DOH comments On April 29 2016 RHBFSF Monitoring Well Installation Plan

Section 1.2.1.3 – Geology and Soils, Page 1-6

Lines 1 to 11:

- Too much discussion on soils with incomplete introduction of basalt (clinkers Aa, Pahoehoe, fractures) (Mark Frazier)
- Omits late stage volcanics (salt Lake) and cap rocks formation and deep stream sediments (barriers) (Mark Frazier)

Line 34:

- This a minor point for the purposes well installation but is important for vadose zone transport. Although the lava beds are "near horizontal" they do have dip. Characterizing the strike and dip of the lava flows is important for understanding any product migration in the vadose zone outside of the concrete cocoon. Strike dip of the lava beds should be part of the overall hydrogeologic investigation. (Bob Whittier)

Section 1.2.1.4 – Groundwater, Page 1-6

Lines 13-17:

- Must mention basal waters in their discussion. Add there is also an unconfined water table present on top of the basal in the cap rocks. (Mark Frazier)

Line 18:

- This description of groundwater in this section fails to mention high-level dike confined groundwater. (Bob Whittier)

Lines 25 – 31:

- Cap rock diverts flow, barriers may confine flow all are within study area and possibly site area. (Mark Frazier)

Section 1.2.2 – Site History, Page 1-7

Line 37:

- The actual downgradient direction in the vicinity of Red Hill has not been adequately defined thus the importance of this and other investigations to characterize groundwater flow patterns beneath the foot print of the facility. It would be more accurate to state "the assumed down gradient direction" or similar since at this point since we don't know regional gradient beneath the Facility. The blue arrow on the figures is consistent with that shown in USGS publications. However, these publications are based on conceptual models developed decades ago and without the new water level data that has been, and will be acquired by Red Hill investigations. (Bob Whittier)
- The stated distances from USTs to the RHS vary from <2000 to >4000 ft. The distance from the east end of the Red Hill Shaft infiltration gallery to UST 1 is about 1,500 ft, while the distance from west end of the infiltration gallery to UST 20 is about 4,500 ft. Some consistency needs to be used when describing this important parameter. It seems the shortest distance is the greatest concern when considering risk. (Bob Whittier)

Lines 43 – 45:

- Text should include that exposed basalt walls were mapped producing barrel logs (1943). Barrel logs document vadose zone of geology surrounding the tanks 250 feet high and 100 feet in diameter. Barrel logs document large voids (lava tubes) often 10 feet by 20 feet openings, clinker zones and loose rock zones. Our concern is that the openings are pathways for fluid migration. (Mark Frazier)

Page 1-8

Lines 1 – 7:

- Emplaced concrete could have bridges/openings. (Mark Frazier)
- Text does not correctly describe construction sequence of tanks. (Mark Frazier)

Lines 8-9:

- Text should acknowledge that the lack of information on past releases is a data gap. (Mark Frazier)

Section 2.1 – Step 1, State the Problem, Page 2-1

Lines 11-17:

- This paragraph should include an acknowledgement of a data gap regarding the potential migration. Potential migration pathways could include migration down within concrete cocoon next to tank and migration from tank to openings in basalt walls. (Mark Frazier)

Section 2.2 – Step 2, Identify Study Objectives, Page 2-1

Lines 24 -28:

- Regarding the scope of sampling and analysis proposed as part of this MW Installation Plan, DOH strongly disagrees with the Navy's intention to only conduct soil sampling at depths below the tanks or if contaminated soil is encountered. As written, it is limiting testing to top 30 feet of soils and ignoring all vadose and saturated zone pathways for next 370 feet. This is a clear sampling bias not to find anything. (Mark Frazier)
- Suggest sampling for contamination within all fine grain materials: soil or volcanic (clay, sand to fine gravel, or ash, cinder, clinker zone sand to fine gravels). Use their definition of contamination (odor, stain, free product, PID hits, etc.) (Mark Frazier)

Section 2.5 – Step 5, Develop the Analytical Approach, Page 2-2

Lines 10 – 11:

- See previous note to sample all fine grain sediments with contamination. (Mark Frazier)
- It is important to screen all cores with a PID whether below or above the bottom of the tanks. Likely this will be done, but need to ensure. (Bob Whittier)

Lines 12-13:

- The definition of "significant contamination" needs to be defined. (Mark Frazier)

Section 2.6 – Step 6, Specify Performance or Acceptable Criteria, Page 2-2

Lines 20 – 21:

- Data gaps should be include as a potential source of error. (Mark Frazier)

Section 2.6.1 – Types of Error, Page 2-2

Lines 24-33:

- This is the data gap of large voids shown in barrel logs. This is bias of samp only soil not fines. (Mark Frazier)
- Regarding groundwater, the focus is only on saturated zone, omits vadose perch waters problem. (Mark Frazier)

Section 2.6.2 – Managing Decision Error, Page 2-5

Lines 7-8:

- Leveling the drilling well twice a day during drilling is not sufficient to ensure that well is plumb. Navy should refer to BWS well construction details for vertical truth of well. (Mark Frazier)

Section 2.7 – Develop Plan for Obtaining Data, Page 2-5
Lines 27-32:

- This paragraph should include a listing of all known data gaps. (Mark Frazier)

Section 3-1 – Monitoring Well Locations, Page 3-1
Lines 34- 35:

- Identify the data gaps that the choice of well locations are intended to fill. (Mark Frazier)

Line 40:

- DOH believes the elevation above mean seal level (msl) at the location of proposed well RHMW08 is 360 ft. (Bob Whittier)

Page 3-2
Line 8:

- DOH believes the location of proposed well RHMW09 is at an elevation of 374 msl. (Bob Whittier)

Line 15:

- DOH believes the location of proposed well RHMW10 is at an elevation of 288 msl. (Bob Whittier)

Line 27:

- DOH believes the location of proposed well RHMW11 is at an elevation of 223 msl. (Bob Whittier)

Lines 31-32:

- Specify that RHMW11 is intended to provide data to help characterize the geological matrix of ***South*** Halawa Valley. (Mark Frazier)

Figure 3, Transverse Cross Section

- Provide an indicator to show additional depth of RHMW11 in the event that bedrock not encountered at target depth. (Mark Frazier)
- X-axis should be centered at RHMW02 so that lateral distances from Facility are easier to determine. (Mark Frazier)
- The Halawa Shaft is completed in basalt. It does not terminate within the valley fill as indicated in Figure 3. (Bob Whittier)

Figure 4, Longitudinal Cross Section

- Dashed line representing South Halawa and Moanalua Streams appear flat in area of tanks, which they are not. This should be removed or corrected. (Mark Frazier)

Figure 5, Cross section of Borehole and Monitoring Well

- Regarding the bentonite seal, how is a chip different than a seal? (Mark Frazier)
- The filter pack should be described. (Mark Frazier)

Section 3.2.3 – Rock Coring, Page 3-8
Lines 21-22:

- Checks for perched should occur more frequently. If only checked at the beginning and end of the day it would be easy to drill through a perched zone without knowing it. (Bob Whittier)

Section 3.3 – Subsurface Soil Sampling, Page 3-11
Lines 2-9

- Not soil limitation as described earlier. Say sediment sampling. With in vadose or saturated. Sample contaminated sediments regardless of origin. (Mark Frazier)

Table 3-3, Existing and Anticipated Borehole and Well Dimensions

- Wells RHMW01 and OWDFMW01 both are screened below groundwater surface. Wells RHMW 2254-01 and HDMW 2253-03 are not screened. Any sampling results from these wells will be biased since the LNAPL release is at the water surface. This bias should be noted on all future sampling results. (Mark Frazier)
- Rather than listing Not Applicable for the screen interval for wells RHMW 2254-01 and HDMW 2253-03, the Navy should provide the depth of the bottom of the well casing. (Mark Frazier)

Section 3.5 – Surveying, Page 3-12

Lines 5 – 12:

- The groundwater flow gradient is a regional problem involving the possibility of groundwater flow from the Honolulu Aquifer to the Pearl Harbor Aquifer. This is particularly important as needs consistent elevation datum to wells from Moanaulua Ridge to well west of North Halawa Valley. (Bob Whittier)

Section 4.3.1 – Drilling, Page 4-3

Lines 23-26:

- The possibly exists for encountering contaminated perch water in RHMW08. Increased vigilance is needed when drilling this hole to ensure that no contamination is advanced down the borehole. (Bob Whittier)
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Section 4.3.7 – Dedicated Groundwater Pump System Installation, Page 4-7

Lines 18-19:

- 10 feet intake is to deep, it introduces a sampling bias. This is why we want short screen wells. Our contaminant is near the water surface. 10 feet depth is influenced by clean water at depth-dilution of sample=lower number or less contamination. Suggest 2 to 5 feet depth. (Mark Frazier)

Section 4.3.9 – Subsurface Soil Sampling, Page 4-7

Line 32:

- This section states that soil samples will be collected if soil is present at depths lower than the tank bottoms or if contaminated soil is encountered. In Section 3.3 it states that soil samples will be collected if soil is encountered at depths >= 100 ft bgs. This plan needs to have consistent specifications. (Bob Whittier)

Lines 34-35:

- The plans description of discrete sampling is unclear. Discrete sampling with 100g. Not encore, not MIS, not per their SOP, no field methanol. Later sample table says use a VOA for soil. Need to research more. (Mark Frazier)

Lines 35-37:

- Insert evaluate for contamination per previous descriptions (stain FP PID etc.), Insert sample if contamination observed. (Mark Frazier)

Section 5, Sample Details, Page 5-1

Table 5-1, Subsurface Soil Sample Details for Monitoring Well Installation WP, RHSF

- Replace the word ***soil*** with ***sediment.*** (Mark Frazier)
- For TPH-g and VOCs, it is unclear why the container type is listed as 40 mL VOA vial. 100g to be collected, no encore sampling method mentioned (encore takes 5 g) yet 40ml VOA? Needs clarification. Seems like a water sample. Ask Randy H for help to pursue/clarify. (Mark Frazier)

Table 5-2, Geotechnical Sample Details for Monitoring Well Installation WP, RHSF

- This seems strange. The matrix is "solid" meaning rock core? If so, it appears the analysis are for soil. (Bob Whittier)

Table 5-3, Potable Water Sample Details for Monitoring Well Installation WP, RHSF

- Missing silica gel, would need split. Navy should specify another set of TPH containers. (Mark Frazier)
- If sample is unpreserved it is 7 days and preserved is 14 days. If I am correct, needs to be corrected. Ask Randy H. (Mark Frazier)