



umicore
materials for a better life

Radioactivity file Olen: Radium production history & legacy

March 2021

Content

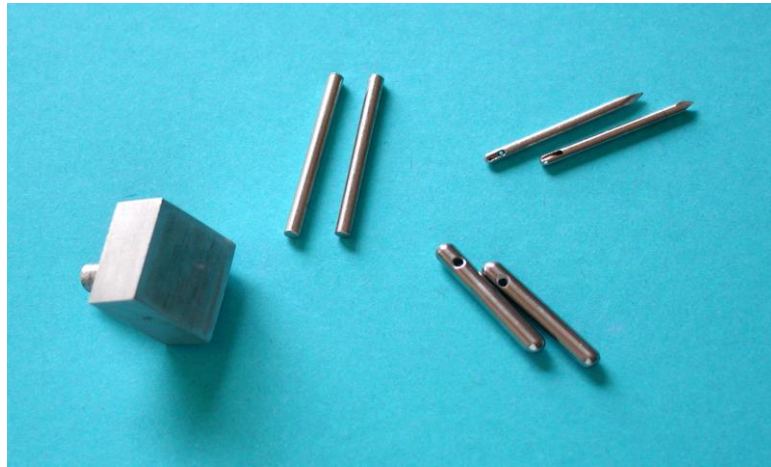
- History
- Legacy overview
- The future: vision note



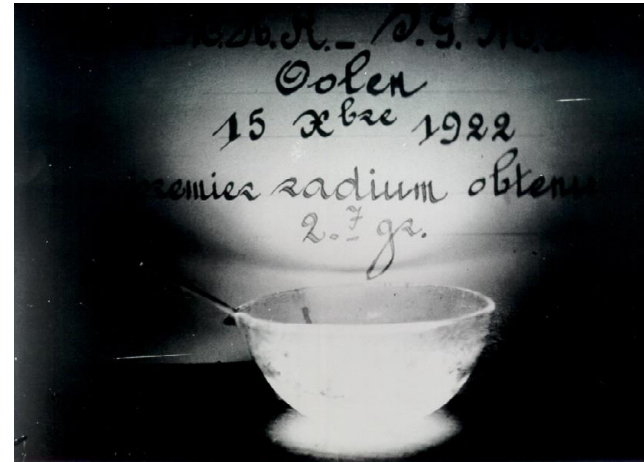
History

Radium was produced in Olen for its radioactive properties from 1922 – ±1970 and was the only available treatment for cancer.

Half of radium worldwide (± 5 kg) has been produced in Olen.



