

Stakeholder Participation in the Environmental Cleanup of Radioactive Wastes in the United Kingdom, Japan and United States - 9024

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ABSTRACT

We review stakeholder participation with environmental cleanup from radioactive wastes in the three countries of the UK, Japan and the US. In the UK, the issue is centered around effective citizen participation with the UK's Nuclear Decommissioning Authority (NDA). In Japan, where there are various stakeholders and decision makers involved, the issues become an effective division of labor among participants and a better representation of different perspectives in the deliberation process. In the US, the issue is focused on citizens encouraging Federal agencies to resolve their differences in the criteria to determine compliance with the closure of high-level radioactive waste tanks.

UK STAKEHOLDER PARTICIPATION IN NUCLEAR DECOMMISSIONING

The stakeholder lead approach initially adopted by the NDA, the nature and role of 'dialogue' and how stakeholders perceive this dialogue to influence the NDA decision-making process have been important themes of the research. The section below provides a brief summary of the work and compares the findings from Questionnaire 1, issued in November 2006 to those of Questionnaire 2 issued in May 2008, to assess any change in stakeholder perception between the third National Stakeholder Group (NSG-3) meeting and NSG-6.

Stakeholder Lead Approach

In May 2008 as in November 2006, the majority of participants that responded either "strongly agreed" or "agreed" that the NDA engagement process has been a positive step by NDA and had been driven by stakeholder requirements relevant to NDA strategy.

The findings from Questionnaire 1 demonstrated the frustration felt by several participants regarding the dominance of some voices, particularly in the plenary sessions of the first NSG in October 2005. This situation had been seen to improve by the third NSG in November 2006, predominantly due to a

reduction in the length of plenary sessions, the introduction of carousel sessions and the development of a 'firm but fair' facilitation style by the convenors of the NSG [3]. At the time of Questionnaire 1, participants were broadly supportive of this type of environment at the meetings although some were concerned regarding the limited time available to discuss some issues of interest.

By NSG-6 in May 2008, some participants had become concerned regarding the perceived lack of influence that they had over the NSG agenda, suggesting that the NSG was now over-controlled, restricting debate and meaningful outcomes for participants. The balance between direct NDA agenda setting; confirmation of the issues that participants would like to discuss and the request from some participants that NDA make clear the areas that stakeholders can and cannot influence remains unresolved.

This issue was demonstrated visibly at NSG-5 in November 2007, when stakeholders were required to 'take back control' of the meeting to enable a discussion of the Draft NDA Business Plan to take place. Although some stakeholders clearly felt empowered by this experience, in a 'stakeholder lead' forum such action would not be necessary. This evidence led to the conclusion that by adopting a strict facilitation style and allowing the meetings to be controlled by the pre-set agenda, the opportunity for debate among participants and between participants and NDA on issues of interest was being reduced.

The importance to participants of having the opportunity to discuss and air alternative view points, without the threat of overt criticism and to scrutinise NDA plans was highlighted by Questionnaire 1. The agenda lead facilitation style now seen at the NSG was implemented post NSG-1 to encourage this and to reduce the role of dominant voices in the plenary sessions, an initial concern of some participants. However, the recent feedback from participants suggests that this has now gone too far and participants' comments regarding the influence that they have over the agenda and the perception that NDA is increasingly controlling items for discussion is considered here to be a manifestation of this.

Transparent Links Between the Engagement Process and NDA Strategy

NSG participants remained confused regarding how their views and opinions expressed at the NSG influence NDA Strategy. When asked directly, 60% of participants in November 2006 and 62% of participants in May 2008 (Questionnaire 1 and 2 respectively) felt that it was not clear how stakeholder views were taken into account by NDA. From those participants who did feel that it was clear how their views influenced NDA decision making, this view appears to be based on discussions with NDA on a 1:1 basis.

The role and influence that participants have is an issue that has been raised by participants on several occasions during the engagement process and was included in the aims of the Waste Issues Group (WIG) – a temporary sub-group of the NSG, derived by group consensus at the first WIG in February 2006. The WIG process was concluded at the end of March 2007 and issued a final report in June 2007 [3].

Section 5 'Progress and Influence' of the WIG final report states (see www.nda.gov.uk):

The WIGs Terms of Reference indicate a desire to influence and improve the decisions the NDA makes. However, during the early stages of the work the group was concerned that it was not always clear what impact their work had on NDA. Several mechanisms were put in place to improve this, one being a tabular format of recommendations and comments from the group that the NDA then respond to alongside with how these have been taken on board.

