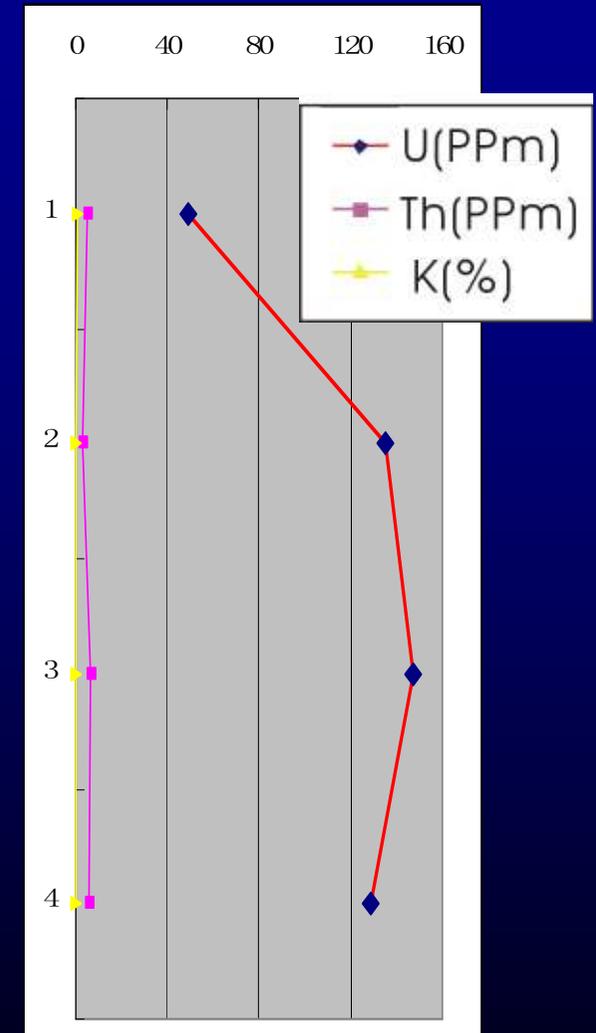
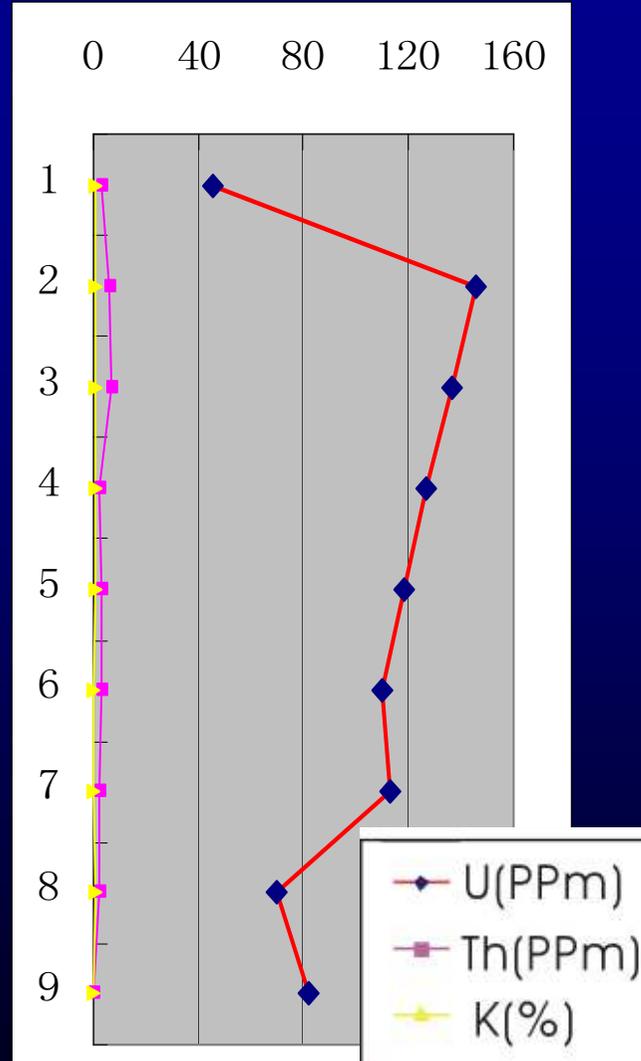
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Northern Jordan

