INL/PRO-21-63939

# Nuclear Transportation Communications Proposal

Month Year

Brett W Carlsen
*Idaho National Laboratory Used Fuel Management*

Nicole L. Stricker
*Idaho National Laboratory Communications and Outreach*

Emma Frances Bloomfield
*University of Nevada Las Vegas, Department of Communication Studies*

Idaho National Laboratory

*INL is a U.S. Department of Energy National Laboratory*
*operated by Battelle Energy Alliance, LLC*

**DISCLAIMER**

This information was prepared as an account of work sponsored by an agency of the U.S. Government. Neither the U.S. Government nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness, of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. References herein to any specific commercial product, process, or service by trade name, trade mark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the U.S. Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the U.S. Government or any agency thereof.

# Nuclear Transportation Communications Proposal

**Idaho National Laboratory**
**Idaho Falls, Idaho 83415**

**http://www.inl.gov**

**Prepared for the**
**U.S. Department of Energy**
**Office of Nuclear Energy**
**Under DOE Idaho Operations Office**
**Contract DE-AC07-05ID14517**

*Page intentionally left blank*

# Nuclear Transportation Communications Proposal

## 1. BACKGROUND

The transportation of nuclear fuel or any highly radioactive material is a topic that requires thoughtful communication with the public. Poor communications can result in skepticism and fierce resistance to future endeavors related to nuclear energy. Conversely, communication handled well can foster trust, confidence, and stakeholder support. Crafting thoughtful and productive communication faces unique challenges relative to the siting and transportation of nuclear materials because there is often a base of misinformation or mistrust due to the complexity of the topic and the associated safety and environmental concerns.

The basics of communication theories and associated tools and techniques are well understood and widely available. However, scientists and engineers who excel in analytical skills are often much less accomplished when it comes to communication and interaction with the general public and those who do not have similar scientific backgrounds. This lack of specific skills and training in public communication has often led to the technical community either failing to build the necessary relationships for effective communication and progress or relegating such activities to communication professionals who, although typically much more effective communicators, are not as effective in terms of having the technical understanding needed to confidently and correctly answer questions and address misinformation.

A solution to bridging technical knowledge and translating that knowledge to the public seems to depend on either an adequate supply of communication professionals who delve deeply into the science or an adequate supply of technical professionals who have both the skills and desires to commit to representing the industry to outsiders. Although there are people that fall into each of the above categories, they are typically in short supply. This paper proposes a few ideas intended to help remedy this deficiency, specifically as it relates to communication relevant to nuclear fuel transportation.

## 2. COMMUNICATION RESOURCES

As illustrated below, a number of resources are readily available to support more effective communications bridging technical and nontechnical audiences. Elements of these programs could be tailored or developed specifically to address needs associated with stakeholder interactions in support of large-scale nuclear transportation.

Though, on their own, they are not explicitly new or unique, the selective application and integration of these tools with a focus on specific transportation-related needs can result in perspectives and tools not otherwise available.

### 2.1 Expert Resources

A wide variety of communication training courses, programs, and materials exist to help hone the necessary skills. Notable examples include:

- The Alan Alda Center for Science Communication at Stony Brook University: https://aldacenter.org/
- The AAAS Center for Public Engagement with Science & Technology: https://www.aaas.org/programs/communicating-science
- The International Atomic Energy Agency's Nuclear Communicator's Toolbox, https://www.iaea.org/resources/nuclear-communicators-toolbox

The Department of Energy and its various program offices have communications experts on staff who routinely draw on additional expertise from the national laboratories as needed. These staff can identify applicable existing programs and resources when available or can craft specific programs tailored to the identified needs.

## 2.2 Nuclear Communications Certification Program

During the summer of 2020, the Idaho National Laboratory (INL) hosted an intern who had just completed degrees in both chemistry and communication studies. She was enthusiastic about the potential of nuclear technologies and was preparing to embark on a PhD program in radiochemistry. During her brief internship, she conceived the idea of providing a forum where scientists and engineers who had an interest in becoming better communicators could "self-select" and join facilitated groups who could meet periodically to discuss and build communication competencies and share their experiences, both good and bad, related to sharing their enthusiasm for nuclear with friends, neighbors, and family (i.e., think "nuclear toastmasters"). She also proposed inclusion of a "Nuclear Communication Certificate" as a means to demonstrate professional commitment and qualifications that could perhaps cross-cut laboratories, industry, and university programs[1]. This certification would be based on a series of self-paced training modules addressing key communication principles as they applied to communicating technical information with nontechnical audiences.

Three additional transportation-specific training modules, approximately 15 minutes each, have been proposed to address specific communications challenges related to the transportation of nuclear materials.