Despite an accurate record of the work activity and discussion points, evidence of action as a result of stakeholder comment was absent from the table. This type of response, without evidence of action from

NDA, could explain existing confusion regarding the level of stakeholder influence that the majority of those who responded to both questionnaires feel.

The issues surrounding the impact and influence that stakeholders have on NDA decision making have also been discussed by the NDA Independent Assessor for the process. In their most recent report for NDA [16], the authors state “The areas where there was least satisfaction with this [May, 2008] NSG meeting were in terms of the design, structure and facilitation of the meeting, and the level of influence of stakeholders on the NDA”. These comments are also based on a questionnaire issued by the assessor.

Deliberative Dialogue

In Questionnaire 1 and 2, 83% and 95% respectively of participants agreed that the NSG was a ‘deliberative’ process. In Questionnaire 1, many participants stated that it was too early in the process to state this with confidence particularly as plenary session in the meetings provided limited opportunity for deliberation. In Questionnaire 2, many of the comments provided were also at odds with the initial agreement from participants that the NSG was deliberative. To resolve this apparent confusion, an additional question was provided in Questionnaire 2 to fully understand participant’s perception of the term ‘deliberative dialogue’.

The question asked stakeholders which one of three descriptions best described the NSG. In summary, when presented with 3 descriptions of different types of ‘dialogue’ only 37% of participants associate a basic deliberative description of dialogue with the NSG process (i.e. “Have a two-way discussion with NDA regarding the issues surrounding the work that the NDA oversee”).

There are several possible explanations for the confusion:

- Participants believe that the transparency provided regarding the work of NDA and an opportunity to express and discuss their views with other participants at the NSG constitutes deliberative dialogue rather than consultation.
- Participants misinterpreted the description provided of deliberative dialogue. For example, the description of deliberation provided in Questionnaire 1 and repeated in Questionnaire 2 used the phrase ‘an open process of dialogue’ in part to describe the term deliberative. Further questioning used the more specific phrase of ‘have a two way discussion (i.e. debate) with NDA’.
- The variation in structure between NSG meetings regarding opportunities for discussion and debate (i.e. variation in the length and occurrence of plenary sessions where open debate is encouraged) has created an inconsistent response from participants and a degree of confusion.

It is likely that all three of the explanations above are relevant in some way to current participant perception of the process and the most likely explanation for the inconsistency between the replies (much informal deliberation takes place between participants who attend the NSG). When descriptions of different models of ‘dialogue’ are provided, only 37% of participants agreed that deliberative dialogue is taking place between NDA and participants at the NSG and recognise that other forms of ‘engagement’ are taking place such as “commenting and asking questions on the information provided” (46%) and “receiving information and updates from NDA on work and progress” (17%).

CONCLUSIONS

NDA has so far demonstrated a significant commitment to stakeholder dialogue, both in terms of time,

cost and availability of staff members at both the nuclear site and national level to be available to stakeholders. By not providing a transparent account of how participants formally influence the outcome of meetings and 'NDA thinking', some stakeholders appear confused regarding their role at the NSG.

Much informal discussion takes place around each stakeholder event; however, this does not translate into a formal demonstration of stakeholder influence. NDA have yet to produce the evidence for NDA action as a direct result of NSG comments, to match the commitment that they have demonstrated to stakeholder engagement over the last two years. Currently, this represents a missed opportunity in terms of validating the dialogue in the minds of stakeholders and increasing decision-making resilience for future iterations of NDA Strategy.

The ability of participants to: express views; have honest engagement with NDA; understand other stakeholder positions; expect transparency as to what is and what is not open for discussion and how discussions influence NDA decision making are all high priority issues for the participants who replied to both questionnaires. In addition, these factors are also typical of a deliberative process of dialogue and an important part of this research. Despite some of the components of deliberative dialogue being achieved in part, participants remain confused regarding the extent of their influence and role at the NSG.

If consultation rather than deliberative dialogue is the overall aim of the NSG, many of the components discussed above are not required; however, this should be made transparent to participants of the NSG.

