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| **From:** | Charles D Hunt |
| **To:** | David Albright/R9/USEPA/US@EPA |
| **Cc:** | Janet Hashimoto/R9/USEPA/US@EPA; watson.okubo@doh.hawaii.gov; Stephen S Anthony; Gordon W Tribble |
| **Subject:** | Re: Presentation - Lahaina and Kihei injection plumes |
| **Date:** | 12/16/2008 02:42 PM |

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Hi, Dave -

Thanks for the questions, answers interleaved below:

During the presentation, I recall you noted that modeled travel time for the ww plume at Kihei (to reach the coastal water) was about 2 years, correct?

-- yes, modeled age in the central core of the plume is approx 1-5 years at the coast according to the model, and subject to its uncertainties

Is that modeling outcome written up/published somewhere?

-- yes, download my report Nutrient Flux to Coastal Waters, Wastewater Injection Modeling - http://pubs.usgs.gov/sir/2006/5283/
-- see page 62 "Simulated Age of Ground Water" and figs 34 & 35 (best viewed on the computer screen, colors may not render as well printed)

Also, you noted that such a travel time model had not been run for the Lahaina facility, but there are indications that travel time might be much shorter.

-- Tetra Tech reportedly made estimates, Wendy Wiltse of EPA recalled them; I've not seen their entire report but Wendy has a copy; if she's able to have it scanned to PDF (Kinkos?) please forward a copy to me please.

1) how difficult would it be to model travel time at Lahaina (in terms of time, $$, and level of accuracy), and

-- Steve Gingerich, 3 doors down from me, has a detailed ground-water model for West and Central Maui; he's presently going on to refine the model grid to next concentrate on West Maui (Lahaina) specifically; these efforts are to estimate water supply; modeling of the Lahaina plume would likely require yet another step of grid refinement for more detail in the plume vicinity; geology is also complex right there and apparently directs the plume more southerly than the expected straight shot to the west; guesses could be made about the geology, and and seeing that there are hi-rise resorts in the vicinity, there may be foundation borings that would help delineate the geology; level of accuracy will be constrained by the various uncertainties and it's not likely the uncertainty could be estimated or quantified.

-- For time and $$ (and modeler availability), I'll refer you to Steve Anthony, head of our projects section; but summary is that we have active models, experienced modelers, and much of the necessary datasets on recharge and volumetric flow in place already on the water-resource projects

2) do you have any ideas about potential projects/studies that would measure (instead of model) travel time, and again how difficult would that be in terms of time, money, and expected accuracy?

-- Tetra Tech attempted an injected fluorescent dye-tracer test that was mostly inconclusive (maybe a reading or two right at the detection level of the instrumentation, but no strong or conclusive detection). I'm not sure they knew about these prominent seeps that are now known, and I think much

of their surveying was relatively far offshore compared to the seeps, which are about 10-15 yards off the beach. It could be worthwhile to repeat a dye-tracer test, measuring right at the seeps and other nearby ocean-bottom locations. Sorbent collectors probably could be tethered and/or buried in the bottom sediments and retrieved monthly or weekly. Our office is planning such a test on another project and may soon have direct experience with this approach. As do others. This type of dye-tracer test is probably best paired with a best-estimate of travel time, such as from the modeling approach discussed above.

-- Again, for more discussion, please contact Steve Anthony, 808-587-2406

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Pacific Islands Water Science Center - http://hi.water.usgs.gov
Ground-Water Quality and its Relation to Land Use on Oahu - http://pubs.usgs.gov/wri/wri034305/
Nutrient Flux to Coastal Waters, Wastewater Injection Modeling - http://pubs.usgs.gov/sir/2006/5283/
Wastewater and Nutrient Source Tracking for Beach Monitoring - http://hi.water.usgs.gov/studies/project_source_tracking.html

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**Albright.David@epamail.epa.gov**

12/16/2008 09:57 AM

To Charles D Hunt <cdhunt@usgs.gov>
cc Hashimoto.Janet@epamail.epa.gov
Subject Presentation

Hi Chip,

Thanks again for your presentation. I found it very interesting and informative as we contemplate the potential impacts of injection wells on the environment in Hawaii. During the presentation, I recall you noted that modeled travel time for the ww plume at Kihei (to reach the coastal water) was about 2 years, correct? Is that modeling outcome written up/published somewhere? Also, you noted that such a travel time model had not been run for the Lahaina facility, but there are indications that travel time might be much shorter. My questions for you are 1) how difficult would it be to model travel time at Lahaina (in terms of time, $$, and level of accuracy), and 2) do you have any ideas about potential projects/studies that would measure (instead of model) travel time, and again how difficult would that be in terms of time, money, and expected accuracy?

Thanks a lot for any "off the cuff" thoughts on these matters.

Regards,
David

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