



The Development of Epidemiological Studies on the Impact of French Nuclear Testing in the Southern Algeria

Article Info

Received: 19th November 2014
Accepted: 22nd February 2015
Published online: 1st April 2015

Abdul Kadhum Al Aboudi

Biophysics and Radiobiochemistry, Department of
Biotechnology, Oran University 1, Algeria

kadhumalaboudi@yahoo.ca

ISSN (Online): 2232-1179

ISSN (Print): 2314-8101

© 2012 Design for Scientific Renaissance All rights reserved

ABSTRACT

Thousands of people have suffered health problems now in south Algeria, as a result of French nuclear explosions and tests in south Algeria. Nuclear explosions and tests left a legacy of environmental devastation and health problems, radioactive material is seeping out from this Sahara desert mountain where French scientists conducted nuclear tens explosions and hundreds tests in the 1960s, contaminating the soil and poisoning relations between France and Algeria. Our study and the collective dates from Algeria show that the people were exposed to the testing then, but also their children, including nomads that were crossing the area for decades and the youth that were on military service in the region, counting “tens of thousands of potential victims.”, People suffering from cancers, diabetes, leukaemia, infertility and thyroid infections, which are radiation- related diseases, have “spurred in recent years” in the country’s south. Data of this work had presented in many scientific meeting n Algeria on cancer and their relationship to the radioactivity generated by French nuclear testing in South Algeria. From many years we pleaded for the development of epidemiological studies and the establishment of many studies for health monitoring to "clarify the impact of these radiations and really understand what has been endured by populations of Reggane and In-Ekker (ex. French nuclear test sites).

Keywords: Reggane, In Ekker, French Nuclear weapons, Fallout, Irradiation.

1. Introduction

When France was secretly convinced of the inevitability of the march of history and the end of its colonial empire, it proceeded Saturday, February 13, 1960 at 7 am 4 min 20 sec, under its first nuclear explosion codenamed "Blue Jerboa" in the sky Reggane, in the Algerian Sahara (Al-Aboudi 2000). Nuclear tests in Algeria in the 1960s were much larger than the French army admitted at the time, stretching across all of West Africa and up to southern Europe, according to recently declassified documents. The documents were released in 2013 following appeals from military French veterans who say their current ill health is linked to exposure to dangerous levels of radiation. One map shows that 13 days after France detonated its first nuclear device – "Gerboise Bleue" (Blue Jerboa) – in February 1960, radioactive particles ranged from the Central African Republic to Sicily and southern Spain.

Gerboise Blue, more than three times as powerful as the bomb dropped on Nagasaki in 1945, exploded in the sky above the Sahara Desert in Reggane southern Algeria. The test took place at the height of the former French colony's independence struggle.

An ecological and human disaster, 54 years later, continues to cause diseases of radiation-induced cancers. Thus, the Algerian people have served as "guinea pigs" of the French nuclear Apocalypse from 1960 to 1966.

According to our measurements, observations, facts, reports from many studies and world media agency like Reuters; BBC, (1960, France explodes Third atomic bomb), radioactive material is still seeping out from this Sahara desert mountain where French scientists conducted nuclear tests in the 1960s, contaminating the soil and poisoning relations between France and Algeria. 54 years later, local people, say the tests left a legacy of environmental devastation and health problems, and are demanding that Paris issue an apology and pay compensation which is being totally ignored by France up to now.

2. Highly strategic project to equip France

2.1 Cronologia French Nuclear Weapons

Racing to build a bomb that would underpin its status as a major Cold War power, France "chose this barren spot" in what was then a French colony to carry out nuclear explosions before a newly independent Algeria called a halt to the tests.

- 1939 work of Frédéric Joliot Curie team.
- (1939-1945): World War 2.
- 18 October 1945: Creation of the Commission for Atomic Energy (CEA).
- 20 June 1952: establishment of a program bill for the realization of atomic energy.
- Development plan for the period 1952-1957 (production of plutonium).
- 20 May, 1954: developing a nuclear program for national defense.
- 1955: creation of Vaujours Study Centre and the Centre for Bruyeres-le-Chatel studies.
- 30 November 1956: signing of a protocol that defines the program for the years 1957-1961 (preparation of nuclear test explosions).
- 5 December 1956: Creation of Military Applications Committee for Atomic Energy (CAMEA).

- 18 March, 1957: creation of the Joint Army-CEA group for nuclear experiments, led by **General Ailleret**.
- March 1957: the project to equip France with nuclear weapons is entrusted to General Ailleret. It was under his responsibility Saharan three sites were selected. He said at the time: "The most remarkable thing was the total absence; I mean total, animal or plant life. The almost absolute drought had done its work; everything was dead. It is clear that this would be the ideal place to make nuclear explosions safe for the neighbours, since there was not etc; the total lack of life course being the key element for this site".
- July 1957: decision to implement a field near Reggane nuclear tests (in defiance of the population, nomadic and sedentary, the environment including the legal status of the territory) and the construction of the basis of tests Reggane, began in October 1957.
- 22 July, 1958: **General de Gaulle** sets the date for the first test explosion in Q1 1960.
- 7 December, 1957: creation, at the University of Algiers, Institute for Nuclear Studies (IEN).
- 5 November 1959: the discourse of **Ailleret** is taken and given by the French delegate **Moch** to the UN forum and by a diagram, presented the Algerian Sahara desert and accurately **Tanezrouf** as an ideal place to carry out atomic experiments.
- 13 February, 1960, 7 pm 04 at Hamoudia (40 km south of Reggane), exploded the first French nuclear test in which energy was 70 kT four times the bomb "Little Boy" on Hiroshima.

2.1.1 Sahara Centre Military Experimentation (CSEM) (10 May 1957) in Reggane, an area of 108,000 km².

2.2 Centers of Experimentation, COEs

2.2.1 Hammaguir, (1947 – 1967). Centre Interarmées d'Essais d'Engins Spéciaux: C.I.E.E.S): Hammaguir, 120 km/75 mile, south west of Colomb-Béchar, Algeria: used for launching rockets.

2.2.2 Three centres of experiments with several sites:

2.2.3 Centre for Military Experimentation Oasis (MECC), 12 July 1960: with In Amguel in the Hoggar (170,570 hectare area).

2.2.4 Pacific Experimentation Centre (CEP) (1964 – 1966; 193 nuclear tests).

2.3 French Nuclear Explosions in Algerian Sahara (1960-1966):

A heavy colonial legacy :

Between 13 February 1960 and 16 February 1966 France conducted 57 nuclear tests and explosions in the Sahara in 03 sites at 02 centers (CSEM & MECC).

A Hammoudia, 40 km south of Reggane, were 4 atmospheric tests and 35 "complementary experience" completed.

Taurirt Tan Afella, In Ekker, In the mountain of, 50 km north of In Amguel, 13 were carried out underground tests in tunnels.

A Tan Ataram, 30 km to the west of **In Ekker** were 05 "security experience" in the open air (Pollen operation).

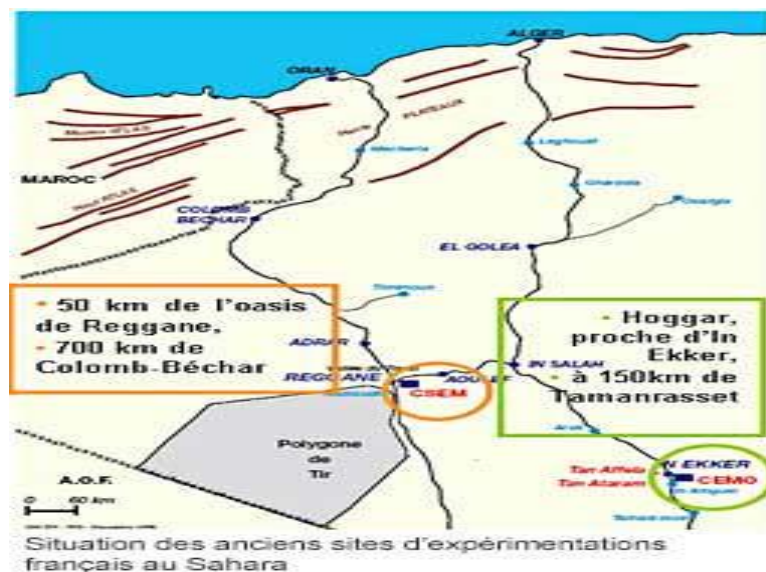


Fig. 1 French Nuclear Tests in Algerian Sahara

Table 1

Surface experiments	Hamoudia (Reggane) 108.000 km ²	1960-1961	04	100	- Contamination continentale - Cobayes
Explosions Underground	Taourirt Tan Afella (In Ekker) 170.570 ha	(1961-1966)	13	500	12 échecs 04 accidents - Large contaminations
Complementary Experiments	Hamoudia (Reggane) 108.000 km ²	(1961-1963)	35	Pu	- Dispersion du plutonium 02 accidents au moins - Des morts et des blessés
Safety Testing	Tan Ataram (In Ekker) 10. 000 ha	(1964-1966)	05	Pu/ Lu	- Dispersion du plutonium - Manœuvres d'unités militaires sur le site.