UK: Future Work

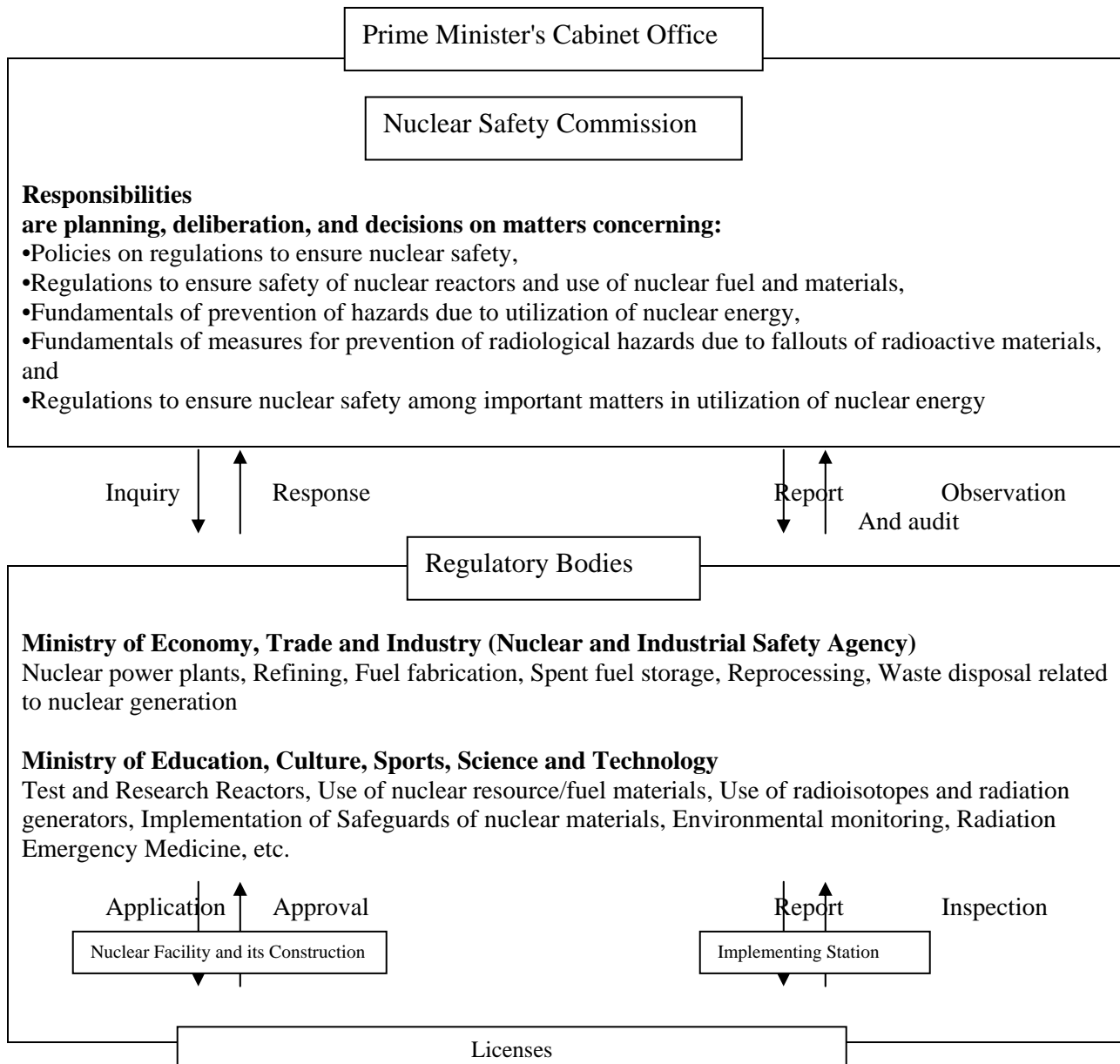
The researcher has adopted an action orientated methodology, a cyclical process of: *diagnostic research; reflection and action planning; data gathering; reflection and intervention*, to provide structure and rigour to the research process. This has encouraged the researcher to remain focused over the six-year work period; periods of reflection which have been important elements of the work have allowed the assessment of the impacts on the research of rapidly changing situations within the work environment, whilst staying true to the original emancipatory aims and objectives of raising participants awareness regarding the nature of NSG dialogue and their role within the engagement process. A focus group of those NSG participants that responded to the questionnaire is currently being convened to assess the success of this process and the effectiveness of the emancipatory aims of the research.