Formation	Thickness (m)	Horizons	Uranium Shows (yellow staining)	Gamma Radiation	Lithology
Pleistocene	At least 1 m	Horizon 1	Not seen	Reach up to 750 c/s	 Limestone and chert fragments cemented by soil (soft materials)
Upper most part of Muwaqqar Chalk Marl	3.35 m	Horizon 2	Moderate shows (yellow), its very fine distributed homogeneously in rock	Reach up to 1000 c/s	 Marl, silt, with pebbles of limestone
	5.0 m	Horizon 3 (concretion rich)	Highly shows of yellow staining of Uranium	200-1000 c/s	 Five concretion horizons cemented by fractured chalk that rich in U. Intercalated by red clay and grey marl
	2.0 m	Horizon 4	Low shows	100-150 c/s	 Thick and massive beds of white chalk, low fractured with Uranium shows but, very low



Northern Jordan



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Northern Jordan

Categories & Genesis of Uranium Mineralization

- **Paleo-weathering zone type**
 - weathering-leaching-evaporation (gypsum and calcium nodules)
- **Fissure type**
 - leaching-evaporation (near the ground surface, usually no more than several meters)
- **Quaternary sediments type**
 - (leaching)-absorption (reduction) - evaporation (near the ground surface, usually no more than several meters)



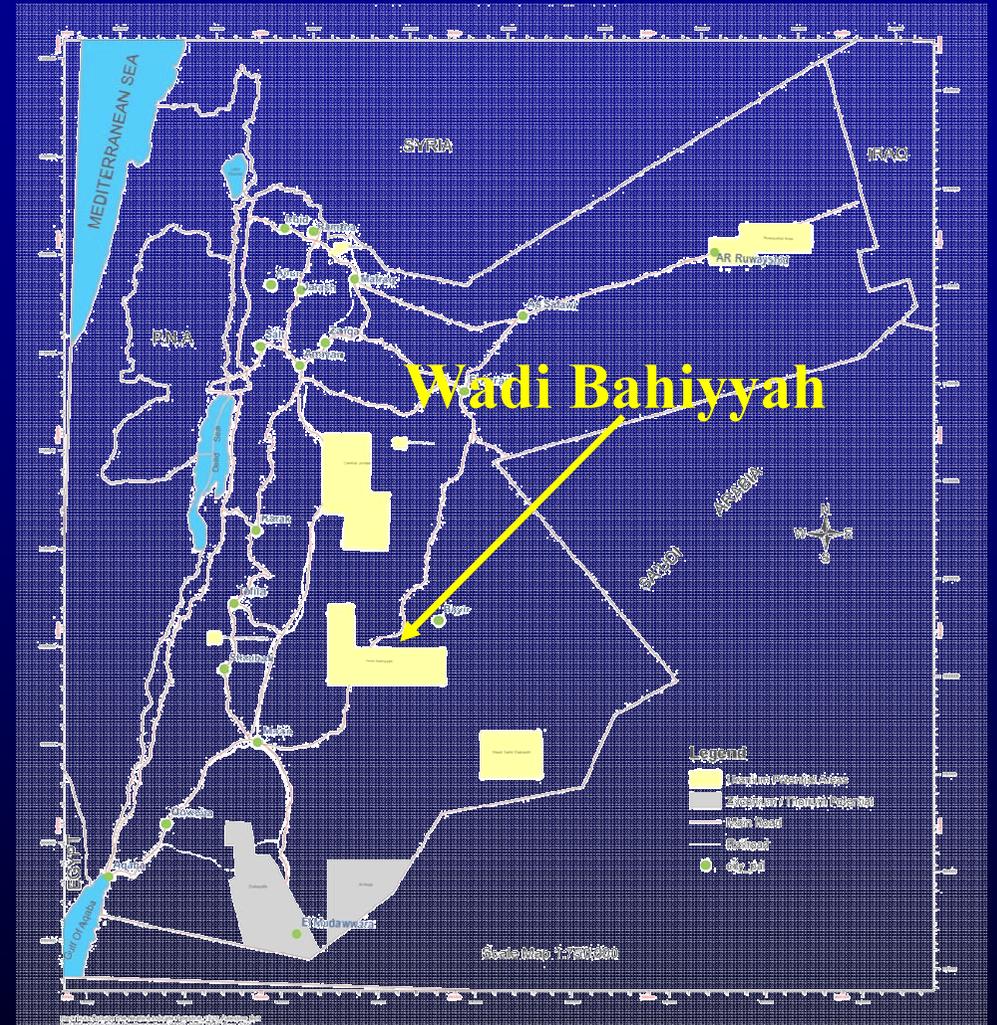
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Wadi Bahiyyah