2.4 Survey of French nuclear tests? Algerian Sahara

Total Power: 600 kT of TNT (40 times the Hiroshima bomb) plus Dispersion significant amount of plutonium over thousands of hectares, 24,000 French civilians and military mobilized (10 000 and 14 000 Reggane In Ekker including 2,000 permanent). The number of Algerian involved in these tests is unknown? go to Archive (**Jean D.Merchet 2007; Lucien Parfait Ecker 2007**).

Thousands contaminated Algerian 150 Algerian guinea pigs (Jerboa White), 101 (Jerboa Red) 195 (Green Jerboa) French guinea pigs.(Al - Aboudi Abdul Kadhum, 2012) French military unit guinea pigs (pollen operation; **El Watan 2008**).



Fig. 2 Photo gate C.S.E.M. (*Centre Saharien d'Expérimentations Militaires*): Reggane, used for atmospheric tests from 1960 to 1961.



Fig. 3 Photo Military Base C.S.E.M. (*Centre Saharien d'Expérimentations Militaires*): Reggane, used for atmospheric tests from 1960 to 1961.

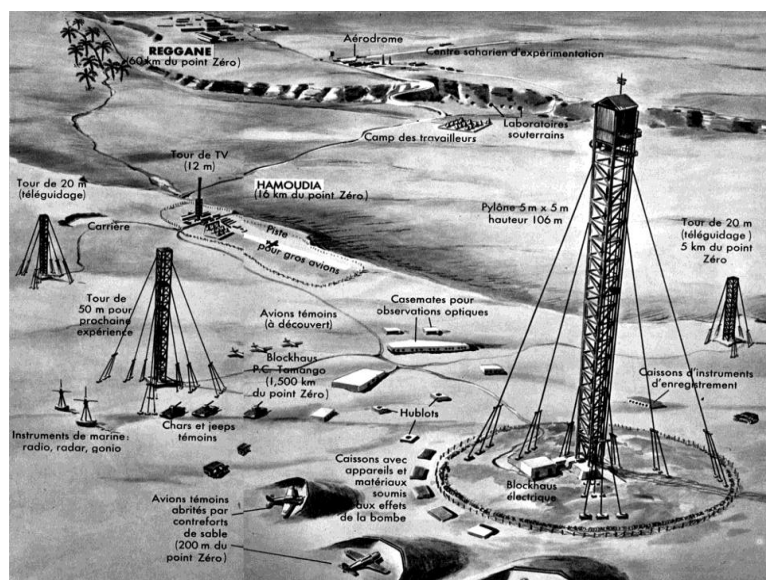


Fig. 4 Plan Hamoudia, Show localisation of four point zero for surface French nuclear tests 1960 /1961

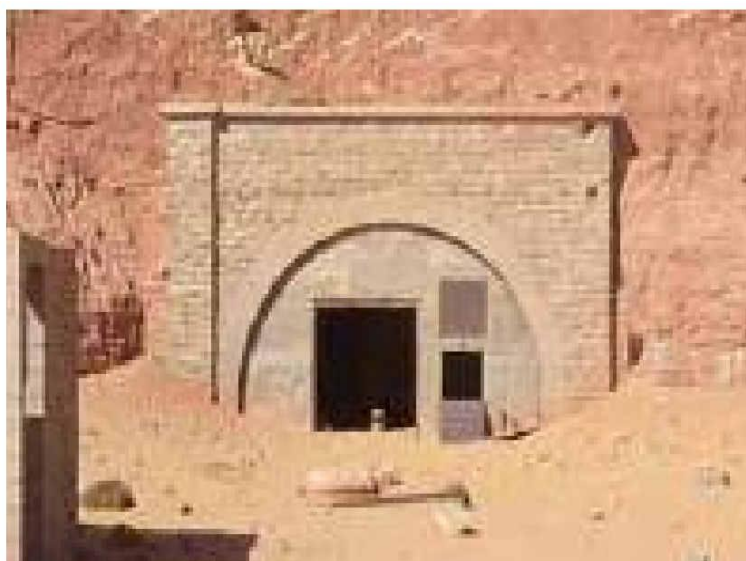


Fig. 5 Laboratory in Hamoudia,



Fig. 6 Site Map Reggane-Hammoudia

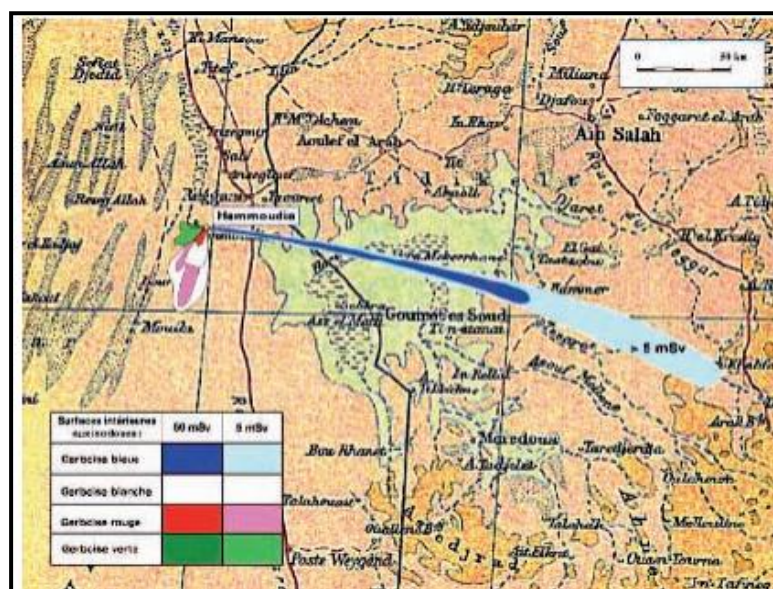


Fig. 7 Locations complementary experiences Hamoudia, Reggane, south Algeria

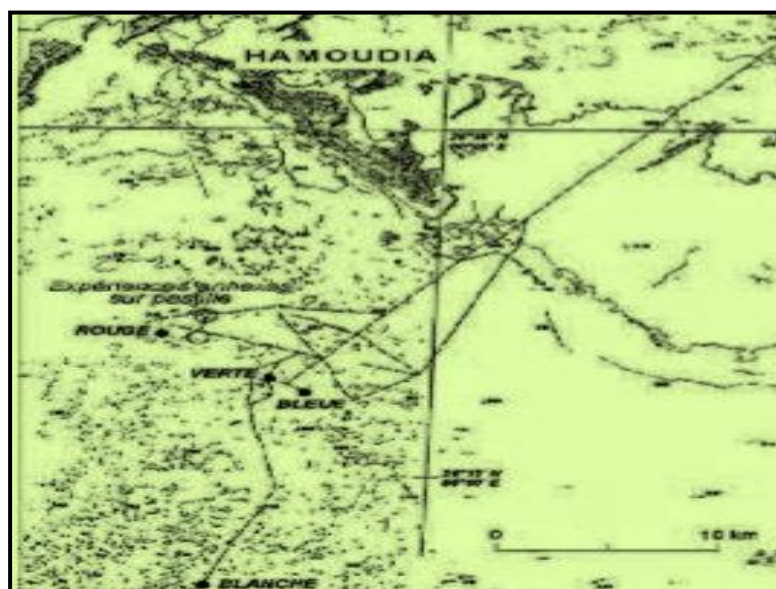


Fig. 8 Vitrified sand, highly contaminated (Pu) to Hamoudia, Reggane



Fig. 9 Fallout through days after first Reggane explosion 13 feb. 1960, (Leparisien, 2014)



Fig. 10 Melting soil components in Hamoudia



Fig. 11 Melting soil coponents in Hamoudia

2.5 Memorandum of 4 February 1960? (Preserved Michel Verger, former president AVEN)

Among the tasks entrusted to the "fixed peloton"."Enforce curfew (...) If applicable, provide reassurance by reminding her that she risks nothing;. It must trust that France who reported him well ; only precaution is taken to avoid the risk of blindness, throughout the month of February and in any case until further notice, do not leave the midnight houses to sunrise; if for some reason, people had to go out in this part of the night, they should have the constant

concern of not looking south (Tanezrouft) and instead to keep his face in the direction of Adrar. "



Fig. 12 Three forgotten cages containing animals (guinea pigs) exposed during nuclear tests Hamoudia, Reggane (16 November, 2007).