JAPAN STAKHOLDER PARTICIPATION IN NUCLEAR ISSUES

The responsibility of nuclear energy control and radioactive waste management in Japan is borne by various organizations with some overlaps. The Atomic Energy Commission (AEC) and the Nuclear Safety Commission of Japan (NSC) are affiliated with the Prime Minister's Cabinet Office. AEC "plans, deliberates, and makes decisions on national policies relating to the utilization of nuclear energy" (METI 2005). AEC has announced nine Long-Term Programs for Research, Development and Utilization of Nuclear Energy (Long-Term Programs) since 1956. Based on the Long-Term Programs, the Agency for Natural Resources and Energy (ANRE) of the Ministry of Economy, Trade, and Industry (METI) designs implementation plans for the use of nuclear energy for power generation and related fuel cycle activities. METI also oversees the Nuclear and Industrial Safety Agency (NISA), whose mission is to regulate the nuclear energy industry. The Ministry of Education, Culture, Sports, Science and Technology draft plans regarding the use of nuclear energy in science and technology.

The NSC is responsible for designing and enacting safety regulations. The NSC occasionally requests reports from the NISA on major incidents/problems and provides suggestions and comments to the NISA.

For example, in the aftermath of an earthquake in Niigata in 2007 (a magnitude 6.6 earthquake), NISA reported the results of the post-disaster inspection of the Kashiwazaki-Kariwa Nuclear Power Plant (KKNPP) to the NSC. The NSC assessed the problems and solutions provided by NISA. For example, the NSC states in their review of the NISA report, "Regarding the problems classified as Class B or over ... the NSC should encourage the nuclear energy industry to address issues regarding cooling functions and radioactive material containment ... " [14].¹ Their task forces encompass a wide range of issues from waste management to facility designs to fast breeder reactor problems.² (See the Figure below; from [15])



¹ More than three thousands "unsuitable incidents" or safety problems were identified in the KKNPP after the earthquake. They were classified into the five groups of As, A, B, C, D, with As being the most serious and D being the least serious.

² In 1995, Japan's only fast breeder reactor, Monju was closed after a sodium leak and fire. It is scheduled to reopen in 2008.



Fig. 1. Administrative structure of nuclear regulation in Japan

The Radioactive Waste Management Funding and research Center (RWMC) is specialized in research on radioactive waste management. Other research organizations include the Japan Atomic Energy Agency (JAEA), the Nuclear Waste Management Organization of Japan (NUMO), and the Central Research Institute of Electric Power Industry (CRIEPI). The interests of the local governments having nuclear power sites are represented on the All Japan Council for Local Governments with Atomic Power Stations (see the Organizational Chart for the NSC in Fig. 2).

Radioactive waste management is one of the most controversial and divisive issues in Japan. The fact that it has numerous earthquake-prone areas complicates the debate. Remarkably, there are very few organizations that represent the middle-of-the-road perspective. The government officially endorses the development and nuclear energy, whereas various NPOs and NGOs are either front organizations of special interest groups or their constant critics.³

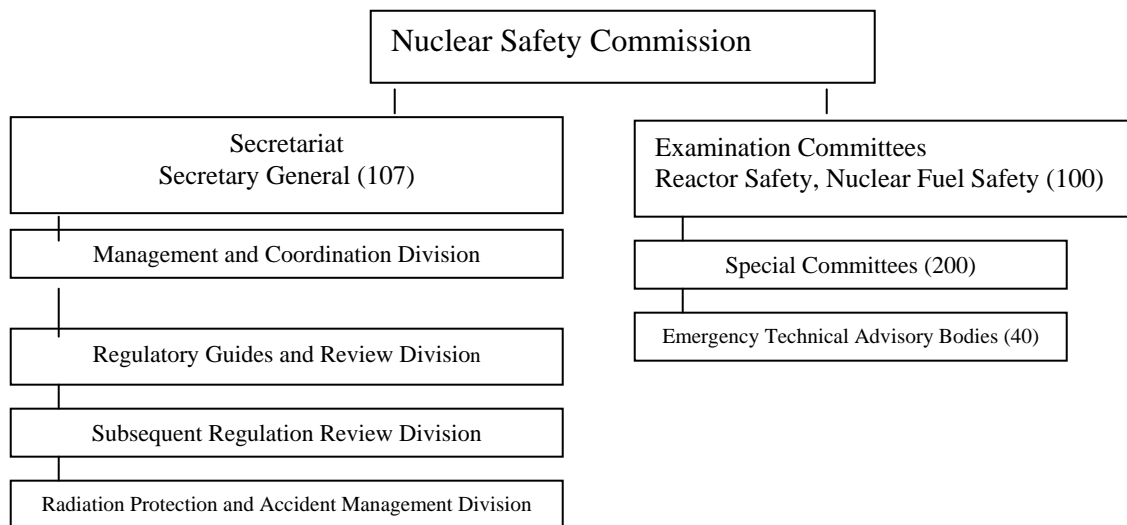


Fig. 2. NSC Organizational Chart (Estimated Workers Shown in Parenthesis)