- Currently under active exploration
- Wide area of approximately 1300 Km²
- Jordanian/ Chinese Joint working groups
- Chinese and Jordanian geologists are currently working in the area

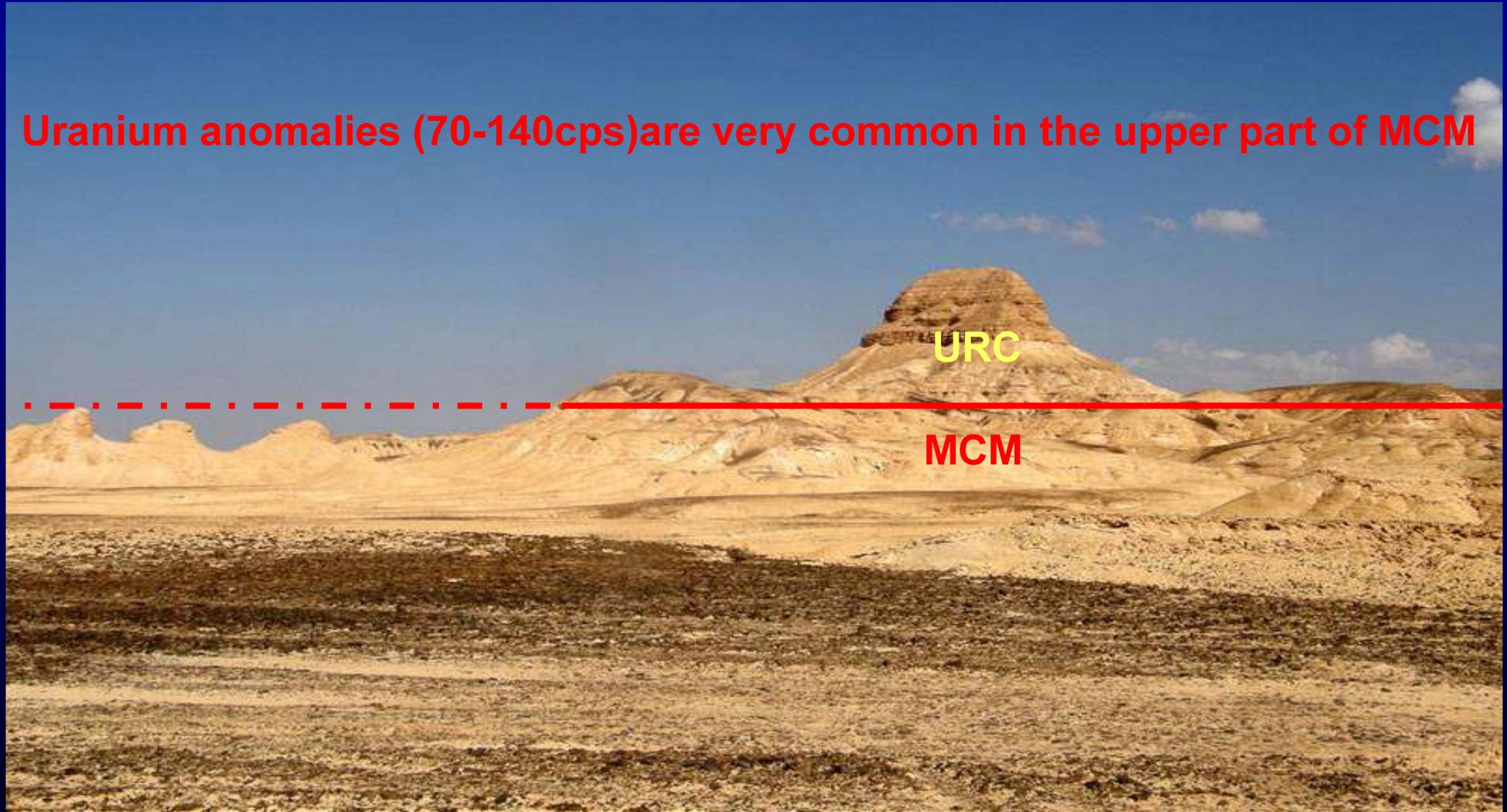


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Wadi Bahiyyah