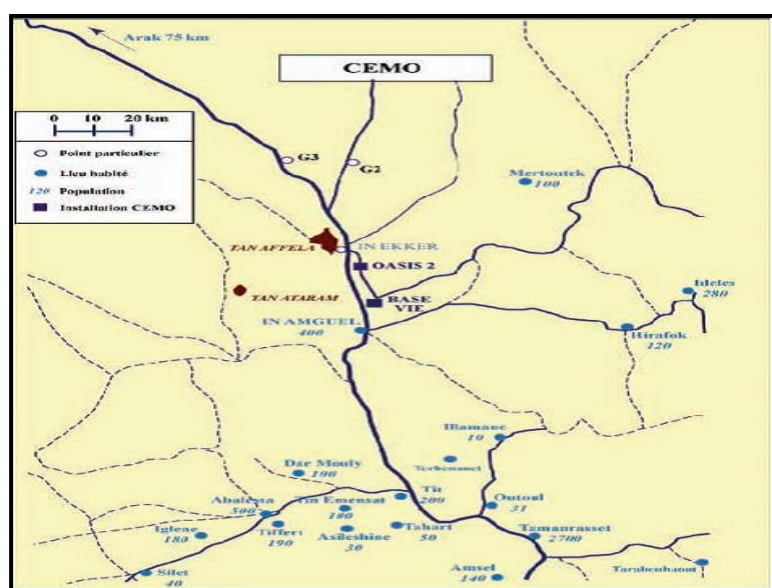


Fig. 13 Site maps In Ekker

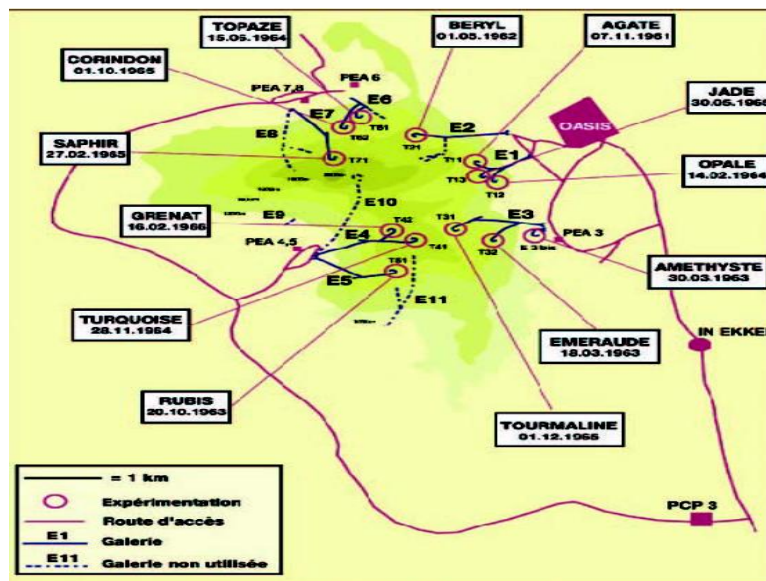


Fig. 14 Localization tunnels testing? (In Ekker), Taourirt, South Algeria

RADAR C.O.T.A.L. (pour indiquer la direction du vent)



Fig. 15 Radar to show the direction of the wind



Fig. 16 Inflatable shelter, In Amguel

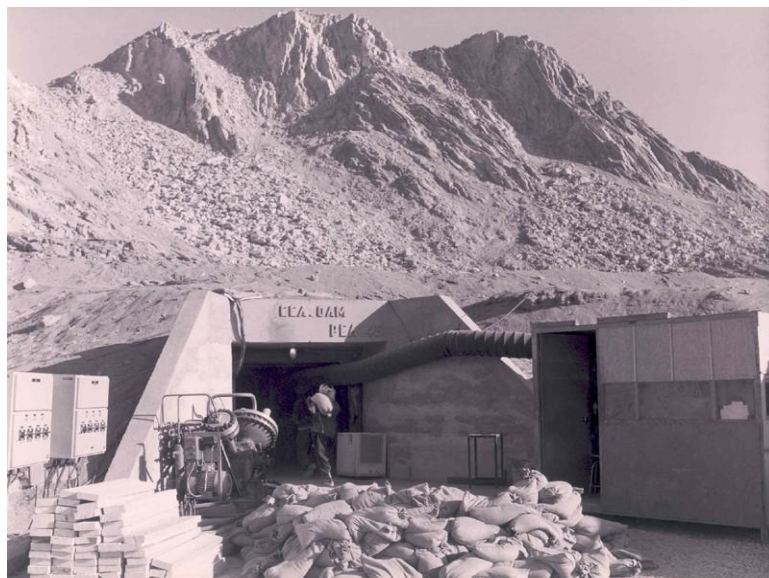


Fig. 17 Workshope at Tunels, In Ekker

Underground Tests C.E.M.O. (*Centre d'Expérimentations Militaires des Oasis*): [In Ekker](#), in the [Hoggar](#), 150 km/93 mi from [Tamanrasset](#), [Tan Afella](#), Algeria:

For example, France has abused the Algerian territory by nuclear explosions that were not "clean" at sites where there are indigenous who have not sought advice. Gross negligence were recorded in the Privacy and populations for military secrecy is needed. According to Professor

Yves Rocard, present in Reggane, as a scientific expert, the four air tests were carried out in adverse conditions. Today, the population living there suffer from multiple pathologies due to irradiation and contamination of the environment.

3. Recorded accidents: The listed major accidents

We recorded four accidents or explosions not contained or confined within the underground explosions namely: Beryl, Amethyst, Ruby and Jade. These accidents resulted lava releases, slag and gaseous or volatile radionuclides forming clouds. These radioactive clouds have reached the local people and have obviously caused significant personal exhibitions present on site. Eight other underground tests Tan Afella also caused radioactive gas leaks. Additional experiments conducted in tanks to Hamoudia on plutonium pellets also leads to accidents generated radioactivity.

3.1 Accident "Beryl"

The French government has not made public any documents about nuclear tests in Algeria. In the absence of official documentation about armed forces participation, participation of Algerians and dose and contamination levels, there has been considerable speculation and rumour about all of these subjects. The one figure that we have seen on radiation doses was reported by Greenpeace: "The first underground test, on 1 May 1962, code-named Beryl, was to test the prototype for the AN 11 bomb for the Mirage IVA aircraft. Despite adverse winds and against the advice of the Commission of Nuclear Safety the explosion went ahead because two VIPs, one from the Ministère des Armees, were present. Twelve soldiers were contaminated when radioactive vapour escaped through a fissure in the rock; nine of them received more than 100 rem of radiation".

First May 1962, was held the second underground test in a gallery of 1,300 m dug in a granite massif 5000 m in diameter and 3700 m thick, shaped staircase (spiral), blocked by reinforced concrete dropoff window during the explosion, the sealing system gave way under the pressure. There was the accident Beryl due to incorrect setting of the machine where the shock wave has not closed the gallery .The massive, shaken to its full extent, suddenly changes color and is covered with a multitude of dust clouds.





Fig. 18 Accident "Beryl"



Fig. 19 Accident "Beryl", the cloud trajectory facing east southeast

3.1.1 Event Sequence

The gallery gives passage to a major escape of radioactive products to (H + 16) seconds in the form of lava, slag, about 700 m^3 which solidify at the exit of the gallery (tile E2), aerosols and gaseous products highly volatile, creating a cloud that stabilizes at low altitude 3000 m above the ground in less than 10 minutes. The cloud trajectory facing east southeast of E2 passes over the command post (PC2) then east bringing a $4,4.10^{-7}$ activity of Ci / m^3 in Djanet (500 km) drop-off window.



Fig. 20 Lava, 2010



Fig. 21 Lava, 1962



Fig. 22 Lava, 1962

3.1.2 Measurements

A study late 1965 evaluates the residual activity of approximately 5,000 C_i fixed on 10,000 tons of lava or slag which about 25 C_i of plutonium. The results of the analysis of lava samples published in the IAEA report in 2005, those published in 2008 in Applied Radiation and Isotope newspaper and those obtained by the laboratories of CRIIRAD in 2009, clearly show that the radiological consequences accident Beryl is, to date, including a potential danger lava flow.

Table 2 Preliminary results CRIIRAD? (Samples (29-30) October 2009)

levy					Analyse par spectrométrie gamma				
Nature	Date place	Flux gamma, G5 sur site "/<.:.1	Masse	Flux gamma SPP2 ,/<.:.	Cs 137 (Bq/kg)	Am 241 (Bq/kg)	Co 60 (Bq/kg)	Autres artificiels émetteurs n"mm"	Pu 239
burning cream	30/10/2009 areasOutputs tunnels (collapsed)	1000 c/s	388 g	180	25500	950	7,2	Eu 152	Déecté
Lave	29/10/2009 output tunnel when nearly scored beryl	> 30 000 c/s saturation)	26 g	800	760000	15100	1050	Eu 152, Eu 154, Eu 155, Ba 133	Déecté

3.1.3 CRIIRAD Report, 2009

Preliminary measurements confirm the contamination of lava and ash with artificial radionuclides gamma emitters (fission products, activation products and transuranic), particularly Cesium-137 (760,000 Bq / kg) and Americium-241 (15 100 Bq / kg).The plutonium contamination is strongly suspected, because of the detection of americium-241 (descending plutonium-241) and from there on the gamma spectra of a characteristic X-ray of the plutonium-239.