Radium in tubes, needles, 'plaques' for radiotherapy usage

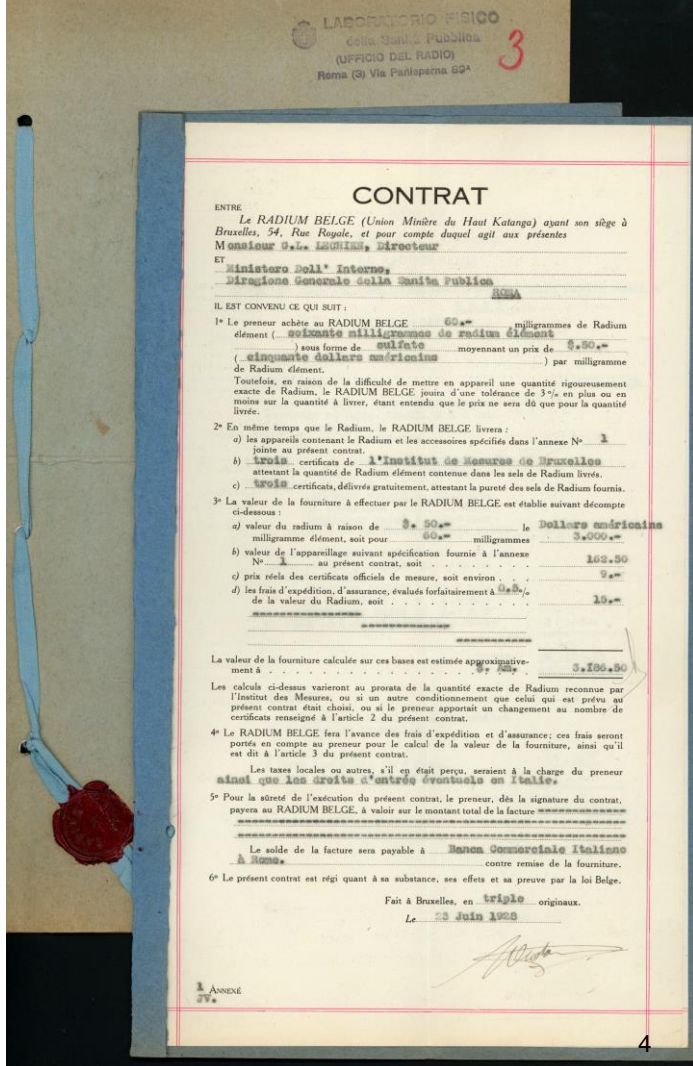


First grammes of Radium produced in Olen in 1922

History: radium sales

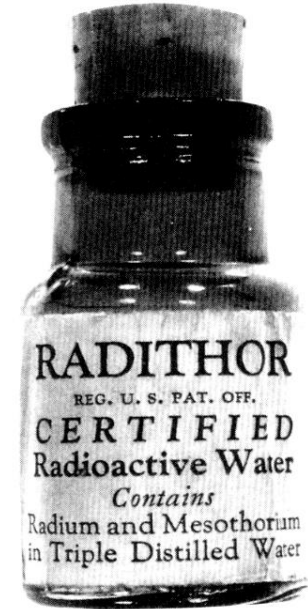
1928 contract of radium sale between 'Le Radium Belge (UM de Haut Katanga)' & Ministero Dell' Interne – Italy : Contract for sale of 60 mg Ra; 50 \$/mg

Sale price up to 150.000 \$/g



History: radium as a cure for everything

Bain radioactif. Dans la cure balnéaire, l'eau du réservoir était vidée dans la baignoire pleine au moyen d'un tube en caoutchouc allant jusqu'au fond de la baignoire dans laquelle le patient se trouvait déjà. Il était conseillé d'y rester quinze à vingt minutes sans bouger, le corps et les membres devant être immergés complètement de manière à ce que le menton affleure légèrement la surface de l'eau. Il fallait éviter tout mouvement pour empêcher les pertes d'émanation qui se produisaient. Les portes et les fenêtres de la salle de bain devaient être maintenues fermées dans le même but. Après le bain, un repos complet d'un quart d'heure était conseillé.



Flacon contenant du Radithor, une panacée censée soigner toutes les maladies.

History: radium as a cure for everything

Radiophan

Combinazione efficacissima di « Atophan » e Radium

CALMA I DOLORI E GUARISCE

INDICAZIONI: Gotta acuta e cronica; tutte le forme di reumatismo; nevralgie, in particolare del trigemino e dello sciatico; ipertrofia della prostata; tutti i processi infiammatori (per esem-



pio, l'infiammazione acuta e cronica della vescica biliare); pielititi; artriti, infiammazioni e coliche biliari, ecc.

