Author's Response to feedback

'RC1'

It was a pleasure to read this article. It is not often that an artist writes about their own work with such intellectual and academic insight. The article contains several interesting and well-chosen references, and the work itself is compelling—both poetic and deeply political. At a time when Japan is releasing "safe" treated water from the Fukushima accident, the artist's work functions as a form of micro-resistance, revealing another truth alongside the official narratives. In fact, her work is far more than "a drop in the ocean," so to speak.

I can see only one possible suggestion to improve a piece that is already strong: perhaps the artist might one day create a work situated in Fukushima as well. However, I imagine this may already be part of her future projects. In any case, the article is excellent as it stands. It would be a valuable contribution to the field of nuclear art. So I strongly recommend publishing it.

No editorial amendments or additions are required by 'RC1'

'RC2'

General comments:

This paper clearly demonstrates how artistic research into sensing radiation through photography can be used as a material witness of both visual, sensory, indexical and geopolitical contexts. Through first hand experience of nuclear sites and landscapes, the artist has used contaminated seaweed to develop her images of the nuclear landscapes of the trees that survived the detonation of an atomic bomb on the city of Hiroshima, and the new Japanese military base on Ishigaki Island. Pinhole photography is used to visually and politically articulate the impact of tritium on the images developed using contaminated seaweed. The original use of contaminated seaweed as a developer is clearly described and theoretically framed as an indexical material witness. Drawing on relevant critical and artistic theory the author's images aim to broaden human perception of nuclear images, and uses close reading to situate the work in an ideological context. The paper makes a valuable contribution to the practice and theories of photography, art and nuclear culture, as well as the wider concerns of how communities can sense and represent the contamination of their environments.

This work is highly relevant to the broader understanding of radioactive waste, as a category of contaminated materials which can easily escape the narrow scope of nuclear designated sites and environmental standards. The project asks relevant questions about the ubiquity of radioactive isotopes from testing and accidents, and how they are sensed in the oceans. The results are compared with other related photographic sensing practices, and the findings situated within both the nuclear and artistic fields.

Specific Comments:

The discussion of the electromagnetic spectrum is a little clumsy at times, and further clarification of the different frequencies of radiation being discussed and the physical properties of their impact on photographic emulsion would benefit the reader. For example, the introductory description of the relationship between photography and radiation might be more nuanced in terms of high and low frequency, scale and energy. This would help the confusion of visible and non-visible light. *(have amended by addressing the introductory paragraph which now reads as follows: Photographic images, produced by either analogue film or a digital sensor, are materially dependent on electromagnetic radiation to exist. This radiation spans a spectrum of wavelengths and frequencies, which correspond to different energy levels. Most photographs use visible light, deriving from the sun and electrical sources, which is a non-ionizing form of radiation that activates silver halide crystals in film or photoelectric sensors in digital cameras. Film, however, can also be affected by invisible ionizing radiation such as ultraviolet, X-rays, and gamma rays.[1] These forms of radiation have much shorter wavelengths and higher energy, which can change the silver halide crystals in film without any visible light. This capacity for both visible and invisible radiation, be it ionising or not, to alter photographic materials underscores photography's fundamentally material relationship to energy. Some form of energy must be present to indexically imprint itself into the image capturing device. For analogue photographs, this connection is physical: the silver halide crystals of photographic emulsion are activated and altered by electromagnetic radiation, regardless of its visibility. Photographic film's sensitivity to registering invisible electromagnetic radiation makes the medium a valuable tool within the context of the Japanese government's 2021 announcement approving Tokyo Electric Power Company's (TEPCO) plans to discharge wastewater from the damaged Fukushima Daiichi Nuclear Power Plant (FDNPP) into the Pacific Ocean. This sensitivity forms the central concern of this article.)*

Although perhaps a topic for a longer paper, it could be helpful to describe the characteristics of radiation on the photographic surface such as spotting and fogging in terms of the alpha, beta and gamma radiation.