1) The first module will elaborate on various stakeholder groups and their potential motives and the reasoning behind being skeptical of nuclear fuel transportation. Research repeatedly shows that there is more than a simple lack of knowledge that prevents people from adopting scientific information. Instead, contributing factors, such as political loyalties, values, fears, personal experiences, and others, explain why people disagree with experts. Instead of viewing one's audience as having an information deficit, it is important to understand the value of audience-centered communication and community participation.[2–10]
2) The second module will map out how to build strong stories and provide examples for nuclear fuel transportation communicators. Traditional conceptions of expertise locate authority and credibility within the norms of degrees and relevant credentials. Some research, however, indicates that more personal measures of trust, vulnerability, dialogue, and sincerity can be more engaging measures of credibility. Instead of solely communicating technical authority, scientists should also engage in storytelling (which highlights their personal connection to a topic) and in dialogue with audiences (which fosters appreciation and goodwill).[11–18]
3) The third module will cover how to translate technical information to remove jargon and be better understood by lay audiences, such as by using analogies comparing the information provided with more commonly understood topics. Given the various reasons that people may be skeptical of science, nuclear energy, and nuclear fuel transportation, it is important to adapt messages to meet audiences where they are in relationship to the topic. These principles are particularly relevant when communicating with elected officials who must know a little bit about a lot of things and often don't have time to immerse themselves in the details of any one topic. They must rely on being able to ask questions and get simple answers to effectively respond to their constituents. This module will also address how to modify the presentation of the information to connect to common values and priorities held by various stakeholders, such as connecting the safe transport of nuclear fuel to public health and community safety.[19–25] This module will provide concrete examples of audience-adapted communication by translating and adapting recurring transportation-related questions and information, such as the FAQ and NUREG relative to transportation safety. [26-27]

## 2.3 INL Case Study

The recent HBO miniseries "Chernobyl" sparked public questions about the show's accuracy, the Chernobyl event, and the safety of nuclear energy. In particular, the series inspired public interest and discussions that offered an excellent outreach opportunity. INL staff were consequently fielding questions about the miniseries from friends or family. The INL Communications and Outreach program organized several employee and public sessions to answer their questions in an honest and thoughtful way, helping to build public trust and confidence in both the U.S. nuclear energy enterprise and the people running it.

Approach: Science-based communication strategies indicate that effective outreach efforts seek to listen to questions and concerns before attempting to educate or inform people. To pilot a new outreach approach, a panel of experts was organized to share their knowledge with employees and the public. Rather than guessing or assuming that they knew what people wanted or needed to know about the Chernobyl miniseries, the organizers convened a panel of experts, prepped them on potential questions, then let the audience drive the conversation. The approach sought to make the engagement more of a dialogue—with experts listening as much as talking. Organizers kept the discussion focused on what the miniseries got right, what it got wrong, and where there were grey areas.

Composition and Preparation of Expert Panel: Organizers assembled INL experts in the areas of reactor design, nuclear safety culture, and radiation safety, with Chernobyl expert Roger Mattson answering questions about the event itself. Organizers specifically sought out panelists who were relatively comfortable speaking to the public and adept at simplifying information. The team then worked with panelists to prepare a list of likely questions and proposed answers, which helped the experts familiarize with the technical content and how it could be simplified. Also, initial sessions were held with "friendly" audiences (i.e., employees) to practice, adjust, and build confidence before engaging with the public. The format minimized prepared statements to maximize time for Q&A. An instant polling app for participants' smart phones enabled the moderator to gauge areas of audience interest and focus the discussion on those areas.

The response was overwhelmingly positive. "I love that it didn't feel like PR," one participant told the moderator at the end of a standing-room-only, two-hour public session. Nearly 700 people attended five INL-employee sessions and four public sessions in eastern Idaho. At each event, more than half of attendees hadn't even seen the miniseries. Nearly every event was standing room only, and several had to turn people away when the room capacity was exceeded. Audience members spanned all age groups and were entirely positive (i.e., no hecklers). Roughly 1/3 of attendees filled out a feedback form indicating their age, how they heard of the event, what they liked and didn't like, and whether they'd be interested in additional discussions. Most thanked us for hosting the event, saying they found it interesting and they learned something new. Nearly 85% expressed interest in similar events on a range of topics about nuclear energy (many didn't even specify a topic, saying only that they wanted more events like this). Listening (rather than lecturing) the audience and preparing speakers in advance were key to success.

The INL has since fielded a number of requests to repeat the panels in other Idaho cities and Washington D.C. This approach can be used for any number of public engagement efforts, either to communicate about a particular event of interest or to establish dialogue. It is very much amenable to engaging audiences relative to the risks and benefits associated with transportation of nuclear materials.

# 3. RECOMMENDATIONS

As preparation for stakeholder interactions relative to identified transportation needs, it is proposed that a hybrid of the above techniques be pursued in order to better prepare staff to respond to questions and to share their personal experiences and confidence in activities related to the transport of nuclear materials.