There is no established stakeholder participation process in nuclear decommissioning issues equivalent to CABs in the U.S. or NDA NSG in the U.K. Virtually all the pertinent agencies affirm their commitment to wider citizen participation. The Long-Term Program for Research, Development and Utilization of Nuclear Energy (accepted by the Atomic Energy Commission on November 2000) acknowledged the need for greater citizen involvement in nuclear decision-making in general. AEC launched the Conference for Public Participation and Decision Making for Nuclear Energy Policy in 2001 for that purpose. The Conference members consists of nine “specialist” members, including journalists, university professors as well as pro-nuclear energy activists. The Conference has a few meetings open to the public every year. The public conferences are held in various places. In 2006, the public conferences

³ The Citizens' Nuclear Information Center (CNIC), an NGO advocating for the abolition of nuclear power, is not brought in for wider deliberation processes involving government agencies and the nuclear energy industry.

were held in Himeji, Sapporo, and Matsue. The topics of the conferences were broadly about PR activities and information acquisition regarding nuclear power plants. The conferences typically feature presentations by invited speakers followed by comments from the floor with about 100 participants. At this point, it is not clear how and to what extent the Conference has been efficacious to achieve that goal. Also, NSC often seeks public comments on high-stake issues. For instance, they sought public comments on the interim report on low-level radioactive waste burial in July 2007. There were 11 posts from 6 individuals and one organization. Note that the most of the comments are from individuals, rather than from organizations that represent specific perspectives or interests regarding the issue of radioactive waste burial.

The list of outreach efforts by agencies involved in waste management is shown in Table I below:

Table I. Japanese Agencies and their outreach efforts.

AEC	the Conference for Public Participation and Decision Making for Nuclear Energy Policy
	Public input meetings
	Public forums
NSC	Information sessions regarding the impact of the 2007 Chuetsu Offshore Earthquake on KKNPP
	Public comments
	Symposiums on Nuclear Safety
NISA	Information sessions regarding the impact of the 2007 Chuetsu Offshore Earthquake on KKNPP
	Meetings with local residents (14 locations in 2008)
RWMC	None
NUMO	Symposiums with Journalists (with 5 newspapers in 2008)
	Workshops with local NGOs (5 locations in 2008)

By comparison with UK and US, Japan reveals some remarkable features in the issue of environmental cleanup from radioactive waste. First, as are the cases with the other two societies, the agencies involved in waste management attempt to promote stakeholder participation. However, various potential stakeholders are not always recognized as such. As a result, those agencies are working with more or less abstract categories of “the general public.” There are vocal opponents of nuclear power plants, but they are not invited to the dialogue with the government agencies. Between the government agencies and anti-nuclear movement organizations, there are not vary many groups that represent the middle-of-the-road perspective and are ready to get involved in decision making processes. Since the agencies rarely deal with representatives of specific perspectives and interests, most of outreach efforts are limited to PR efforts, rather than sustained dialogues with various stakeholders. It was evident in the format of these activities: Public outreach programs are typically comprised of a series of workshops and symposiums held in different cities, which do not expect continuous participation. The issue of environment cleanup itself is embedded and often made invisible in the broader issue of nuclear safety. There are not very many workshops that are specifically targeted at the issue of waste management.

In short, there are various stakeholders and decision makers involved in the development of nuclear energy policies in general and the management of radioactive waste materials in particular in Japan. The

division of labor is not always straightforward. Not all perspectives are well-represented in the deliberation processes, either.

CONCLUSIONS

A review of the government structure and comparative analysis with the UK and the US reveal the remarkable absence of sustained deliberations among non-government stakeholders and government agencies. But even in societies where the notion of “deliberation” is beginning to take root, what it entails is not always clear, as indicated in the previous section on the UK's NDA. It is intriguing to see if and how Japan moves toward expanding stakeholder participation in radioactive waste management and catches up with models suggested by the UK or the US. And if it happens, it is crucial to identify facilitators and constraints on such development.