3.1.4 Fallout

Personal essays present PC2 and near contaminated and subject to variable radiation which, for some, were above the accepted standards of the time.Because of the risk of contamination, staff kept the base life Oasis II are limited, PLO remain at Centre Point. Tuareg auxiliary employees menial tasks were abandoned on 1 May 1962.Local people suffer only temporary and localized restrictions in their movements in the consumption of water and pasture.The accident contaminated an area of 250 ha.

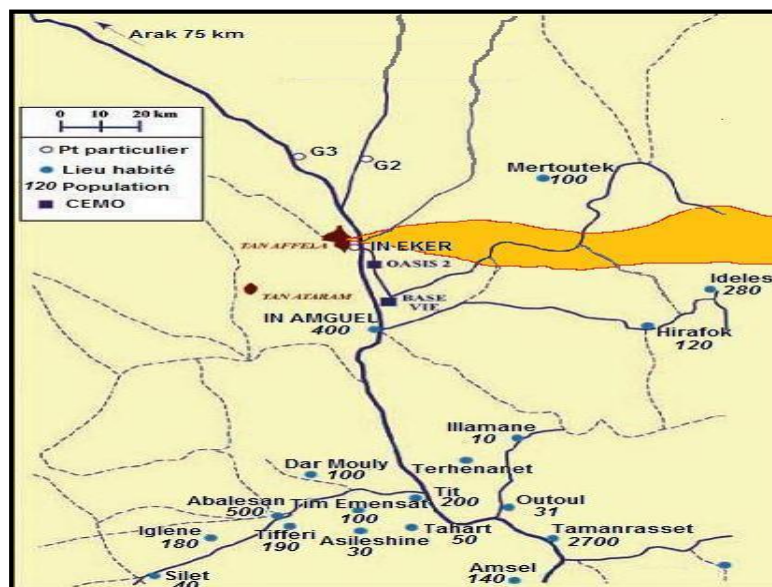


Fig. 23 Shot from the fallout zone Beryl 1 May 1962

According to the estimation of the time, the sedentary population living within 100 km of In Ekker did not exceed 2,000 inhabitants, nomads are not taken into account. The main inhabited place in sedentary population is that of Ideles with 280 people, which is about 100 km from the firing point on the southern fringe of the fallout, the dose it received was of the order of 0.05 mSv (5 mrem). Nomads, mainly those of Kel Torha which about 240 people, moving at 150 km from the firing point on the northern fringe of the settled, received doses of up to 2.5 mSv (250 m rem).

3.1.5 Fallout Radioactivity

For CEA staff, it is saved 437 equivalents significant doses exceed 75 5 mSv (500 mrem) and 10 are above 50 mSv (5 rem). For defense personnel, 232 people received an equivalent dose of between 5 mSv and 0.2 Sv (500 mrem and 20 rems), 02 people received equivalent doses of 0.2 to 0.4 Sv (from 20 to 40 rems), and 09 people, a monitoring station in the east of Tan Afella, have been forgotten in the clouds to 16h, the dosimeters were saturated, received doses evaluated to 0.5 Sv (50 rems).

3.1.6 Decontamination

(D + 1) to (D + 9), the following numbers were decontaminated: 100 people by the Health Department of the hospital, 675 people by the 620th G.A.S. the station installed near the road leading to the airline stopover. The Department of Health has practiced a number of fine decontamination and 9 military hospital. The safety of the local population (nomadic and sedentary) in the area of impact and nearby is assured after firing, with all the discretion imposed by the circumstances. The level of radioactivity is monitored mainly in the cities of Ideles and Mertoutek and throughout the East zone to Djanet.

Accident 1 May 1962: Distribution of the results of external dosimetry based on dose ranges in mSv?

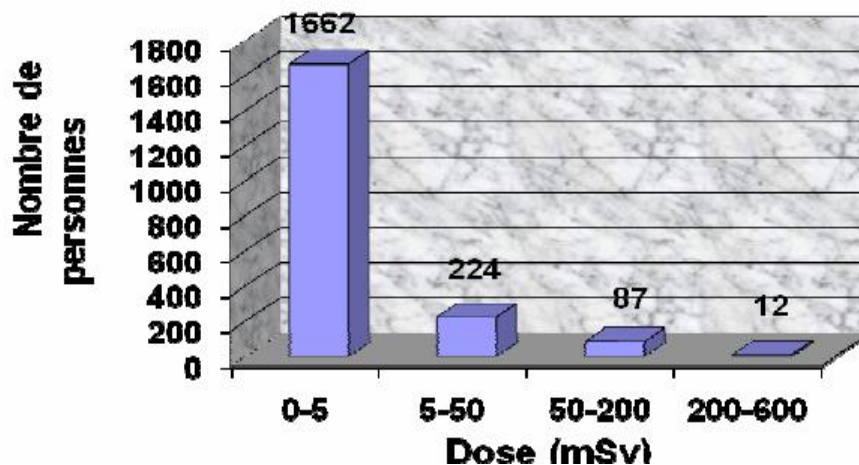


Fig. 24 Overall division of work force? By dose ranges

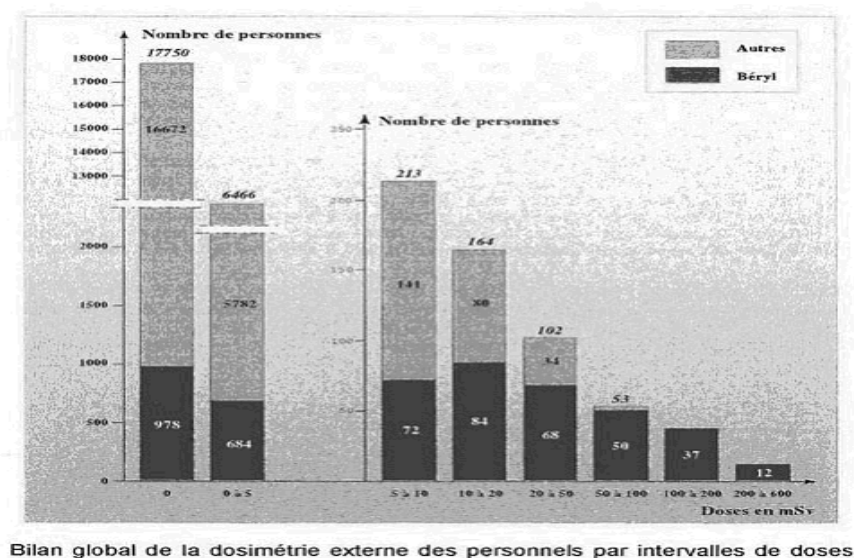


Fig. 25 Global scale for external personal dosemetry

24 000, nearly 18 000 received a zero dose to about 6500 a dosage of between 0 and 5 mSv. 581 people (2.5%) received a cumulative dose greater than 5 mSv. Almost all of the 50 mSv higher doses are attributable to the test Beryl.

2.1.7 Documents and testimony

Many documents and testimonies collected and published in books, Algerian and French press, testimonies of French and Algerian veterans committed to trial sites, especially during accidents. Journalistic investigation as that carried out by the Swiss Romande TV (TSR) "The sorcerer's apprentice." The telefilm "living bomb!" (accident of 1 May 1962).

B - account- REPORT OVERVIEW OF UNDERGROUND NUCLEAR TIR "BERYL" (Paris August 28, 1962, No. 948/3 / CIA8 / S.)?

Firing "BERYL" aims to experiment with a machine whose energy is 50 kt intended to arm the Mirage IV. Steps are taken to ensure the safety of personnel involved in testing and that of local populations, particularly some traffic restrictions, with maximum discretion. The main technical security tasks are divided among different agencies:

Homeland Security Technology

Radiological Safety Outdoor

Security Mechanical Outdoor

Radiological Monitoring Staff

3.1.8 Safety factor

According to the minutes of the Security Consultative Committee dated 2 July 1964, the risks of radioactive escapes are related to three causes: bad closing spiral, causing a leak or "stripping" by the gallery; insufficient coverage, causing the formation of a crater, leakage existing flaws of the massive, created or aggravated by the mechanical effects of the explosion. The safety factor for this kind of explosion must be theoretically greater than 1.

The practice has shown that contained explosions had coefficients greater than **the safety factor "Beryl" and "Amethyst" is only 0.9?**

According to the minutes of the Security Consultative Committee dated July 2, 1964, the risks of radioactive escapes are related to three causes: bad closing spiral, causing a leak or "stripping" by the gallery, insufficient coverage, causing the formation of a crater, leakage existing flaws of the massive, created or aggravated by the mechanical effects of the explosion. The safety factor for this kind of explosion must be theoretically greater than 1. The practice has shown that contained explosions had coefficients greater than 2.5. The safety factor "Beryl" and "Amethyst" is only 0.9?