Società Generale Radium

Via Torino 62 - MILANO - Tel. 85-445

LABORATOIRES DU "RADIOGEN"

M. LEBLANC, Pharmacien
Licence scientifique
Ex-interne, Médaille d'Or des Hôpitaux de Paris
21^{bis}, Rue de Paradis - PARIS (X^e) -

LE RADIUM PUR
de l'Union Minière du Haut-Katanga
(RADIUM BELGE)

employé avec succès dans le traitement des :

rhumatismes, arthrites, goutte, névrites, névralgies, sciaticisme, lombago, migraines, inflammations aiguës et chroniques de l'intestin et de la vésicule biliaire, appendicite chronique, troubles de l'âge, ménopause, --- anémies, états de faiblesse, asthénie ---

par les **PRODUITS "RADIOGEN"**

COMPRESSES RADIOACTIVES "RADIOGEN"
(Sulfate de radium précipité à partir d'une dissolution de Radium-Élément)

INJECTIONS et PILULES "RADIOPHAN"
(Atophan de Schering + Chlorure de Radium)

SEL "RADIOGEN"
(Sels du plasma sanguin + Chlorure de Radium)

BOUÉ "RADIOGEN"
(60 fois plus active que le Jango naturel)

L'Eau des Sources radioactives à domicile par les **Emanateurs "RADIOGEN"**
pour boisson et pour bains

Location et vente aux **LABORATOIRES DU "RADIOGEN"**
S. A. R. L.
21 bis, Rue de Paradis - PARIS (X^e)



CRÈME COLD-CREAM
POUR PEAUX SÈCHES

CRÈME MAURESQUE
FOND DE TEINT

POUDRE SAVON

LAIT DE TOILETTE
DÉMAQUILLANT

ROUGE À LÈVRES
DENTIFRICE

THO-RADIA

MÉTHODE SCIENTIFIQUE DE BEAUTÉ

EN PHARMACIE EXCLUSIVEMENT

ON NE VIEILLIT PLUS
MEUX OR. RAJEUNIT



LA CRÈME ACTIVE
radioactive

provoque une activité particulière de la vie des tissus; la peau mise en état de jeunesse constante devient plus fine et plus blanche et les rides disparaissent

ENVOI D'ESSAI: Un pot (durée 1 mois) plus que suffisant pour constater des résultats déjà surprenants, est envoyé franco, sans marque d'adresse, avec notice contre mandat de 2125 adressé à Compagnie française de Wigansthan 41, RUE D'AMSTERDAM, PARIS 8^e ENVENTE DANS BONNES PARFUMERIES & GRANDS MAGASINS



umicore
materials for a better life

UMTRAP

D1

BL storage

S1

LRA &
Site

Olen: legacy overview



Legacy: overview

(source : FANC presentation EMRAS WG 10/2011)

| UMTRAP storage | Under control of FANC | Built in the 80s for radioactive waste from former production |
|--------------------------|----------------------------|--|
| Bankloop storage | Under control of FANC/OVAM | Built in 2006 for waste from remediation of Bankloop stream banks |
| Temporary storages (LRA) | Under control of FANC/OVAM | Built between 2013 and now to store low RA on site earth movements |
| D1 landfill | Vision note remediation | Residues non ferrous + radium extraction, rubbles from dismantling Ra facility |
| S1 landfill | Vision note remediation | Residues non ferrous extraction + some sediments dredged from Bankloop |
| Contamination on plant | Vision note remediation | Patchy contamination |

UMTRAP

D1

BL storage

S1



LRA & Site

Legacy: UMTRAP

- Remediation & Construction : 1984 – 1986.
- 75.000 tonnes of contaminated materials containing ± 1 kg Radium:
 - Ra-needles (19.2% of the total Ra-226 content)
 - Tailings (67,6%)
 - Ra-containing residues (10.9%)
 - contaminated soil (2.3%)
- Waste encapsulated in ± 6.000 tonnes of concrete covered with Cu-foil.
- Multi-layer cover of 100.000 tonnes of which 1/3 is clay (1m).

Legacy: UMTRAP

- Monitoring obligations & programme:
 - Radon emanation, monitoring of groundwater quality; yearly report to FANC.
 - ERT and groundwater level monitoring to assess integrity of the concrete and clay layer.
- Licensed facility since 10 July 1991.