The relative invisibility of stakeholders may be attributed to the lack of experience on the part of NGOs; NPOs and NGOs were given corporate status only in 1998 by the so-called NPO Act. Research & development functions have been concentrated in the government bureaucracy, which is often dubbed as the “biggest think tank in Japan.” The concentration of expertise, professionals, and other resources within the government agencies might explain the lacuna in stakeholder participation.

Japan: Future Work

The tentative findings that the common platform for stakeholder participation is under-developed in Japan is largely based on the analysis of publicly available documents. They lead to a key question for future research: Why do genuine deliberations among government agencies and stakeholders defy avowed efforts for inclusive decision making? Future research must examine the relationship between the level of institutionalization and professionalization of potential stakeholders and outreach efforts and strategies deployed by government agencies involved in waste management and address the issue of decision making rules.

US CASE STUDY CLOSING SRS HIGH-LEVEL WASTE TANKS

The US Department of Energy (DOE) at the Savannah River Site (SRS) in Aiken, SC, closed the first two of its high-level radioactive waste⁴ (HLW) tanks, numbers 17 and 20, in 1997 [18][19]. Supported by citizen advice recommending closure and formal regulatory approval, these two tanks were the first of their kind to be closed in the U.S. and possibly the world [6]. Since then, the HLW closure program at SRS has stalled. The current HLW tank closure problems at SRS are indirectly driven by new tank cleaning technology but more directly by the decision oscillations occurring between DOE and the US Nuclear Regulatory Commission (NRC) over the criteria for points of compliance (POC). In 1997 when the first two tanks were closed, DOE and the State of South Carolina, supported by the US Environmental Protection Agency (EPA), had the authority to close these tanks. Since then, the National Defense Authorization Act of 2005 [13] has become law; it gave NRC an oversight role for HLW and tank closures but no clear authority to regulate DOE's activities. The public announcement by DOE in 2005-2006 was that it planned to close its tanks 18 and 19 in 2007 with existing waste residuals in the tanks (known as "heels", described below); but informally, DOE expressed concern that NRC would push DOE to reduce or remove the heels. Almost three years later, the two agencies have yet to resolve their different metrics for the POC. Consequently, closing dates for these two tanks have been postponed

⁴ The term HLW has recently been replaced and used interchangeably by DOE with "liquid wastes", "liquid radioactive wastes", or "tank wastes" [17].

repeatedly. The POC determines the performance of the disposal sites for future closed tanks in the SRS tank farms.⁵ Once criteria have been set, closure milestones become realistic. The POC measurements will be located at either NRC's standard of 100 m downstream from buried waste release sources or at DOE's planned natural outcrop into Four Mile Creek (4MC), also located downstream in the 4MC basin at DOE-SRS in Aiken, SC, but upstream of its release into the Savannah River. Since 4MC is downstream from the tank farms, radionuclides predicted to be released over the next 10,000 years from the tank farms—once closed—would flow via groundwater before outcropping into 4MC. However, DOE's plan for 4MC as the POC is over an order of magnitude farther away than NRC's standard distance of 100 m from where the tank farms would be closed. The added distance to the 4MC outcrop means that whatever radioactivity is released from the tank farms reaching 4MC would have significant additional time for decay and dilution, a much easier standard for DOE to achieve in its projected releases during the next 10,000 years. In defense of its position, DOE argues that, as the point of outcrop where future residents will have access to the groundwater, 4MC reduces the risk to future generations. NRC's standard, however, includes the risk from inadvertent well-drilling that might pierce contaminant plumes flowing in the groundwater aquifer below the surface between the closed HLW tanks and 4MC before the groundwater outcrops into the surface streams at 4MC; meeting the NRC standard at these interim points provides more protection.

Tanks 18 and 19 were scheduled to be closed in 2007, but have been postponed until 2012 (Slide 9 [5]) as a result of the lack of resolution over the POC that sets the closure criteria for the extent of waste removal from these two and the remaining tanks.⁶ New vacuum technology designed to breakup and remove the residual heels in tanks 18 and 19 is progressing; breaking up the zeolites in tank 19 is more difficult with slurry pumps, requiring the new vacuum technology; see the Fig. 3 below; from p. 13 [11]).

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are needed to see this picture.

Figure 2. A notional cross-section of 4 Mile Creek (4MC; adapted from [12] p. 89; and [11]). Point-of-compliance (POC) for NRC is a 100 m buffer zone (360°) around the edge of a disposal facility.