Yves Rocard is considered the father of the French atomic bomb: "In our underground tests he performed a nuclear incident, to my knowledge the only (memory problem?) Motivating the intervention of the security services and having exposed the subjects to nuclear radiation - without it resulted no damage (just a few deaths, illnesses ...) on the one hand, this is proof that our experiences have always been conducted with the utmost caution, on the other hand, if we relate the events of the incident we see that the risks were not negligible, and that the weight and stiffness of the organization could worsen considerably ".

3.1.9 Testimony of Pierre Messmer, (5 December 1995)

A number of personalities, including two ministers Pierre Messmer, Minister of Armies, and Gaston Palewski, Minister of Scientific research and atomic affairs, attended testing and a hundred soldiers. "I was present at In-Amguel in Algeria between April 16 and May 14, 1962 to attend nuclear tests etc.) I was accompanied by Mr. Gaston Palewski, himself a minister of research. A incident occurred during an underground fire (...) causing a gas leak and radioactive dust (...) immediately exposed personnel were brought back to the base life and evening, all people on the site, including two ministers, were subject to the usual decontamination measures and a medical examination. the clothes were incinerated. I remember that 4 or 5 people were evacuated in France but their case did not seem alarming. I know you say more. I specify here that all nuclear fire operations from that time are still

classified defense secrets", "We were facing a very serious pollution (...) and the tide turned in one go in our direction." Messmer continued admitting that there was "a lot of organizational problems" and "some panic." Testimony that precisely overlaps those of other people present that day at In- Amguel, including Gaston Palewski.

Palewski died of leukemia 22 years later and Messmer also died of cancer, but at a later age. These cancers are attributed to the accident of "Beryl".

3.1.10 Other Testimonials

André Bendjebbar confirmed what the physicist and the minister: "The return to life is based in an atmosphere of every man for himself." , "The World", 19 May 1962: "Everyone fled except called and auxiliary workers They remained three hours in the radioactive cloud, drilling wells and with sand to seal gaps and cracks caused by. explosions ".

Fabien Gruhier New Observer says "Instead of containing the explosion, the mountain of Tan Afella opened under the incredulous eyes of assistants. A huge black cloud came up and began to darken the sky above the crowd spectators. the general panic, meltdown, is not to the credit of the military hierarchy. The leaders fled first, soldiers forgotten for hours in the radioactive cloud ".

Driver testimony Jacques Muller: January 2002, "I have been irradiated at In-Amguel" (died September 25, 2007).

"We had invited us to come to attend the trial. It'll be pretty, had it explained to us. We were in shorts and shirt but when the blast occurred, a huge horizontal flame escaped from the mountain facing the command PC (...) ... So, I can tell you that the exodus of 1940 in hand, it was nothing. it was total panic, the stampede in general ... "the mountain bleaches, soil waves. For me it is very beautiful, this red and black flame coming out of the mountain (...). The "Come and see, it's beautiful, you risk nothing!" prevents me to react, and I'm not the only one "... The nuclear cloud came out of the mountain is panic "... Officials, civil, curious, everyone runs, if the vehicle is saved to the basic life - except perhaps called, which await orders. The helicopter pilot was blinded is convinced that his blindness is the consequence of the accident on May 1, 1962 but how to prove it? All nuclear firing operations of the time remaining classified "defense secret".

The Ministry of hosts invariably replied that his blindness is "not attributable to service" and no part of his medical file not found in military archives .dropoff window.Worse, after the underground explosions, ordinary soldiers were sent to collect samples in the spiral-shaped tunnel.

3.1.11 Testimony of Michel Dessoubre

Young soldier called in ALT in Nancy, I went to Algeria, where I have been incorporated into the 621st GAS (Group of Special Weapons).

Arrived in Algiers, we flew: unknown precise destination ... Once in the unit, we learned that we were going to the atomic basis (secret) of In Amguel we were assigned to the security of the site of in Ekker, 1 May 1962 (my birthday), we were on patrol my 8 friends and I around the mountain Taourirt Tan Afella since the explosion of the bomb Beryl was scheduled for that day. Our mission: to secure the site, remove and prevent access by the local population. We were placed about 10 Kms from the mountain, on a sandy hill in the center of the tunnel where the bomb was installed at 11:00 local time, we saw the white mountain become the dust that

raised its flanks. Seconds later, we received a kind of slag rain, as large grains of sand. The ground began to rumble and undulate beneath us raise up our 4x4.

At that time, we saw a cloud out of the mountain and head towards us. The cloud grew and was increasing up to 2600 m altitude. We had no information about what was happening or what was going on because the radio was turned off. Around 11:45, the cloud was on the ground and we covered, we thought at the time that is needed to be a radioactive cloud. We went to the tunnel entrance, where scientists in combination and gas masks, we have Respondent ordered to leave the area immediately to get us decontaminated Oasis 2.

Arriving at Oasis 2, we found that the site had been evacuated and we left towards life based In Amguel where we were supported. Decontamination lasted several hours and was repeated for several days. Placed in isolation in the hospital, my 8 comrades and myself, were then repatriated to the hospital a sanitary armies in Clamart. Doses are estimated at 600 mSv!

3.1.12 Film "Long live the bomb!" Inspired by true events ? Jean-Pierre Sinapi

Philippe, a young lieutenant, and three conscripts, Fred, Jojo and Javiez, are part of one of the companies responsible for providing security around the mountain of Taourirt, which will perform an underground nuclear test. But during the test, the Taourit cracks; an atomic cloud escapes from the mountain and unfolds over the young soldiers. Exposed all afternoon to radiation, they expect a decrease of order which does not come.

3.2 Ranking parameters? Nuclear accidents

The classification depends primarily on the level of radioactive fallout: human exposure, measured in mSv / h, the impact on the environment, which account in Bq / g, the proportion of the affected population, and the affected geographical area.

3.2.1 International Nuclear Event Scale, INES

Scale that ranks nuclear incidents and accidents according to eight levels of severity rated from 0 to 7. Some accidents are covered by defence secrecy; their circumstances and their severity are not known accurately.



Fig. 26 Scale that ranks nuclear incidents and accidents according to eight levels of severity rated from 0 to 7.

3.3 Other accidents at In Ekker

The accident "Beryl" was not the only one. Other accidents occurred: accident "Amethyst" March 30, 1963: During this test, there was release of a quantity of molten rock slag. A plume containing aerosols and gaseous products headed east southeast, and reached the oasis of Ideles, located 100 km, where there were 280 inhabitants to which must be added the nomadic population. n has not done medical monitoring object or dosimetric measurements.

Accident "Ruby" 20 October 1963: During this test, a release of radioactive noble gases and iodine occurred within one hour of the completion of the test, with the formation of a plume. Contamination was detected to Tamanrasset (150 km). The accident "Jade", 30 May 1965: in this accident, it was observed a noble gas and iodine clearance by the gallery. The relevant departments of C.E.A. recorded a radiological impact on personal, local people are downright ignored.

2.5 Other accidents Hammoudia/Reggane

Complementary experiments on plutonium pellets made in vats generated radioactivity. Accident of April 19, 1962, described as premature detonation. The blast caused by the shock wave caused burns and shrapnel injuries on staff. This listed accident caused the dispersal of a significant amount of plutonium that has led to the contamination of at least thirty people were evacuated and taken over at the Percy hospital in Clamart in France.

However, the Defence Ministry report published in January 2007 makes no mention of these accidents, except the April 19, 1962 which is minimized. He did not mention the accident on a similar experience of 28 June 1962.

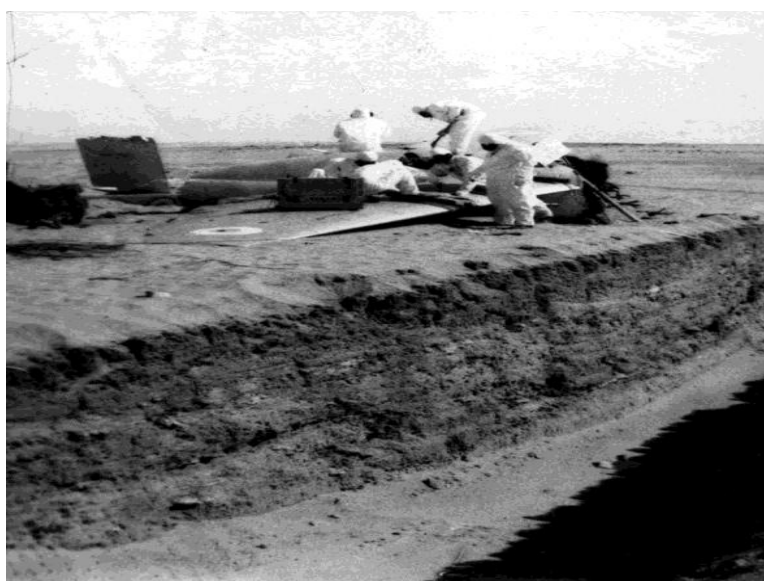




Fig. 27 Landfill operation? contaminated equipment?

4. Site Rehabilitation

Following completion of its latest nuclear test in Algeria February 16, 1966, the test sites were evacuated in June 1966 after the "dismantling operation and Sanitation". These sites were handed over to the Algerian authorities in June 1967 (Saâd Lounès 2006).

