Participatory Mapping as a Proposed Method for Engaging Stakeholders in Spent Nuclear Fuel Relocation from Areas Exposed to Coastal and Climate Hazards

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ABSTRACT:

Climate change and sea-level rise pose a risk to seven spent nuclear fuel installations in the United States (Jenkins et al., 2020). One of these at-risk sites is the Humboldt Bay Independent Spent Fuel Storage Installation (HB ISFSI). As it is located at the edge of the North American plate near the southern end of the Cascadia Subduction Zone, the HB ISFSI is at risk of earthquakes and tsunamis (Pacific Gas and Electric Company, 2017). As adequate contingency planning that engages the public is required in the event the spent nuclear fuel must be removed to a safer location, we need to explore potential alternative locations for the fuel located at the HB ISFSI (Brown et al., 2023). Geographic information science when used in a way that engages interested parties and affected communities can help us to mitigate and adapt to the climate crisis even when dealing with challenges classified as "wicked problems" (Brunnengräber, 2019), such as the management of spent nuclear fuel.

A mixed methods approach will be used to: (1) Determine which factors local community members in the Humboldt Bay area and other experts consider important when deciding whether and where to relocate the spent nuclear fuel stored at the HB ISFSI; and (2) determine potential alternative locations to the HB ISFSI should the fuel need to be relocated within California to mitigate for coastal and climate risks and hazards. This approach will involve conducting surveys and semi-structured interviews to identify the key factors that community members and experts consider important when determining suitable locations for storing spent nuclear fuel. The multiple-criteria decision-making Analytic Hierarchy Process approach will be used to determine the most effective way to prioritize these factors. Additionally, geographic information systems (GIS) will be used to perform site selection analysis and map potential sites for spent fuel storage within California. Surveys will then be used to evaluate whether these mapped locations align with the criteria identified by the community and experts.

If geographic information science is used in a way that engages and empowers communities hosting spent nuclear fuel sites, these tools could be leveraged more widely to better prepare us for managed retreat in a way that builds public trust in the decision- making process.

KEYWORDS: *participatory mapping, geographic information systems, site selection, spent nuclear fuel, managed retreat*

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