

Exhibit D50

From: [Grange, Gabrielle Fenix](#)
To: [Klein, Noa](#); [Hargrove, Wade H](#)
Subject: FW: [EXTERNAL] DRAFT - Navy IRR Limitations Outline
Date: Saturday, December 18, 2021 10:41:51 AM
Attachments: [IRR Comment outline-v1.docx](#)

The PDF will include the email below and the IRR-Comment_outline attached.

Page 2 item 4 is the reference.

From: g.d.beckett@aquiver.com <g.d.beckett@aquiver.com>
Sent: Monday, November 22, 2021 9:25 AM
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Subject: [EXTERNAL] DRAFT - Navy IRR Limitations Outline

Hi folks,

Fenix is traveling, so I thought that perhaps the most efficient way to keep our IRR discussion going was to provide the attached outline of the key IRR limitations. As you all know, Matt and his folks reviewed some aspect of the IRR (chemistry and NSZD primarily), and the DOH technical team dove into the whole of it. Per our call last week, attached is my first cut outlining the primary limitations of the IRR based on our collective technical reviews.

Please review and let me know what I have missed, or clarifications you might like. If a topic is too oblique, I'll be happy to provide any additional information or context. On our call, we thought that this outline might form the basis for updates to the agency response letter to the IRR. As you know, there is an existing draft agency letter that can be updated with this outline in mind. So, with Robert's Rules in mind, when we all concur as to the particulars of the IRR limitations, the letter should be easy to modify & get out the door. With that in mind, additions are probably the most important, along with any changes to those that I have provided.

If I've missed anyone on the email string, please forward to them as you see fit.

Best regards & happy holidays to everyone!

November 22, 2021

To: DOH & EPA Management and SME Team

Subject: Outline of Technical Comments; Navy IRR Report (March 2020)

Overview

The Navy submitted their “Investigation and Remediation of Releases Report, Red Hill Bulk Fuel Storage Facility” (IRR) to the DOH and EPA on March 25, 2020. DOH and EPA SMEs have reviewed this document and found it to be unreliable at the present time to inform groundwater remedy and aquifer protection decisions. Aquifer cleanups in hard-rock settings are complex and often ineffective. Therefore, prevention of widespread aquifer damages is likely an important element to aquifer protection beneath the Red Hill Facility. Similarly, aquifer cleanup methods must be adequately robust to address the range of potential impacts and the uncertainties.

Given the recent sequence of releases at Red Hill (Hotel Pier, Tanks 18/20, valve issue in September, Fire system in on Nov 21), it is clear that future releases are to be reasonably expected. Even the extent and volumes of recent releases remain unconfirmed. Until there are significant Tank and infrastructure upgrades, the Facility will likely continue to pose a potential threat to the sole source aquifer and response measures need to be robust, efficient, and most of all, in-place sooner rather than later.

There is a range of unanswered questions in the IRR regarding the appropriate groundwater protection and cleanup strategies, primarily because it does not consider scale-appropriate comparative actions. Rather, it compares small-area cleanup methods to pump and treat and then determines that the latter is the only applicable cleanup method (with attenuation being the aquifer cleanup method).

From a technical standpoint, the overarching question is how might current and future fuel releases migrate to become the “source” for additional CF&T in groundwater and what mitigation strategies are sufficient to mitigate that range of potential aquifer impacts? Obviously, there are many details that go into answering this question. A second high-level question is whether there are mitigation strategies not considered by the IRR that may be sufficiently robust that aquifer protection can be achieved ahead of the many AOC deliverables that are currently insufficient to adequately inform agency decisions? In other words, the AOC schedule of deliverables has not produced well informed and near-term IRR decisions, is there a way around that?

A few of the essential key requirements of the IRR and related Navy operations facets are:

- Aquifer damages should not extend beyond the Red Hill Tank Farm footprint as a requisite to meeting Hawaii non-degradation and water preservation rules. It is also consistent with stakeholders likely being less concerned about the Navy contaminating their own water, than if the Navy impacts other users and a broader footprint of the aquifer.
- Within the Site footprint, aquifer damages must be remediated to State EALs within a reasonable time frame, defined by the relationships between the fuel mass/type to be remediated, concentration targets, and the method(s) applied.
- The remedy/protective measures must be responsive to past and potential future releases, and to do so, must be easily and immediately activated by Navy at the request of the agencies in response to a release and/or change in conditions that threatens damage to the aquifer.