The health consequences:

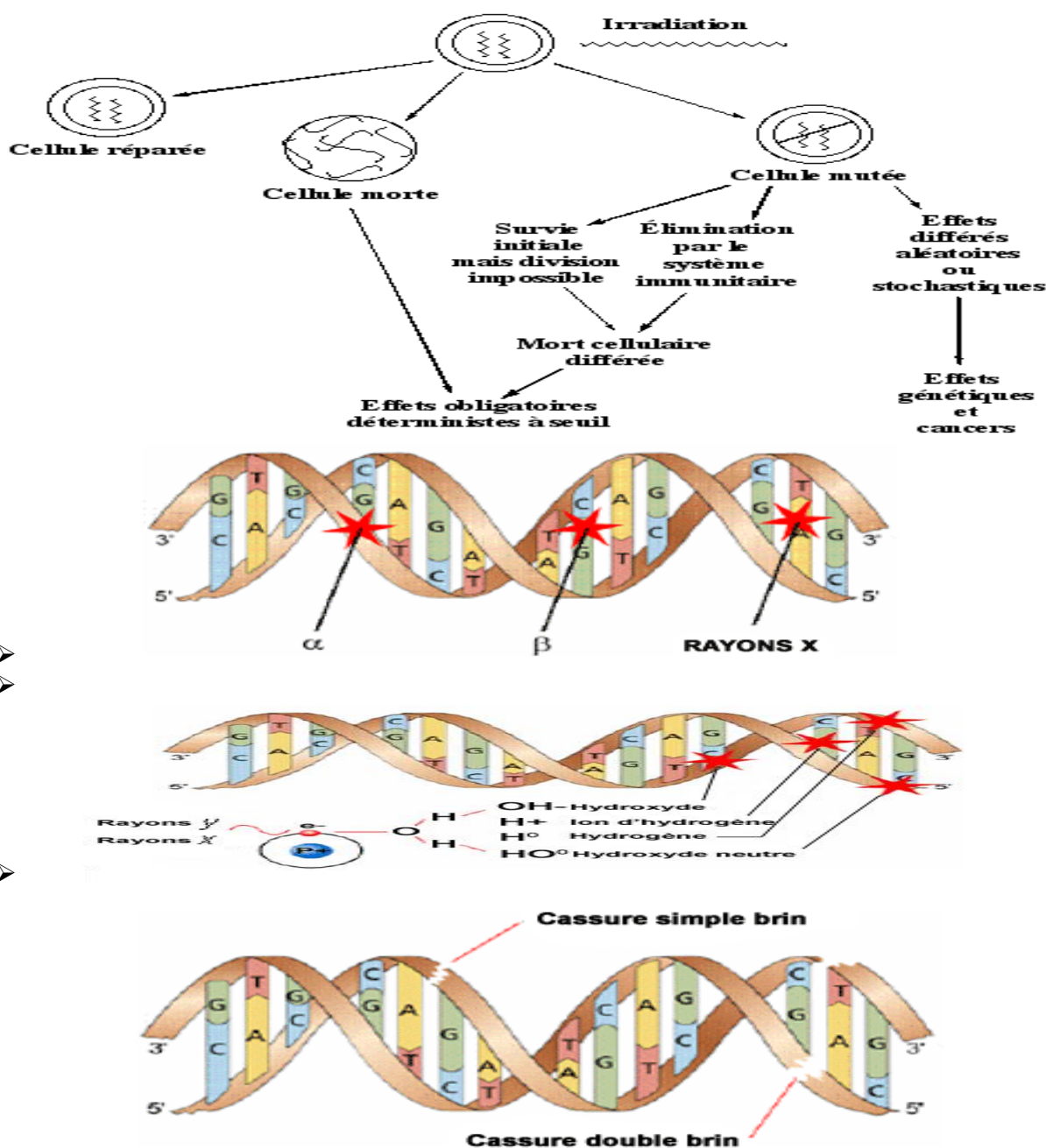


Fig. 28 The effects of radiation on DNA

5. Risks of radiation

A very high radiation kills cells and causes radioactive burns, disease and often the death. A lower level of irradiation causes mutations whose effects are unpredictable. Some people suffer from cancer or give birth to children with deformities. The effects often occur many years after irradiation (Andrea Davoust, 2012). If even lower radiation, scientists disagree about the effects. Some scientists, particularly those associated with the nuclear industry; claim that low radiation is harmless to health? Others consider that the extent of risk remains unclear, as it continues to discover unexpected effects of radioactivity. Therefore, any radiation dose

has a carcinogenic and genetic risk. Thus, any dose "as low as it" may be an increased risk of cancer.

6. Irradiation and contamination

We must differentiate the concepts of radiation and the concept of contamination. External radiation: sources emitting radiation is outside the body but the radiation through it. Internal radiation: radioactive substances penetrate into the body either by inhalation or ingestion or through injury (Aalem Abdu- Hameed, 1998).

7. Environmental damage

Need I remind you that it is more necessary and urgent to take all measures to decontaminate different sites of the tests. Thousands of hectares agricultural and pasture are no longer usable due to the presence of radioactivity?



Fig.29 Zone rehabilitate around? Reganne tray?



Fig. 30 Rehabilitation and decontamination of the site Hamoudia

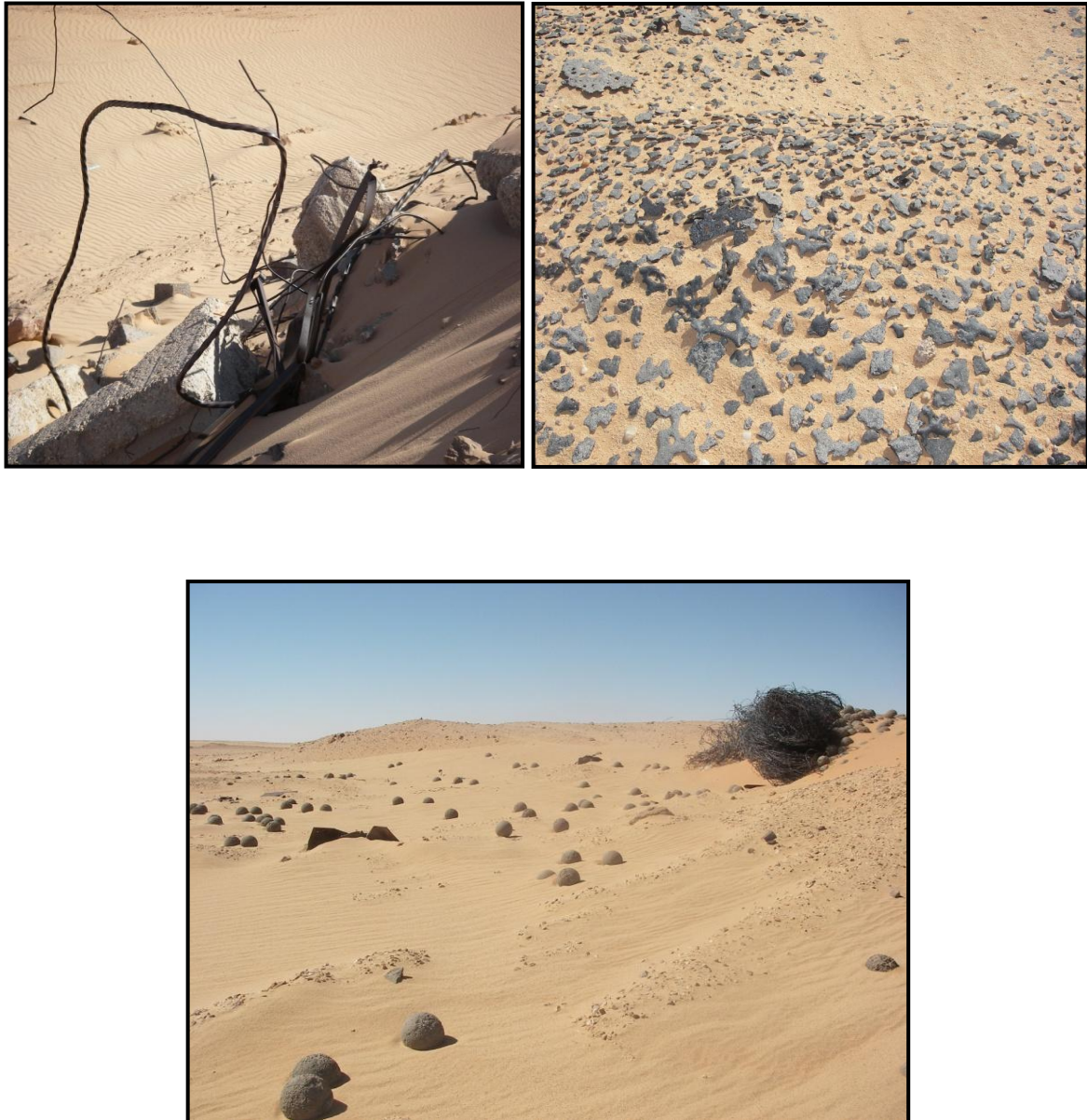


Fig. 31 Geomechanical monitoring massif Tan Afela



Fig. 32 Expertise and action on the area of the accident "Beryl"



Fig. 33 Identification, expertise and action on the 05 test area of "pollen operation"?