1) Vet available training and tools to develop recommendations for key staff who will interact with the public.
2) Develop a condensed set of training modules focused on specific topics related to the transportation of nuclear materials. The above-noted modules should be reviewed by transportation staff to help ensure that content and examples target specific transportation communication needs.
3) Engage Department of Energy and laboratory communications professionals to 1) help select, coach, and prepare technical staff for public interaction; 2) to capitalize on available communications technologies and platforms; and 3) to plan and facilitate public engagements.

As illustrated above, specific activities can be crafted to address communication needs relative to the transportation of spent fuel. The specific approaches, tools, and efforts required can be properly defined only in context of clearly identified needs related to transportation-related communications. Hence, a key first step to moving ahead with transportation communication initiatives will be to thoroughly review the processes associated with identifying and preparing transportation routes (i.e., engaging with elected officials, first responders, general public, activists, etc.). This review should include related previous work, including past failures and successes and associated impacts, in order to clearly identify transportation-related communication needs. The deliverable would be a clear set of objectives and associated needs relative to nuclear transportation communications[28].

Table 1 provides a rough order of magnitude budget estimate and key deliverable for each of the described activities. The funding needs and associated scope for each activity can be reduced or expanded as appropriate to best support DOE and NE-8 program needs and direction".

| Activity | Estimated Funding | Basis | Deliverable |
|---|---|---|---|
| Work with stakeholders, regulators, and technical staff to clearly identify and specify nuclear transportation objectives and needs. | $150k | ½ FTE | Clearly identified objectives and needs, along with proposed supporting activities. |
| Vet and recommend available communications training resources relevant to transport of nuclear materials | $75k | ¼ FTE | List of available training resources and recommendations for target audiences |
| Development of nuclear-transportation-specific communications training modules | $50k | University support and lab staff to review and advise | Three transportation-specific communications training modules (see section 2.2 above) |

| Activity | Estimated Funding | Basis | Deliverable |
|---|---|---|---|
| Communications professionals to prep, coach, and advise technical staff and to maintain the previous three items | $225k/yr | ¾ FTE ongoing | Ongoing support for planning, preparation, and facilitation of public engagement activities |

**Table 1.** Proposed activities and associated funding estimates and deliverables.

# 4. CONCLUSIONS

Focused communications activities, such as those described above, can support preparations and help assure success for the eventual large-scale transportation of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities, e.g. NWPA 180(c) initiatives, by better preparing those who interact with local constituents and officials relative to transportation safety, route planning, and training.

As the nation's lead laboratory for nuclear energy, the INL is prepared to take the lead in defining needs and crafting the appropriate communications strategies for stakeholder interactions to build understanding and acceptance of SNF transportation activities. Alternatively, the INL can play a supporting role in efforts led by the Department of Energy.

# REFERENCES


[1] Patenaude, Hannah Katherine, Carlsen, Brett W, Bloomfield, Emma Frances. 2020. Nuclear Communication Certification Summary, INL/CON-20-58860.

[2] Bloomfield, Emma Frances, Lyn M. Van Swol, Chen-Ting Chang, Stephanie Willes, and Paul Hangsan Ahn. 2020. "The Effects of Establishing Intimacy and Consubstantiality on Group Discussions About Climate Change Solutions." Science Communication 42(3): 369–394. https://doi.org/10.1177/1075547020927017.

[3] Endres, Danielle. 2009. "Science and Public Participation: An Analysis of Public Scientific Argument in the Yucca Mountain Controversy." Environmental Communication 3(1): 49–75. https://doi.org/10.1080/17524030802704369.

[4] Endres, Danielle. 2012. "Sacred Land or National Sacrifice Zone: The Role of Values in the Yucca Mountain Participation Process." Environmental Communication: A Journal of Nature and Culture 6(3): 328–345. https://doi.org/10.1080/17524032.2012.688060.

[5] McFadden, Brandon R. 2016. "Examining the Gap between Science and Public Opinion about Genetically Modified Food and Global Warming." PLOS ONE 11(11): e0166140. https://doi.org/10.1371/journal.pone.0166140.

[6] Long, Richard. 1983. "The Role of Audience in Chaim Perelman's New Rhetoric." Journal of Advanced Composition 4: 107–117. https://www.jstor.org/stable/20865537.

[7] Pechar, Emily, Thomas Bernauer, and Frederick Mayer. 2018. “Beyond Political Ideology: The Impact of Attitudes towards Government and Corporations on Trust in Science.” Science Communication 40(3): 291–313. https://doi.org/10.1177/1075547018763970.

[8] Vraga, Emily K., and Leticia Bode. 2018. “I do not believe you: how providing a source corrects health misperceptions across social media platforms.” Information, Communication & Society 21(10): 1337–1353. https://doi.org/10.1080/1369118X.2017.1313883.

