



Challenges Related to Communicating With the Public About Radioactive Waste Disposal

L. Bueno ¹ and R. Vicente ²

¹ *lilian.bueno@ird.gov.br,*
Avenida Salvador Allende, 3.773, 22783-127, Rio de Janeiro, RJ, Brazil

² *rvicente@ipen.br,*
Instituto de Pesquisas Energéticas e Nucleares
Avenida Prof. Lineu Prestes, 2.242, 05508-000, São Paulo, SP, Brazil

1. Introduction

The applications of ionizing radiation to the societal benefits is increasing in such areas as healthcare, industry, agriculture and research, where radioactive sources are utilized and at the end of their life cycle they need to be properly stored. Nowadays these sources are essential in medical, industrial, and research applications, also used to ensure the safety of consumer products. One of the expected outcomes of the current research project developed within the Postgraduate Program of IPEN/USP is to contribute to more efficient science communication in the nuclear field, notably regarding the disposal of radioactive waste, using resources that incorporate new technologies and concepts from digital culture.

A structured and integrated communication program reflects the maturity of an organization. It demonstrates the commitment of the enterprise or project to the community and requires involvement with the different groups related to or impacted by the initiative (IAEA, 2014) [1]. The general public tends to demonstrate deeply rooted concerns about the safety and risk of radioactive waste disposal (IAEA, 2022) [2]. On the other hand, nuclear professionals adopt the technical stance that the technology involved is inherently safe and reliable (IAEA, 2011) [3].

The advent of digital media has greatly impacted the phenomenon of information production, formatting, and distribution. The citizen has become not only a consumer but also a producer of information. The phenomenon of fake news has brought even greater challenges.

The idea that the common citizen has a knowledge deficit and must be educated by researchers and technical professionals is outdated. The public brings knowledge and insights that should be considered, interpreted, and understood based on what they know, have experienced, or perceive about the topic, considering their own experiences.

Public perception of nuclear technology is influenced by various factors [HORE-LACY, I., 2023; FERREIRA, V.M. et al, 2009; MURAKAMI, T. et al., 2020; WORLD NUCLEAR NEWS, 2019] [4,5,6,7], including safety issues, environmental impacts, and perceptions of benefits regarding nuclear energy. Topics related to nuclear sciences, technology safety, disposal of generated radioactive waste, and environmental impacts pose significant challenges for the industry, related organizations, funding,

and authorities besides regulatory agencies.

The proposal for a public communication program on radioactive waste disposal should meet the needs of the public, related to the project's relevance. It should provide elements about the importance for the country, social development, as well as anticipate and attempt to address the main stakeholder's demands and concerns. It is important to emphasize that such a proposal focuses on the disposal of sealed sources declared as radioactive waste.

2. Methodology

Initially, a literature review was conducted, guided by the concepts of risk communication, Social License to Operate (SLO), scientific dissemination, public perception of nuclear energy, and radioactive waste. Thus, the keywords used were risk, risk communication, social license, radioactive waste, public opinion, public engagement, nuclear waste, waste disposal.

An exploratory study was also conducted through the analysis of documents that mention initiatives related to radioactive waste disposal in nations engaged in discussions and developments on the topic.

Critical analyses were carried out on documents and reports from regulatory bodies of nuclear installations in the nuclear field and other organizations, such as the International Atomic Energy Agency, including reports produced on radioactive waste and public communication with stakeholders specially in the last five years. Documentations from waste disposal operators' websites, regulators, and entities involved in the subject were also evaluated in a qualitative exploratory research.

Informational materials available for dissemination about radioactive waste disposal worldwide, in their various formats, were evaluated, such as reports for policymakers, videos, websites, and various other communications.

3. Results and Discussion

The municipality that will host the repository and neighboring municipalities near the facility can be defined priority as the central audience. However, the State where the installation will be located should receive coordinated dissemination actions involving educational institutions, as well as schools and teachers. The communication process should bear opportunities related to generating knowledge about the project and building value within the community. Additionally, the federal capital, where the House of Representatives, the Federal Senate, and the central Executive branch are located, should be considered an influence area for the program. The program should be structured from the pre-operational phase to the post-operational phase.

From the municipality's perspective, demands from residents and business, as well as local groups, should be observed. Financial compensation and local investments have been adopted as tools to boost the local economy and promote development related to global and already established initiatives. In the Brazilian case, it is important to emphasize initiatives supporting the region's development, linking this support to the region receiving the project, with the opportunity to attract new investments, industrial focus, links with productive chains, and the possibility of local development.

It is therefore essential to obtain local data about the municipality where the project will be installed and neighboring municipalities, using official sources. Regarding the environment and health, data from local

authorities should be used, as well as national statistics. Demographic, economic, social, and political highlights should be monitored to serve as references for a historical series. Data analysis software, social network analysis, and communication trend analysis can be used in the development and monitoring of the communication plan. The monitoring activities should cover internal and external communication, international experiences, and educational actions. The goal is to promote data integration and management of these multidisciplinary areas, structuring a dashboard that enables better understanding and more dynamic and effective course corrections.