⁵ A total of 51 HLW tanks existed at SRS, with two now closed; of those tanks, 24 were old style, inferior tanks, many with leaks and cracks [6].

⁶ Generally, bulk waste removal of supernate, salt and sludge is followed by water washing with pumps to reduce the residuals to heel remnants (heel remnants average about 1% or less of a full tank's contents. However, the residual heels in tanks 18 and 19 contain among the largest amounts of radioactivity projected for any of the tanks, and the heel in tank 19 contains zeolite; [1]; future plans will add oxalic acid washes to remove the heels, a technique first used at SRS to clean its tank 16 during the 1970s [4][21].

The POC for DOE at SRS is 4MC, a significant distance from the HLW disposal facility, giving additional time for decay.

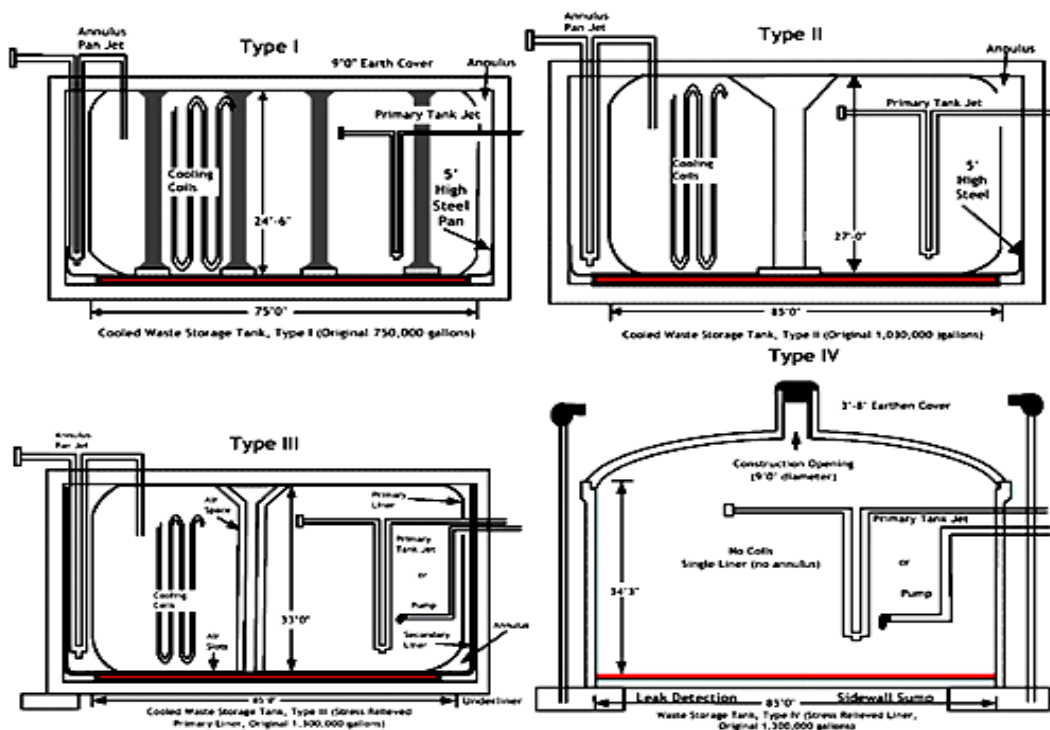


Fig. 3. The Four Tank Types at SRS.

The Type I, II, and IV tanks do not meet regulatory standards for secondary containment [20]. Although all of these older tanks have failed and their wastes stabilized, seven of the 12 Type I tanks, all four of the Type II tanks, and two of the Type IV tanks have leaked. The leaks occurred from cracks formed by stress corrosion along welded joints. In addition to the urgency to remove wastes from the non-compliant tanks, similar concerns have been raised about the dense subsurface network of transfer lines that connect the tanks. The argument on earthquake impacts pits funding the cleanout of unclosed and failed Type I, II and IV tanks plus their aged HLW tank farm system and infrastructure that transfers wastes between tanks versus spending money to upgrade earthquake protections for the Salt Waste Processing Facility (SWPF; see [7]; [8]).

In contrast to the non-compliant tanks, none of the 27 relatively newer modern Type III double-wall tanks have leaked, which has been attributed to simultaneous heating of the inner and outer double-wall tanks to reduce the welding stresses (thermal stress relief) that have promoted corrosion cracking in the older non-compliant tanks.