Legacy: UMTRAP



Legacy: UMTRAP



Legacy: UMTRAP



Legacy: UMTRAP

1



2

Legacy: UMTRAP

1



2



Legacy: UMTRAP



Legacy: UMTRAP

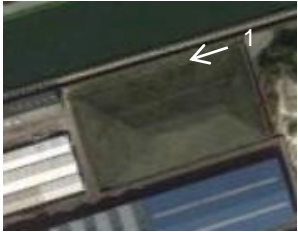


Legacy: Bankloop storage facility

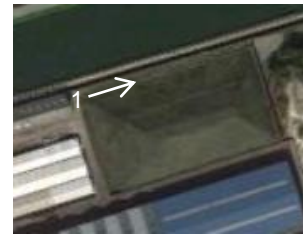
- Constructed 2007 – 2008, commissioner OVAM (fund project : “Sanering Bankloop”).
- Contains $\pm 30.000 \text{ m}^3$ contaminated soils from facility location and Bankloop remediation works; average Ra concentration : 3 Bq/g.
- Licensed facility (class II) until December 2015 including monitoring programme (visual inspection, background radiation, GW monitoring both chemical and radiation, Rn monitoring).



Legacy: Bankloop Storage

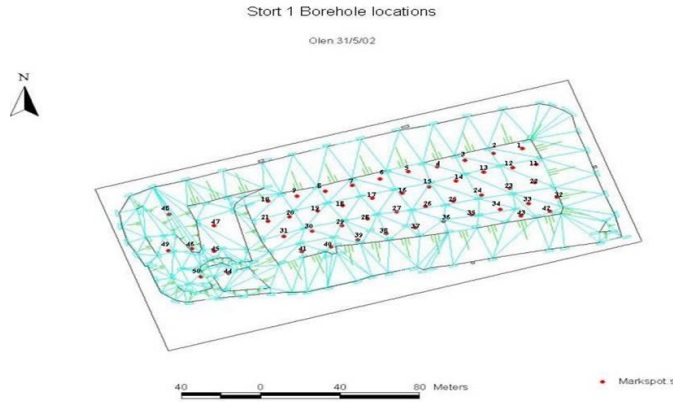


Legacy: Bankloop Storage



Legacy: S1 (built 1925 – 1955)

- Volume : 207.000 m³
- Production residues from Cobalt refining process + radium contaminated dredging sludges.
- \pm 10% of total volume has radiological contamination.
- Remediation project foreseen in 'OVAM covenant' and in Vision Note.
- Under BSP : Drain to prevent contaminated GW from off site migration, GW monitoring.



Legacy: S1



Legacy: S1



Legacy: D1 (built 1955 – 196x)

- Started with filling of a previous sand excavation pit with sludge from cobalt production (iron hydroxide and CaSO_4).
- Gravel applied to create road for lorries on D1 included rubbles from first phase of dismantlement radium facility (1955 – 1960).
- 130 000m³ waste ($\text{Fe}(\text{OH})_3$, Gypsum) with heterogeneous radioactive contamination on a 10 ha surface: average 8.8 Bq/g radium.
- Daily surveillance integrity of fence; regular control by FANC.
- Under BSP/OVAM obligations.