N° 105

SÉNAT

SESSION ORDINAIRE DE 2010-2011

Inregistré à la Présidence du Sénat le 10 novembre 2010

PROPOSITION DE LOI

relative au suivi des conséquences environnementales des essais nucléaires français en Polynésie française.

PRÉSENTÉE

Par M. Richard TUHEIAVA et les membres du groupe socialiste (1),
apparentés (2) et rattachés (3),

Sénateurs

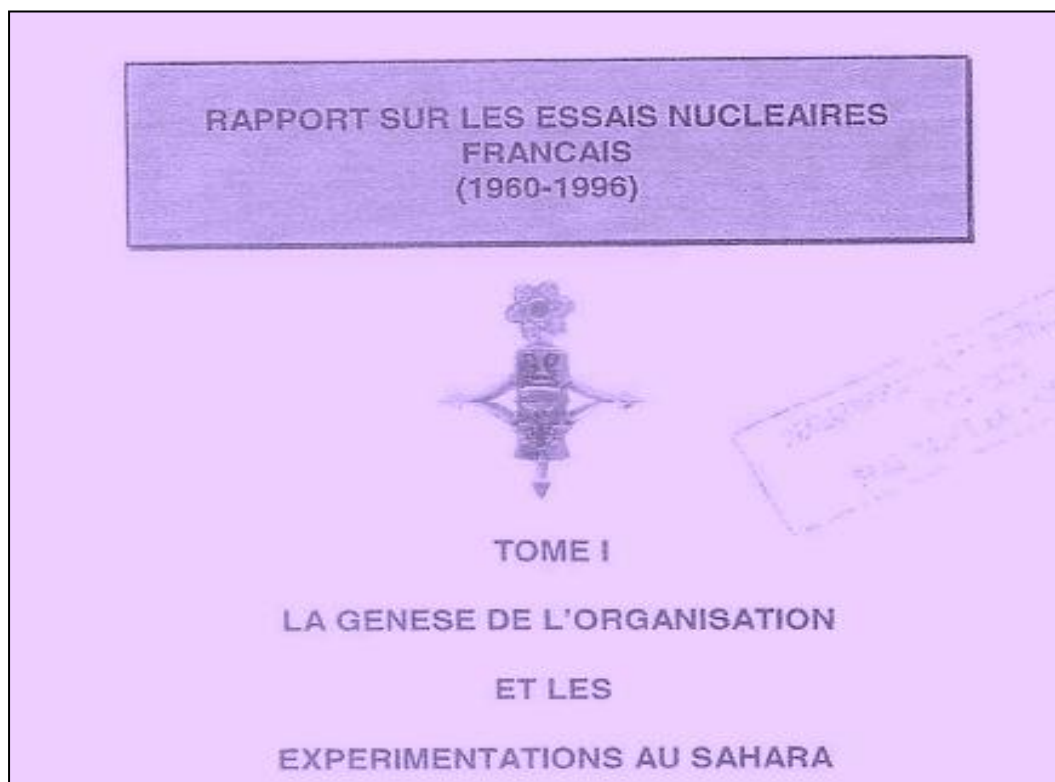
(Envoyée à la commission de l'économie, du développement durable et de l'aménagement du territoire, sous réserve de la constitution éventuelle d'une commission spéciale dans les conditions prévues par le Règlement.)

(1) Ce groupe est composé de : Mmes Jacqueline Alquier, Michèle André, MM. Serge Andreoni, Bernard Angah, Alain Anziani, David Assolant, Bernard Auban, Robert Badier, Jean-Pierre Bel, Claude Bériz-Débat, Jean Besson, Mme Maryvonne Blondin, M. Yannick Bodin, Mme Nicole Bonnefoy, MM. Yannick Borel, Didier Boulaud, Martial Bourquart, Mme Bernadette Bourquart, M. Michel Bourat, Mme Nicole Brégo, M. Jean-Pierre Caffet, Mme Claire-Lise Campion, M. Jean-Louis Carrière, Mme Françoise Carron, M. Bernard Carraz, Mme Monique Carlier-ban Guiga, MM. Yves Chassan, Gérard Collomb, Pierre-Yves Collombat, Roland Courau, Yves Daudigny, Yves Dauge, Marc Daunis, Jean-Pierre Dénariat, Mme Christine Demonce, M. Claude Dooptzel, Mme Joëlle Durieux, MM. Alain Faussonier, Jean-Luc Fichel, Jean-Claude Fignon, Bernard Fimat, Charles Gaubier, Mme Samia Ghali, MM. Serge Godard, Jean-Pierre Godfrey, Jean-Noël Guérin, Didier Guillaume, Claude Hain, Edmond Hervé, Mmes Odette Hurvieu, Annie Jarnaud-Vergnolle, MM. Claude Jannaron, Roman Kerdaron, Mme Bariza Kharri, MM. Yves Kraemer, Philippe Labeyrie, Serge Lagache, Mme Françoise Laugon-Perrigot, M. Jacky Le Menn, Mmes Claudine Lepage, Raymonde Le Texier, MM. Alain Le Vern, Jean-Jacques Lecauch, Roger Madec, Philippe Madrelle, Jacques Mahéas, François Marc, Jean-Pierre Masseret, Marc Masson, Pierre Mauroy, Rachel Maurin, Louis Mennaz, Jean-Pierre Michel, Gérard Miquel, Jean-Jacques Mirassou, Robert Navarro, Mme Renée Nicoux, MM. Jean-Marie Pastor, François Pariat, Daniel Penchenn, Jean-Claude Peyronnet, Bernard Piras, Roland Povinelli, Mme Gisèle Prinz, MM. Marcel Rainaud, Daniel Raoul, Paul Raoult, Françoise Rebouren, Daniel Reiner, Thierry Repentin, Roland Riou, Mmes Michèle San Vicente-Baudrin, Patricia Schillingier, MM. Michel Sergent, René-Pierre Signé, Jean-Pierre Soutir, Mme Catherine Tasca, MM. Michel Texon, René Teulada, Jean-Marie Todeschini, André Vannemont et Richard Yung.

(2) Appartient à : MM. Jean-Étienne Anselme, Jacques Berthoin, Jacques Gillot, Mme Virginie Kils, MM. Serge Larcher, Claude Lise, Georges Pizani et Richard Tubelava.

(3) Rattachés administrativement : Mmes Marie-Christine Blandin, Alina Broumediens-Thiery, MM. Jean Desossard, Jacques Muller et Mme Dominique Voyant.

Rapport from CRIIRAD, Valence, France 2009.



8.1 Partial lifting of defense secrecy about the tests in Polynesia

Demand the lifting of military secrecy on nuclear testing in Polynesia (Moruroa e Tatou AVEN & 28 November 2003), which was rejected by the Ministry of Defence 7 October 2010 despite the decision of the administrative court had been taken on 3 October 2012 by the new Defence Minister Jean-Yves Le Drian. The latter took the Advisory Commission of the secrecy of national defense that made 20 December, 2012 a favorable opinion on the declassification of 58 papers identifying radiological measurements of nuclear tests conducted between 1966 and 1996. "But are excepted from this favorable reviews" radiological measures a dozen shots, including Canopus shots (the first test of a hydrogen bomb in 1968) and Dragon 1970. The declassified documents, however, being "purged" many pages (Andrea Davoust, 2012).

8.2 Archives of French Nuclear Tests in the Algerian Sahara !!!

Unfortunately, The lifting of the "secret defense" does not concern the archives of French nuclear tests in the Algerian Sahara (1960-1966), as claimed by the Algeria!. How long will this not the place and this silence?.

8.3 Declassification of secret documents

In the US, the declassification of secret documents on US nuclear testing began in 1994 following the decision by the Clinton 7 December, 1993, and they continue today. But the association Moruroa eTatou, the decision of the commission "removes a thorn from the ministry of defense." Indeed, in the rejection of the demand in 2010, Moruroa e Tatou and AVEN had filed an appeal before the State Council last French legal step before going to European Court of Human Rights. Such an appeal, "would have messed constant attitude of the Ministry of Defence is to avoid a new" internationalization "of French nuclear testing issue."

8.4 Their Nuclear tests and our Studies with victims:

The Commission of Inquiry of the Assembly of French Polynesia in February 2006 revealed that the French tests were not as "clean" as stated by the Department of Defense: 25 reports classified "defense secret" demonstrating that all inhabited islands and atolls suffered significant radioactive fallout. If the archives will be open one day we will arrive at the same conclusion or worse for all the Algerian Sahara (Rabah Beldjenna, 2007).