Uranium anomalies (70-140cps) are very common in the upper part of MCM



Wadi Bahiyyah



0230958 E
3378343 N



Uranium anomaly occurs in the modern weathering zone, just beneath the concretion



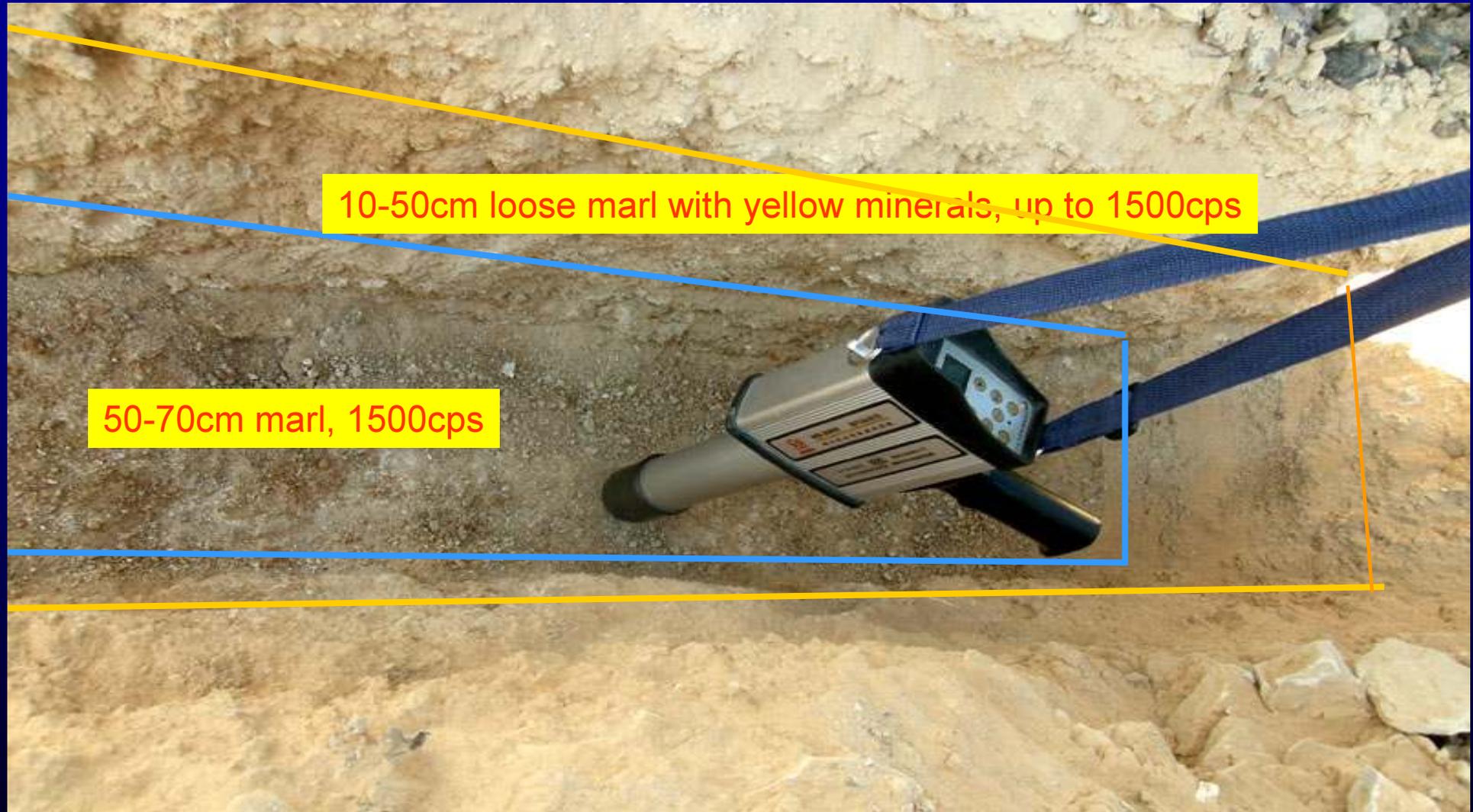
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Wadi Bahiyyah