[9] Hornsey, Matthew J. 2020. “Why Facts Are Not Enough: Understanding and Managing the Motivated Rejection of Science.” Current Directions in Psychological Science 29(6): 583–591. https://doi.org/10.1177/0963721420969364.

[10] van Swol, Lyn M., Emma Frances Bloomfield, Chen-Ting Chang, and Stephanie Willes. 2021. “Fostering Climate Change Consensus: The Role of Intimacy in Group Discussions.” Public Understanding of Science n.v.:n.p. https://doi.org/10.1177/09636625211020661.

[11] Bloomfield, Emma Frances. 2019. *Communication Strategies for Engaging Climate Skeptics: Religion and the Environment*. New York, NY: Routledge. https://doi.org/10.4324/9780429504921.

[12] Fisher, W. R. 1987. “Technical Logic, Rhetorical Logic, and Narrative Rationality.” Argumentation 1: 3–21. https://doi.org/10.1007/BF00127116.

[13] Goodwin, Jean, and Michael F. Dahlstrom. 2014. “Communication strategies for earning trust in climate change debates.” Wiley Interdisciplinary Reviews: Climate Change 5(1): 151–160. https://doi.org/10.1002/wcc.262.

[14] Johannesen, Richard L. 1974. “Attitude of speaker toward audience: A significant concept for contemporary rhetorical theory and criticism.” Communication Studies 25(2): 95–104. https://doi.org/10.1080/10510977409367774.

[15] Jones, Michael D., and Holly Peterson. 2017. “Narrative Persuasion and Storytelling as Climate Communication Strategies.” Oxford Research Encyclopedia of Climate Science. https://doi.org/10.1093/acrefore/9780190228620.013.384.

[16] Ratcliffe, Krista. 1999. “Rhetorical Listening: A Trope for Interpretive Invention and a ‘Code of Cross-Cultural Conduct.’” College Composition and Communication 51(2): 195–224. https://doi.org/10.2307/359039.

[17] Stein, Randy, Alexander B. Swan, and Michelle Sarraf. 2020. “Hearing From Both Sides: Differences Between Liberal and Conservative Attitudes Toward Scientific and Experiential Evidence.” Political Psychology 42(3): 443–461. https://doi.org/10.1111/pops.12706.

[18] Waddell, Craig. 1990. “The role of *pathos* in the decision-making process: A study in the rhetoric of science policy.” Quarterly Journal of Speech 76(4): 381–400. https://doi.org/10.1080/00335639009383932.

[19] Burke, Kenneth. 1950. A Rhetoric of Motives. Berkeley, CA: University of California Press, 1950.

[20] Dillow, Megan R., and Keith Weber. 2016. “An Experimental Investigation of Social Identification on College Student Organ Donor Decisions.” Communication Research Reports 33(3): 239–246. https://doi.org/10.1080/08824096.2016.1186630.

[21] Elliott, Kevin C. 2014. “Anthropocentric Indirect Arguments for Environmental Protection.” Ethics, Policy & Environment 17(3): 243–260. https://doi.org/10.1080/21550085.2014.955311.

[22] Fahnestock, Jeanne. 1986. “Accommodating Science: The Rhetorical Life of Scientific Facts.” Written Communication 3(3): 275–296. https://doi.org/10.1177/0741088386003003001.

[23] Hart, P. Sol, and Erik C Nisbet. 2012. “Boomerang Effects in Science Communication: How Motivated Reasoning and Identity Cues Amplify Opinion Polarization about Climate Mitigation Policies.” Communication Research 39(6): 701–723. https://doi.org/10.1177/0093650211416646.

[24] Perelman, Chaim, and Lucie Olbrechts-Tyteca. The New Rhetoric: A Treatise on Argumentation. Notre Dame, Indiana: University of Notre Dame Press, 1969.

[25] Wang, Susie, Zoe Leviston, Mark Hurlstone, Carmen Lawrence, and Iain Walker. 2018. “Emotions predict policy support: Why it matters how people feel about climate change.” Global Environmental Change 50: 25–40. https://doi.org/10.1016/j.gloenvcha.2018.03.002.

[26] U.S. Nuclear Regulatory Commission,” Frequently Asked Questions, Spent Nuclear Fuel Transportation,” https://www.nrc.gov/waste/spent-fuel-transp-faq.html.

[27] U.S. Nuclear Regulatory Commission, “Safety of Spent Fuel Transportation”, NUREG-BR-0292, Revisions 2, February 2017, https://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0292/index.html.

[28] Lisa R. Janeiro, Mitch Arvidson, and Melissa Bailey. “Transportation Issues Involving the U.S. Department of Energy’s Radioactive Waste Management Program, The Post Yucca Mountain Years.” The Council of State Governments, December 2020.