In considering the plug-in-rod concept from environmental remediation of multiple seepage basins at SRS, the SRS CAB has encouraged DOE and its regulators to standardize the regulatory process to accelerate future tank closures. As mentioned, the closure of tanks 18 and 19 have slipped five years behind schedule from their planned closure in 2007 to 2012. The reason given to the public was that the discovery of new tank vacuum technology to reduce the size of the heels in Tank 19 has made it necessary to postpone the closure dates (for a description and sketch of the heels, see [2], pp. 85-86). The actual reason was more likely based on the continuing debate between NRC and DOE over their different contentions about POC (point-of-compliance).

To reiterate, the tanks had been declared in public by DOE sufficiently cleaned in early 2005. The NDAA 2005 act (NDAA, 2004) had been enacted to get the High-Level Waste management program to empty and close tanks operational again. In it, as part of the final bill, the Nuclear Regulatory Commission (NRC) was given an oversight role as an observer, not as a regulator. As described earlier, that meant that NRC had no power to stop DOE's plans. NRC considers POC from a closure site to be 100 meters downstream; DOE had planned for years to use Four Mile Creek (4MC) as its POC, an order of magnitude further away downstream. Had DOE been required to adhere to NRC's criteria, it would have meant significantly more tank cleanout of heel remnants than DOE had previously considered to be necessary. By October 2008, no resolution of the POC issue had been reached. However, at a public meeting in Washington, DC, Layton [10] presented slides with new calculations using NRC's criteria that indicated a margin of safety in the closure of Tanks 18 and 19 as currently planned (i.e., nothing released is greater than 4 mrem/y in the first 10,000 years, peaking at 6 mrem/y at year 14,000 based on Ra-226; see slide 32 [10]).

Theory

We review briefly the role of theory in guiding our research project [8]. We have predicted and found that majority rule limits the oscillations in discussions that occur during the public's review of the technical issues set before it. The reason is that majority rule is based on challenges of the prevailing notions, with the winning challenges determined by the best knowledge available, i.e., scientific evidence. In contrast, under the rules of consensus seeking, no one in the public or the scientific arena is allowed to challenge a comment no matter how bizarre it may be. The end result we have also predicted and found is a lengthening of debate oscillations of up to four times the length of majority rule [9].

As a major extension of theory, when an agency like NRC is not given clear lines of authority over another agency, like DOE with its difficulty in where to locate the POC, an issues that has required the investment of significant additional funds to develop an alternative tank heel-removal technology (vacuum), the oscillations between the agencies can continue unimpeded for a significant amount of time. At this point, the debates have continued without resolution since NDAA 2005 was signed into law--over four years. To solve the issue, DOE has pinned its hopes on its calculations that no additional cleanout is necessary, independently of where the POC is set.

Citizen Participation in HLW Tank Closures

The CAB at SRS has continued to drive the closure of the high-level waste tanks. It has repeatedly drafted motions to DOE and its regulators and asked questions in public about both about the delay in closing tanks 18 and 19. It has also criticized both NRC and DOE about the lack of resolution over the POC. Regardless, DOE's plans for tank closures are continuing along with more public assurances that the POC issue will not slow down its tank closures. Tanks 5 and 6 are preparing to close in 2010, followed by Tanks 18 and 19.

CONCLUSION

In our paper, we have reviewed progress in the UK's NDA cleanup process, we have introduced nuclear waste management cleanup in Japan, and we have focused on the case study of HLW tank cleanup at the Savannah River Site in the USA. In addition to the progress that we have noted, we draw the conclusion that, similar to consensus rules, the lack of authority in environmental cleanup given to an agency (NRC) for the express purpose of accelerating cleanup has instead actually slowed it significantly. Remarkably, this slowing down in decision-making between government agencies is strikingly similar to the slowing

of decisions under consensus rules compared to majority rules.

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18. SRS-CAB-R-15 (1996, January 23) High Level Waste Tank Farm Closure, Recommendation No. 15 by the Savannah River Site Citizens Advisory Board to DOE-SR.
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20. SRS-CAB-R-237 (2007, June 28), HLW risk reduction efforts, Recommendation No. 237 by the Savannah River Site Citizens Advisory Board to DOE-SR.
21. SRS-News (2008, July 16), SRS begins final cleaning of next two radioactive waste tanks scheduled for closure (Tanks 5 and 6; closure scheduled for 2010); Media contact Dean Campbell 803-208-8270.