Wadi Bahiyyah

Uranium: 300-380cps or 40-50 ppm, in Quaternary sediments
Width: more than 150m

0212990 N
3412313 E



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Other Potential Areas

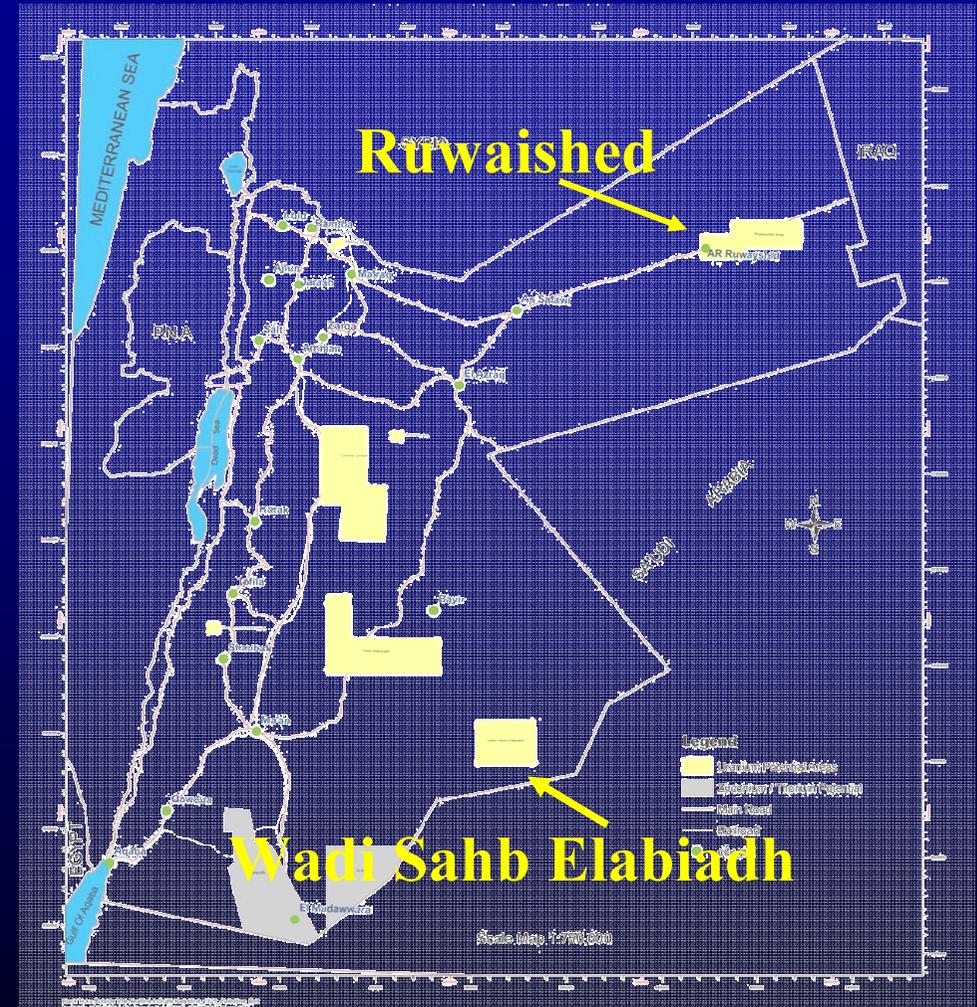
Other potential Areas including

1. Ruwished
2. Wadi Sahb Elabiadh

Are under negotiations with a major Uranium company

Joint working groups

Exploration should start soon



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Thank You



More than a dream It is our Goal

Questions ?

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