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May 24, 2019

VIA EMAIL: holly.mullen@slcgov.com
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SALT LAKE CITY DEPARTMENT OF PUBLIC UTILITIES
1530 South West Temple
Salt Lake City, UT 84115

Re: Second Comment by Kurt A. Fisher on 4th Avenue Well Chemical Treatment Plant
Securing the sodium hypochlorite tank against seismic risk; Option 2c location alternative design

Ms. Mullen:

This letter is a comment with respect to the conceptual design phase of the Fourth Avenue Well Chemical Treatment Plant (the "Well").[1] As noted in my first comment dated May 23, 2019, all of the proposed locations for the chemical treatment facility are located in seismic zones that will be subjected to high levels of ground shaking in the event of a greater than magnitude 6.75 earthquake. This comments recommends incorporating special engineering features to secure the Well's proposed sodium hypochlorite tank against that seismic risk. Only complying with existing magnitude 5.0 earthquake standards would be insufficient in these premises. In Point II, I propose a concept design for the Hansen, Allen and Luce Report Option 2c alternative site (Figure 3) at the north end of City Creek Canyon Park..The concept design is of my own making and was done without consultation with or approval by residents in the immediate neighborhood. This siting proposal supplements and does not replace my May 23rd suggestion of approaching the Church of Jesus Christ of Latter Day Saints to locate the facility at the west end of the parking lot at 61 East North Temple.

I. THE WELL CHEMICAL TREATMENT PLANT SODIUM HYPOCHLORITE STORAGE TANK SHOULD BE SECURED AGAINST SEISMIC SHAKING USING THE BEST AVAILABLE TECHNOLOGY.

The proposed well-site and all the conceivable alternative relocation sites are located in an area where earthquake experts predict severe seismic shaking during a catastrophic earthquake.[2] Experts predict that in an anticipated 7.0 mag earthquake, the ground in Memory

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[1] This comment has not be circulated to the Chemical Facilities Anti-Terrorism Standards Desk at the Department of Homeland Security ("CFATS-DHS").

[2] Wong, I., Silva, W., Wright, D., Olig, S., Ashland, F., Gregor, N., … Jordan, S. (2002). Ground-shaking Map for Magnitude 7.0 Earthquake on the Wasatch Fault Salt Lake City, Utah Metropolitan Area (Public Information Maps No. P-76). Salt Lake City, Utah. (url:

Grove will move horizontally between 0.3 and 1.0 meters. Horizontal accelerations will be between 0.9 and 1.0 standard gravities (g_n).[3] During such an earthquake event, there will be an estimated 2,000 to 2,500 deaths, and the estimated number of injured persons needing hospital care is between 7,400 and 9,300.[4]

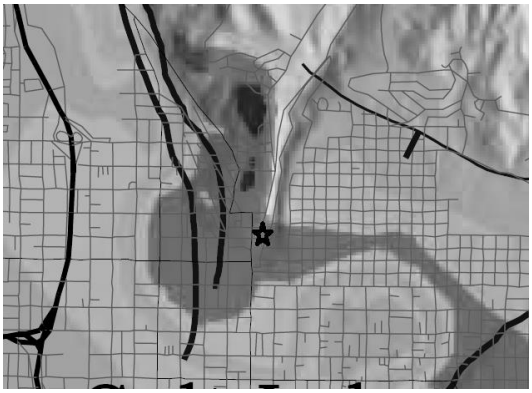

Figure 1 – Excerpt - Ground Shaking Map from Wong 2002. Notes: The proposed DPU facility is marked with a star in an MMI IX predicted shaking region. The faults to the immediate west are extensions of the Warm Springs Fault and have been active in the last 15, 000 years.

Where ever the proposed Well chemical treatment plant is built, the sodium hypochlorite storage tank might incorporate anti-shaking Teflon pads similar to those retrofitted under the City and County Building and the State Capitol or other damping springs.[5] Expert engineers can decide if an additional active-mechanical damping system is needed. The storage tank itself could be set into a concrete tank, so if the tank fails in an earthquake, the sodium hypochlorite will still be contained within the building. The outflow pipes from the storage tank might be fitted with double-redundant automatic earthquake shut off values. While automatic natural gas

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https://geology.utah/hazards/earthquakes-faults/ground-shaking/); Bartlett, S. F., Hinckley, D. W., and Gerber, T. M. (2016). Figure C-1 in: Liquefaction-Induced Ground Displacement Hazard Maps for a M7.0 Scenario Event on the Salt Lake City Segment of the Wasatch Fault Zone, Salt Lake County, Utah. Salt Lake City, Utah. (url: http://www.civil.utah.edu/~bartlett/ULAG/Liquefaction Maps Text.pdf).

[3] For other non-technical general readers of this document, one standard gravity – 1 g_n – is equivalent to 9.8 meters per second squared of acceleration, or about 22 miles per hour squared of acceleration. In an earthquake setting, the structural concern is deceleration from 22 miles per hour back to rest. Think of it in terms of driving a car at 22 miles per hour into a concrete wall and coming to an instantaneous stop.

[4] Earthquake Engineering Research Institute, U. C. (2015). Scenario for a Magnitude 7.0 Earthquake on the Wasatch Fault – Salt Lake City Segment: Hazards and Loss Estimates. Salt Lake City, Utah, at 3 (url: https://dem.utah.gov/wp-content/uploads/sites/18/2015/03/RS1058_EERI_SLC_EQ_Scenario.pdf).