Outline Of Key IRR-Deficiencies

1. The Navy CSM & derivative GWFMs are foundational to the conclusions of the IRR. Both these work products have been found to be unreliable and non-conservative with regard to key conclusions. Those conclusions fall into two general categories; i) those that cannot be adequately demonstrated with available data; and ii) those that conflict with and are disproven by available data.
2. Fuel plumes and conditions beneath the facility are not adequately delineated, relative to State, EPA and industry standards, and the implications of existing in situ conditions (and uncertainties) have not been considered by the IRR.
3. Related to #1 above, the Navy CSM/IRR purports that 100% of all fuel constituents will naturally degrade in rapid time frames. Literature and site data do not support this conclusion. Neither do available data from the area of RHMW03, where ongoing impacts are indicated to remain approximately two decades following the last known release there. The IRR does not recognize or consider the cumulative effects of likely ongoing releases on the vadose & aquifer buffering.
4. Capture/P&T has not been demonstrated as viable, for the following reasons:
 1. Field drawdown data under the Navy-modeled pumping conditions do not indicate that capture of the full Red Hill footprint is achieved; gradients are nuanced and complex.
 2. The IRR does not evaluate the time component of capture (transience) as it relates to active fuel migration resulting from releases and the magnitude of containment necessary to halt that migration (i.e., gradients of migration vs. gradients of capture).
5. No assessment of how far, fast and where fuel might migrate under large-scale releases and the potential aquifer damages and impacted volumes caused by those release scenarios. The key processes of fuel/LNAPL migration remain undefined.
6. The IRR relies implicitly on the Navy fuel holding model that the agencies have noted is non-conservative because it ignores key processes and makes unsupported assumptions about release geometry and formation holding capacity. Earlier versions suggested millions of gallons of fuel could be release without aquifer impacts. Navy revisions currently suggest that a “hypothetical sudden release of 150,000 gallons of jet fuel would be mostly retained in the vadose zone and would be protective for users of groundwater; *high confidence*.”
 1. The agency SMEs have no-confidence that this calculation is representative. There are direct indications that the 2014 Tank 5 release likely impacted groundwater (27,000 gallons).
 2. As noted above, the Navy’s estimates are unfounded without consideration of both key fuel transport processes as well as present conditions in the subsurface. The fuel holding model considers neither.
 3. Hawaiian experience is that fuel released to the hard-rock volcanic sequence migrate rapidly and in complex ways that often defy characterization by common methods.
7. The IRR assume that the comparative scale of cleanup is the area around single tank. It does not consider that releases can occur from any of the 20 tanks and migrate far beyond the area of a single tank. In the 2014 Tank5 release, vapor data indicated subsurface transport likely over the lower-third of the Tank Farm, and possibly further (limited characterization data).
8. The remedies evaluated, except for P&T, are not site-scale applicable (e.g., things like SVE/IAS using vertical wells and other inapplicable comparative remedies). Remedies that might be applicable, such as cutoff tunnels, surfactants, and a range of others are discarded by the IRR or simply not considered.

9. Unrealistic rates of natural source zone depletion are applied in the IRR. As noted, RHMW03 last release more than 20-yrs ago & still a persistent thermal signature. The IRR assumption that NSZD will cleanup the aquifer in acceptable time-frames is counter to available data.
10. The IRR, per the CSM, oversimplifies the complexity of the system and likely contaminant transport.
11. The IRR has no chemical or mechanistic evaluations of the remedies. Each fuel type, its release conditions, and the character of subsurface materials will control the rate of cleanup and the end-points of effectiveness. The IRR provides no evaluations of these important facets.
12. Per the CSM, the IRR assumes there are no contaminant impacts now, or in the past, to the northwest of the Red Hill Facility. Agency SMEs have determined there are sufficient technical grounds to believe the observed impacts to the NW are likely real and have direct implications to the risk context of potential aquifer damages.