From the first medical statistics Algerian data conducted in 1990 at the level of the nuclear explosion areas, represented by the «Reggan area and its environs», was recorded injuries several forms of cancer, bone marrow, skin and blood and thyroid in childhood, and abort the large number of women, and the high the proportion of premature births, and the high mortality rate at birth, hair loss, and an increase in the proportion of the deaf and dumb and mentally retarded. Medical notes also recorded renal deficit resulting from exposure to nuclear radiation diseases (Aït Ouarabi, 2009). Studies by Dr. Abdul Kadhum Alaboudi, a professor at the University of Oran, western Algeria, under the title «French nuclear testing and the dangers of radioactive pollution on health and the environment in the near and distant cities», that were counted 42 varieties of cancer. Al-Aboudi Abdul Kadhum (2000), Data which published ten years ago explained that the nuclear radiation have serious repercussions on the body, break down organic material and cells, and influence in the genes, causing birth defects, which affect the chromosomes, especially in children and fetuses in the womb.

Visited «Environment and Development 2014» Reggan area which saw the French nuclear explosions. Said Dr. Osidhm Mustafa, a doctor at a hospital Reggan 22 years, fewer than 300 patients they meant the hospital a year before the nineties, raising the number in recent years to more than 3,500 patients, pointing to record injuries insanity genetic and partial paralysis cases satisfactory doctors diagnosed deficit .

Also hundreds of the population suffering from various diseases, including eye diseases and skin diseases, deafness and other exotic diseases, doctors specialists confirms that they are the main cancers caused by nuclear radiation scattered at the level of the soil of the region, where the interests of the statistics indicate health and societies, including the 13 February 1962 Association, Mr.Omar Al Hamel , and Mrs. Hamdi Fatma from Victims French Nuclear Tests Association, Tamanrasset, recording dozens of such cases annually, which was recorded the previous year more than 30 new cases of the onset of cancer among the population, in the absence vouch for their lack of doctors and specialists and others, despite the pleas of the population and associations interested in the subject and aimed to put pressure on the French administration in order to recognize these victims and submit them to a file of people who have been used in the experiments and to compensate those affected by the Algerians, noting that France had recognized their victims in French these experiments and has no intention yet to take action which could determine the diseases that can be compensated by the radiation, ignoring what was done by the United States, for example in this regard identified in the list with 36 some sort of serious diseases caused by the nuclear war in Japan (Rabah Beldjenna, 2007). It is noteworthy that gallimaufry forces which oversaw the implementation of these crimes against humans, animals and the environment in the region, took advantage of dozens of women and children in the trials, where it was put on the necks especially necklaces and paintings by numbers placed on their chests before the implementation of the bombing of the "Gerboise Bleue" (Blue Jerboa) area " Hamoudia" , Reggan, obtained " day " on private and

rare photographs of these people who have been exploited as samples to see what would result from the effects of the bombings, most of whom have died a few months and years after the bombings and some of them still yet alive to suffer in silence ,those pictures, that some of the victims mice, who were carrying panels, they symbolize their numbers forums on those panels, where some of them carrying two thousand numbers above, which means that the number of victims of the nuclear explosion was more than two thousand.



Fig. 35 Some of the victims photos, who were carrying panels, they symbolize their numbers forums on those panels, Where put on their necks especially necklaces and paintings by numbers placed on their chests before the implementation of the bombing of the “Gerboise Bleue” (Blue Jerboa) area " Hamoudia, Reggane

And reach the research conducted by the Algerian Centre for Radiation Protection finally to the radiation in the region, the level is still despoiler of the environment and human and agricultural yield recorded weakness in productivity compared with the conventional rate, in addition to the terrible decline in livestock and the weakness of biodiversity and the disappearance of a number of reptiles and migratory birds The cross and the settlement. And recorded several series of deadly diseases, studies have contributed to the decline in livestock and agricultural wealth. Known for example, that the area was Reggan had been mainly exporter to European countries, the fruits of tomatoes.

The talking head victims of nuclear tests Association Haji Abdul Rahman Ksasi congenital birth defects, including small skull size or inflation, and also the demise of the manifestations of the spring in areas that have undergone nuclear tests, and the decline in the age of the camel to less than 20 years, in while the normal age ranges between 30 and 50 years old.

It describes the nuclear tests Ksasi environmental holocaust that engulfed the entire plant families, and hit trees infertility, including wild pistachio and olive desert, as contaminated water pockets.(Environment and Development Magazine , 2014).

9. UN resolution 64/35

On 02 December 2009, the UN General Assembly adopted resolution 64/35 declaring August 29 as International Day against Nuclear Tests. According to the UN, this day "aims to educate the public and raise awareness to the effects of test explosions of nuclear weapons and other nuclear explosions and the need to end it, as a means among others to achieve the goal of a world without nuclear weapons".

9.1 The moral and legal responsibility of the colonial France

France conducted nuclear tests in full knowledge of the dangers of radioactivity and its effects on health and on the environment, because studies on the effects of radiation, following the atomic bombing of Japan, had been published, and even translated in French in 1957. France conducted its first test in Reggane full moratorium by the nuclear powers in 1958. It is legally responsible for damage to the local population, the natural environment and ecological balance.

10. Conclusion

Determine the responsibility of France which remains always engaged; Morin need to reform the 2010 law establishing the original presumption of radiation-induced diseases and taking account of the Algerian victims (1960-present); creation of a compensation fund for the environment and therefore the Algerian victims; emergency in the promulgation of the law on the environment, linked to French nuclear testing (1960-1996), taking into account the case of the Algerian Sahara; speed up the cleaning and rehabilitation of the three sites of nuclear tests in the Algerian Sahara.

There are already a number of civil cases lodged by Algerians against the French state and if it can be demonstrated that the fallout of the bomb tests spread dangerous levels radiation over large parts of North Africa, many more demands for compensation from individuals and from national governments could be in the pipeline.

The issue has become a symbol of the tension between Algeria and France. Algeria is angry that Paris has not offered a broader apology for what it sees as France's colonial crimes,

References

- Aalem Abdu- Hameed, (1998), *Effects of Depleted Uranium on Human Health in Basrah*, International Scientific.
- Aït Ouarabi. M. (2009), Cinquante ans après, les essais nucléaires français. *El Watan* 12.02.2009.
- Al-Aboudi Abdul Kadhum, (2012), http://libya-2.blogspot.com/2012/08/blog-post_4510.html.
- Al-Aboudi Abdul Kadhum, (2000), Jarabii Raggan, *French Criminal Nuclear Tests in South Algeria* Dar Al Gharb, Oran, Algeria.
- Andrea Davoust, (2012), <http://www.france24.com/en/20120717-france-nuclear-tests-polynesia-algeria-radiation-cancer-victims-compensation-health/>.
- BBC, (1960): France explodes third atomic bomb, from *British Broadcasting*, [online], Available at news.bbc.co.uk [Accessed: 31 January 2013].
- Eddine CHITOUR (2009), <http://niarunblog.unblog.fr/histoire-universelle/essais-nucleaires-de-regganealgerie-24-fois-plus-puissants-que-ceux-de-nagasaki-et-hiroshima/>.

- El Watan, (2008) ,Essais nucléaires en Algérie. Les «*bienfaits*» de la colonisation El Watan.12.02.2008.
- Environment and Development Magazine, (2014), Number of September - October (September-October) 2014.
- http://en.wikipedia.org/wiki/France_and_weapons_of_mass_destruction.
- <http://nuclear-news.net/2014/02/15/legal-cases-loom-for-french-govt-over-radiation-caused-illnesses-from-nuclear-bomb-testing/>.
- Jean D. Merchet, (2007), Les essais atomiques français dans le Sahara ressortent. Libération, 5.12.2007.
- Le Monde (2009), *Gerboise Bleue*: un document à charge sur les essais nucléaires français en Le Monde , (2009), Algérie, avant et après l'indépendance du pays. Le Monde 10.02.09.
- Leparisien, (2014), <http://www.leparisien.fr/faits-divers/le-document-choc-sur-la-bombe-a-en-algerie-14-02-2014-3590523.php>.
- Lucien Parfait Ecker,(2007), appelé en 1962- «*Nous avons été des cobayes*». Le Figaro nov. 2007.
- Nuclear Weapon Archive,(2013), France's Nuclear Weapons Origin of the Force de Frappe, from *Nuclear Weapon Archive*, [online], Available at nuclearweaponarchive.org [Accessed: 31 January 2013].
- Rabah Beldjenna, (2007), La France n'exclut pas l'indemnisation des victimes El Watan, 25.12.2007.
- Saâd Lounès ,(2006), Wikipédia , Essais nucléaires français Encyclopédie libre.Wikipédia, et LDH Toulon. Les méfaits nucléaires de la France coloniale Le Quotidien d'Oran, 14.02.2006.
- Symposium on The Use of DU and its Impact on Man and Environment in Iraq, Baghdad, 2-3 Dec. 1998.
- Tahar Fattani, (2009), Un autre dossier «*explosif*» entre Alger et Paris. L'Expression 12 février 2009.