Line 27-29: Treated and diluted are scientifically measurable claims. But purification is always subjective. This could be discussed in relation to the social construction of images later in the paper. *(have amended, by adding the following paragraph: Within this context of longstanding suspicion toward documentary truth claims and a renewed emphasis on what images can do I approach nuclear imaging as a site where material traces and ideological framing coincide. Within the context of how the Fukushima wastewater release is publicly communicated, terms such as treated, diluted and purified are repeatedly used. Their purpose is to stabilise public perception. While treated and diluted draw on the authority of scientific measurement, by contrast, purification operates on a subjective register, signalling a narrative of safety rather than a strictly technical outcome. These distinctions echo how the social construction of photographic images and their meanings have been*

[1] Physicist Henri Becquerel, in the late nineteenth century, while investigating whether phosphorescent materials might emit X-rays, discovered that uranium salts emit invisible beta particles and gamma rays that penetrate the silver halide crystals of photographic emulsion. He found that when an object was placed between these emitted rays and the emulsion-lined photographic plate, the object's interior mass became visible. Becquerel's discovery used radiation to see through and inside of something, giving insight into the limits of human perceptibility and vision.

theorised. In a similar way to how precise use of language manages perception of the Fukushima wastewater discharge; photographic meaning is shaped not only by what is materially present but by the ideological frames through which it is received. There is a tension between measurable claims and subjective assurances. This tension connects to how and what my images can communicate within nuclear, environmental, and political contexts.)

Line 36-41: Whilst photographic sensitivity to ionizing radiation is undoubtably a form of sensing and material witness, it is not clear how the radioactive fogging of an image is ideological or political in itself. *(have amended)*

Technical comments:

Image captions should include the name of the artist. *(have amended)*

References: Websites should be referenced with the date of access. *(they are)*

Throughout: typo ironizing should be ionizing (it is not ironic!) *(have amended)*

Line 57-58: physical and material are not alternatives here – the material is physical. *(have amended)*

223: comma *(have amended)*

Footnote 1: I would suggest that footnote 1 refers to the scientific demonstration (Becquerel etc) of how analogue photography captures the effects of radiation and not a reference to AI generated images which are not discussed anywhere in the paper. (The impact of radiation on digital technology is a material impact wiping hard drives, which is not discussed). The model collapse of AI would be interesting to discuss in relation to the model collapse of mutation – but this is another paper. *(have deleted this reference to AI and have made reference to Becquerel via the following footnote: Physicist Henri Becquerel, in the late nineteenth century, while investigating whether phosphorescent materials might emit X-rays, discovered that uranium salts emit invisible beta particles and gamma rays that penetrate the silver halide crystals of photographic emulsion. He found that when an object was placed between these emitted rays and the emulsion-lined photographic plate, the object's interior mass became visible. Becquerel's discovery used radiation to see through and inside of something, giving insight into the limits of human perceptibility and vision.)*

I have implemented the feedback from 'RC2', by specifically focusing on strengthening the opening discussion concerning electromagnetic radiation (see below for summary). I have also revised the entire text and made minor amendments for clarity of expression. I have also noted editorial amendments and have made necessary corrections.

'RC2' commented that: "Although perhaps a topic for a longer paper, it could be helpful to describe the characteristics of radiation on the photographic surface such as spotting and fogging in terms of the alpha, beta and gamma radiation". I agree with this comment/suggestion and will be looking to develop the topic for an expanded related paper.

Summary of Implementation of 'RC2' comments/amendments:

Abstract – reframing of witnessing and scope:

I amended the abstract to narrow the technical phrasing around radiation and make the authorial stance more explicit. Where the original referenced 'not just radioactivity but also, by proxy, the ideological contexts', the revision foregrounds 'the presence of environmental radiation' and then introduces a first-person analytical bridge ('I am interested in how this witnessing functions…'). This amendment preserves the claim that film registers ionizing phenomena while clarifying that the critique of nuclear ideology is an interpretive move developed in the article rather than a property of the medium itself.

Introduction – electromagnetic spectrum clarification:

I streamlined how electromagnetic energy is described, connecting wavelength, energy and photographic materials in fewer more direct sentences. The emphasis shifts from a general explanation of refracted light to the material dependency of both analogue and digital capture on radiation, preparing the ground for later claims about film being affected by invisible forms such as gamma and X-rays. I also removed the footnote reference to AI and developed a reference to the historical context concerning Physicist Henri Becquerel.

Project framing – Listening to Seaweed:

Minor amendments across the text give slightly stronger connective tissue between Hiroshima and Ishigaki and emphasise that the developer is made from seaweed collected along the wastewater current. These changes tighten the causal line from environmental contamination to photographic process, reinforcing material witnessing as both method and claim.

Method and theory – material witnessing:

The revisions retain Susan Schuppli's methodological framework but make the evidentiary threshold clearer: the image's political force emerges from how matter intervenes and is registered in the substrate, not simply from aesthetic effect.

Argument – ideology and critique:

By moving the ideological critique into its own sentence ('I am interested in…'), the amended version distinguishes between what film can materially register and my own interpretation. This subtle separation improves the essay's methodological argument.