[5] *E.g.* Andre HVAC International Seismic Isolation Springs rated to 2 g_n. (url: http://www.andrehvac.com/seismic-spring-mounts-c-6.php).

cut-off values are common and available for residential purposes,[6] I am unaware of what is available for a similar function for corrosive chemicals in chemical facilities.[7]

Regardless of the regulatory standard of seismic protection – I understand it to be 5.0 magnitudes – the sodium hypochlorite storage tank within the structure should be designed to resist a higher magnitude 7.0 event. This should be done without regard for cost efficiency. During a catastrophic earthquake event, residents that live within the immediate neighborhood and first responders should not be burdened with also dealing with a 500 to 900 gallon chemical spill as they digging their neighbors out of the rubble of their homes.

I assume that the able engineers working under Chief Engineer Brown have already anticipated such a design requirement, but I wanted to make a public record of a request so it is not overlooked in the design phase. I would appreciate a response indicating what special seismic protections for the chemical storage tank that have been already incorporated in the DPUs ongoing concept and preliminary construction drawings for the Well project.

II. A CHEMICAL TREATMENT PLANT RELOCATED TO THE HAL REPORT OPTION 2C SITE COULD BE IMPROVED FROM THE DPU'S MAY 9 CONCEPT USING THE FOLLOWING CONCEPT DESIGN.

The April Hansen, Allen and Luce Report[8] evaluates an alternative site location at the "old City Hall site" in Option 2c. This comment proposes utilizing the north end of City Creek Canyon Park at State and North Canyon Roads[9] except with a design hardened against an anti-terrorist attack as discussed in my May 23rd comment and herein. Other features to make the facility more compatible with the surrounding park and neighborhood are discussed below.

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[6] *E.g.* at Home Depot (https://www.homedepot.com/p/Watts-3-4-in-Steel-Earthquake-Valve-AGV-75/202547063).

[7] I have and claim no special engineering knowledge in these matters.

[8] Memorandum by David E. Hansen, Hansen, Allen and Luce, Inc., to B. Stewart, Salt Lake Department of Public Utilities, dated April 12, 2019, re: 4th Avenue Well Assessment (hereafter "HAL Report") (url: https://docs.wixstatic.com/ugd/80b28b_3607f771b2984d63a44ce7a4c3d1c7a9.pdf).

[9] Map at url https://goo.gl/maps/cow8mNYjkHKnWdvJ6 .

Figure 3- Proposed Option 2c Relocation Site within City Creek Park. The "star" marks the proposed re-location site and the white box suggests a facility foot print. The white box is approximately 100 by 50 feet.

Figure 2- Photograph of the proposed relocation site showing no windows on the South facing wall of the Victoria House Apartments.

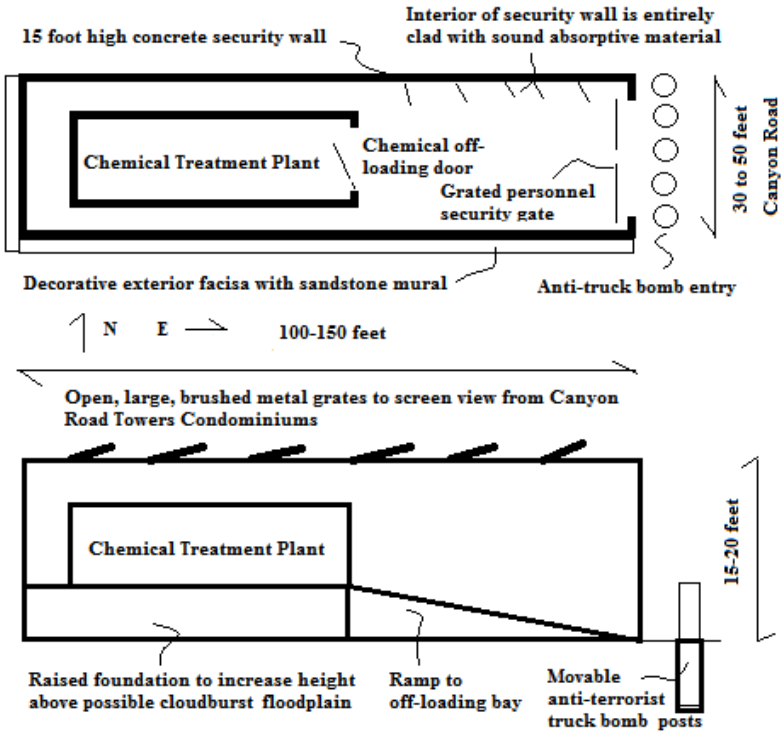


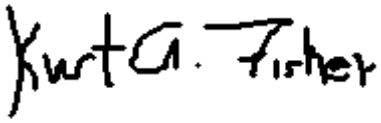
Figure 4- Concept schematic of the proposed facility from above and side.

Figure 3 illustrates an anti-terrorist facility that is more resilient than the DPU's current concept design. Aesthetic features to make the facility better blend in with City Creek Park and the surrounding neighborhood include:

- An exterior decorative fascia on the exterior south and west walls with a sandstone mural depicting animals still commonly seen in City Creek Canyon, *e.g.* – Rocky Mountain elk, moose, eagles, falcons, mountain lions and coyotes.
- The interior would be clad with sound absorptive tiling.
- The top of the security enclosure would consist of wide open grates of brushed metal with the bottoms also clad in a sound absorbing material (not shown in figure). This open roof would screen the interior of the facility from the Canyon Tower Condominiums and summer tourists walking up State Street.
- Not shown in the schematic are removable stone ports around the exterior perimeter to allow firefighters to put water on the facility without having to enter the enclosure.

I hope the above information contributes positively to the DPUs decision-making process. Please feel free to contact me with respect to this matter by the means listed above. As always your cooperation is appreciated.

Very Truly Yours



Kurt A. Fisher

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