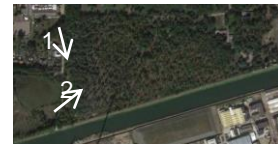
Legacy: D1



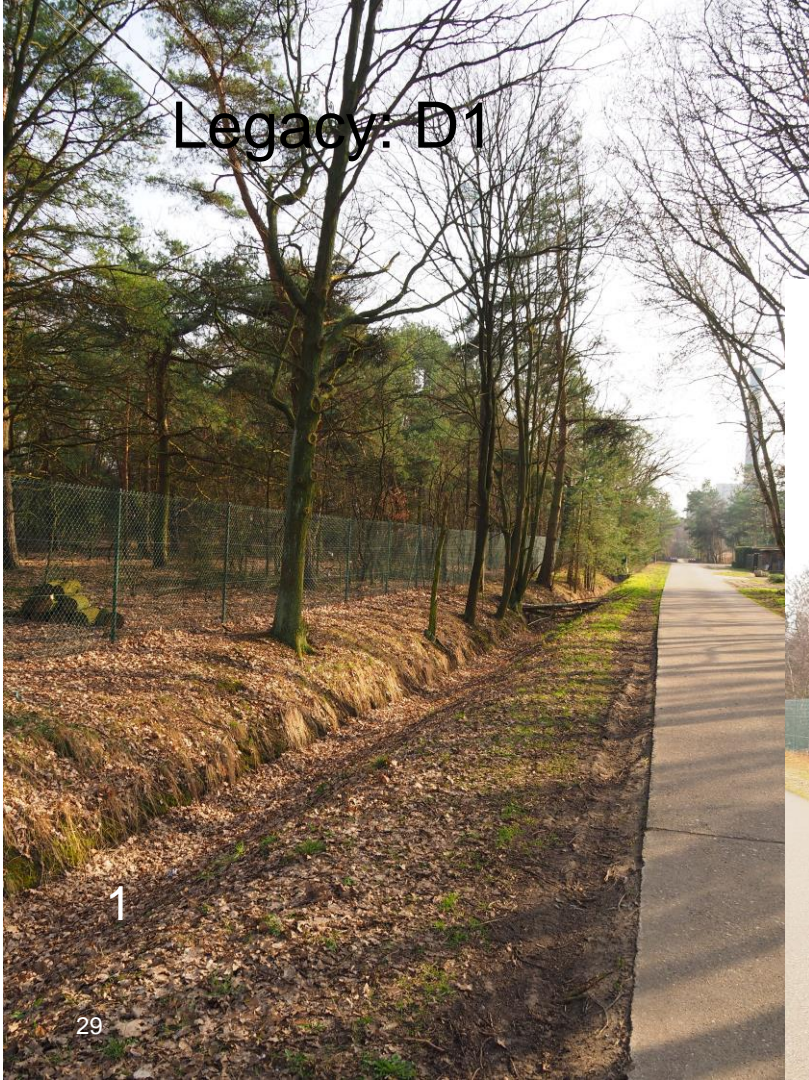
Legacy: D1



Legacy: D1



Legacy: D1



Legacy: site

- Scattered contamination; estimated volume : 50.000 m³.
- Point of attention during infrastructure works on-site (LRA's to store this material).
- To be remediated.
- Exact volume assessment is currently ongoing.

Legacy: Site & LRA



Legacy: Site & LRA



Future: vision note

- Early 2020, FANC together with NIRAS presented a vision note about the long-term strategy to tackle the RA legacy in Olen.
- The main provisions in the note are:
 - Material <15 Bq/g can be stored in a conventional above ground landfill.
 - Material $15 > \text{Bq/g}$ and <1000 Bq/g is to be stored in an underground repository (roof at approx. 10m bgl)
 - Material >1000 Bq/g : deep burial
 - UMTRAP is out of scope.
- Exact volume assessment is currently ongoing.
- Working groups (Umicore, FANC, NIRAS, OVAM) are meeting on a regular basis to prepare the road map.

Communication with our stakeholders



Neighbours: we foster a good relationship and an open dialogue with our neighbours

- Structural communication with our neighbours: magazine (2 x / year)
- Ad hoc communication: letters on different topics (eg. construction works on site potentially creating nuisance, windmills, open house, ... including the coverage of RTBF)
- Site visits
- Free phone number 24/7 - 0800 90 212
- Neighbourhood survey (every 4 years 2010-2014-2018, conducted by Thomas More): focusing on knowledge of, attitude towards and communication of Umicore:
 - Umicore is again seen as the company making the most environmental efforts
 - Neighbours feel that Umicore is making sufficient efforts towards the safety of local residents and employees
 - Neighbours believe that they are well informed by Umicore

Local authorities: open dialogue with the environmental lead & mayor (2 x year)





materials for a better life