A public communication program on radioactive waste disposal should engage and effectively inform the stakeholders about the project, address their concerns, and create and strengthen the confidence in their relationship with the project's developer. A communication policy on radioactive waste disposal should establish links between communication and other areas of knowledge. Basic principles of accessibility, interactivity, and plurality of voices in dialogue with society should be respected.

The research and implementation scope of this program are multidisciplinary, encompassing institutional communication, institutional relations, and extending into other areas. The area known as ESG (Environmental, Social, and Governance) should be a focal point. Some aspects of communication planning deserve emphasis for this process:

- Establish a permanent relationship with local media;
- Use language and approach appropriate to each audience;
- Prioritize proactivity in communication, with quality, timely, and efficient information, anticipating possible crises;
- Maintain an organized and accessible system of information about the installation;
- Invest in the workforce as subjects of the communication process, strengthening internal communication so that they act as multipliers, avoiding conflicts of information;
- Commitment to updating, continuous improvement, and agility for websites, social networks, and other platforms;
- Disseminate with transparency and agility situations of real risk and invest in the importance of the role of the nuclear area professionals, educators, managers, and other information multipliers in radiological protection and safety culture, taking part of the local scientific culture;
- Content management focused on new generations and actively listen to different audiences;
- Promote local and regional development;
- Strengthening of social, ethical, environmental, and quality principles of the work developed;
- Management of the knowledge developed and use of the learning throughout the process to improve communication actions and update the process.

See Table I for a short view of actions proposed to reach those guiding principles.

Table I: Actions proposed in this communication program

Stages	Specific actions
1	Identification and Mapping of Stakeholders
2	Stakeholder analysis
3	Stakeholder engagement
4	Development of the key messages

5	Production of communication materials (content management)
6	Education and awareness building
7	Identification of communication channels
8	Identification of channels to hear the public
9	Identification of material and human resources
10	Partnerships and collaboration
11	Monitoring, Evaluation, and Update
12	Training and capacity building
13	Contingency communication

The proposed communication actions cover the pre-operational, operational, and post-operational phases of the facility. The actions should be updated and readjusted in their methodology, according to the results obtained during the execution phase. Through evaluation, the goal is to achieve constant improvement of the program.

4. Conclusions

The objective of an integrated program on radioactive waste disposal for sealed sources should present communication with clarity of principles, ideas, and values, transparent to the public, and strengthening fundamental rights to life, health, and full exercise of citizenship. Dialogue with the most diverse segments of society should be ensured in all actions. One of the major challenges of this program is to promote communication that is structural and permanent, not circumstantial, purely technical, and instrumental.

A project focused on an installation with so many different stakeholders, with a customer-centered culture, monitoring processes, and measuring communication results as much as possible in real-time, becomes quite interesting and challenging, especially regarding verification and validation of actions. It is necessary that the safety culture is presented as a permanent value. It is essential to invest in coordinated actions, good monitoring tools, identify stakeholders, considering their influence, and expectations.

Auxiliary instruments can be developed, such as research and questionnaires; interviews and dialogue with focus groups; monitoring of conventional media; monitoring of social media; feedback mechanisms; stakeholder engagement meetings; database management and registration of stakeholders on demand; social listening tools; survey platforms; website analytics. Qualitative and quantitative analyses can be conducted to give an overview of the situation, main challenges, and actions to be taken to promote engagement of interest groups.

Among the greatest challenges is the integrated action of the organizations involved in the implementation of radioactive waste repositories, encompassing much more than technical and operational issues, since the underlying values of the program and the incorporation of suggestions arising from the participation of stakeholders are essential aspects for public support for the project.

Acknowledgements

To Nuclear and Energy Research Institute (IPEN), National Nuclear Energy Commission (CNEN), Brazil, teachers from IPEN's Postgraduate Program, the team of professionals, and the research group from the Radioactive Waste Management Department who have contributed to enriching discussions throughout this research.

References

- [1] IAEA. “*Communication and Stakeholder Involvement in Environmental Remediation Projects*”. IAEA Nuclear Energy Series”, Viena, 43 p. (2014).
- [2] IAEA. “*Communication and Stakeholder Involvement in Radioactive Waste Disposal*”. IAEA Nuclear Energy Series, Viena, 92 p. (2022).
- [3] A IAEA. “*Stakeholder Involvement Throughout the Life Cycle of Nuclear Facilities*”. IAEA Nuclear Energy Series, Viena, 27 p. (2011).
- [4] HORE-LACY, I. “*Factors in Public Perception of Nuclear Energy*”. Uranium Information Centre, Melbourne (2023).
- [5] FERREIRA, V. M.; MOURÃO, R. P.; FLEMING, P. M.; SOARES, W. A.; BRAGA, L. T. P; SANTOS, R. A. M. “*Public perception on nuclear energy and radioactive waste storage*”. Proceedings, International Nuclear Atlantic Conference, Rio de Janeiro, Brazil (2009).
- [6] MURAKAMI, T.; ANBUMOZHI, V. ; KIMURA, K.; IWATA,T.; YOKOTA, E.; SHIBATA, T. “*Eria Research Project Report N. 08*”. Japão, 58p. (2020).
- [7] WORLD Nuclear Association. “*How world view affects public perception of nuclear power*”. World Nuclear News, Londres (2019).