

International Conference on the Management of Naturally Occurring Radioactive Materials (NORM) in Industry

VIRTUAL EVENT

International Conference on
**Management of Naturally
Occurring Radioactive
Material (NORM) in Industry**

19–30 October 2020

#NORM2020



Contribution ID: 110

Type: Poster

Individual and collective doses due to Thorium in welding electrodes and other NORM appliances in Uruguay

ARNR is uruguayan Radioprotection Regulatory Body and has competences over all radioactive sources inside country, including existing or planned exposures to NORM.

No uranium or coal/ oil/ gas deposits are known in Uruguay. Mining/ processing of other metals do exist but do not include rare earths or niobium and so far, no radiological impact due to NORMs in those activities has been detected. Use of coal as a fuel is almost non-existent. Phosphate ores are not extracted in Uruguay and, when required, fertilizers and others, are imported in end-use forms.

Few industries using NORMs in their processes have existed in the past, mainly lamp mantles manufacture. Mantles remaining in market have low impact according to ARNR surveys; no legacy sites or facilities remain. Presence of bulk uranium oxide –imported long ago- for pigments use, has been detected, but ARNR assessments consider its impacts marginal.

In the last 10 years, great development in automotive industry and other metallurgical industries (vessels and others), has surged in Uruguay. This has triggered expansion of welding activities, including TIG (Tungsten-Inert-Gas) welding, the latter use tungsten electrodes containing additives such as Thorium, Lanthanum, Cerium. Potential impact of welding electrodes containing Thorium is currently being analyzed by ARNR as part of its strategy on NORM, according to IAEA suggestions. Assessment of current scenario, is the purpose of the paper.

Radiological survey –on employees and public- inside large depots and sale-points of TIG-electrodes, as well as characterization as radioactive sources ($[A]= 82\text{Bq/gr}$, dispense criteria is not met) of typical TIG-electrodes used in Uruguay, has been carried by ARNR. This survey, has also extended to welders, through measures of external exposure dose-rates along simulated welding processes; reference values for Thorium internal doses published elsewhere, have also been used to evaluate some potential radiological impacts.

Abovementioned dose rate values, along with uruguayan actual data as depots and stores occupation, and estimated total hours of TIG-welding, has led to estimations of maximum individual and collective dose linked to the use of Thorium electrodes, inside Uruguay, for diverse population groups.

In very conservative scenarios, maximum estimated individual ($\approx 530 \mu\text{Sv/yr}$) and collective ($\approx 650 \text{mSv} \cdot \text{man/yr}$) dose values for welders –most exposed group- are not trivial and so, not automatically exempted, but do not pose significant concerns according to ARNR rules or expected IAEA SSG 60 classification. However, ARNR is dealing with relevant stakeholders to optimize Radioprotection in this field of activity.-

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Session Classification: Session IV - Characterization in Industrial Facilities and in the Environment

Track Classification: NORM Characterization, Measurement, Decontamination