KURT ALLEN FISHER
P.O.B. 11753
Salt Lake City, Utah 84147-0753
fisherka@csolutions.net
(801) 414-1607 (cell)
May 21, 2019

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

VIA EMAIL: csat@dhs.gov[1]
Chemical Facility Anti-Terrorism Standards (CFATS) Help Desk
DEPARTMENT OF HOMELAND SECURITY
Washington, D.C. 20528

Re: Comment and Request by Kurt A. Fisher ("Applicant") for Determination that the Proposed 4th Avenue Well Chlorination Project at approximately 400 North Canyon Road, Salt Lake City, Utah (the "Well")[2] is a "High Risk Facility" pursuant to Federal Chemical Facility Anti-Terrorism Standards (6 C.F.R. § 27.203 and 205).

Sirs:

First, this letter is a Salt Lake City Corporation (the "City") level comment on the concept design of the proposed Well by the Salt Lake City Department of Public Utilities ("DPU") at approximately 400 North Canyon Road in Salt Lake City.[3] Second, this letter is a request to the United States Department of Homeland Security ("DHS") (a) to conduct a preliminary security risk assessment into whether the DPU and the City have complied with chemical facility anti-terrorism standards for critical infrastructure facilities[4] when designing the Well and (b) to issue a determination on whether the facility, given its overall characteristics as described below, is a presumptively high risk facility.[5]

---

[1] From url https://www.dhs.gov/department-white-pages.

[2] Salt Lake City Department of Public Utilities. 2019. Information Website on 4th Avenue Well Project (url: https://www.slc.gov/utilities/fourth-avenue-well-project/, accessed May 2019).

[3] Well location map (url: https://goo.gl/maps/XFZfkuXYPXCPdGgZA).

[4] 6 C.F.R. Part 27 (2019) (url: https://www.govinfo.gov/content/pkg/CFR-2019-title6-vol1/pdf/CFR-2019-title6-vol1-part27.pdf).

[5] 6 C.F.R. § 27.203 (c)(1) (April 9, 2007).

Alternatively, if the proposed Well is not a presumptive high risk facility, your Applicant requests that the DHS make a discretionary determination that the Well chlorination facility is a high risk facility.[6]

The DPU proposes to place an insufficiently secured domestic water supply chlorination plant in a small public park principally on the grounds of cost savings.[7] The proposed chlorination facility is surrounded by residential homes at distances of approximately 150-300 feet. As presently designed, the Well chlorination facility presents a high risk of significant adverse consequences for human life or health, national security and/or critical economic assets if subjected to terrorist attack, compromise, infiltration, or exploitation.

In essence, the DPU proposes to construct one component of a binary chlorine chemical gas weapon, relatively unsecured, in the middle of a densely populated residential neighborhood. If the second component – a relatively inexpensive low-yield truck bomb containing a combination of 1,000 to 1,500 gallons of household vinegar and concentrated ammonia cleaner, available from any janitorial supply house and wholesale food supplier, would create a large chlorine gas cloud. The cloud would be lethal to residents of the immediate neighborhood and could injury the some 48,000 persons who work in Salt Lake City's Central Business District ("CBD") approximately one-quarter mile southwest of the proposed facility.[8]

Your Applicant seeks to have the proposed chlorination facility relocated from a residential neighborhood to a more secure, redesigned chlorination facility. Your Applicant readily admits that this alternative siting proposal will be significantly more expensive than the DPU's current design, but relocation is necessary to protect against reasonable plausible terrorist scenarios. Currently, the DPU has selected lower cost options without consideration of terrorist attack scenarios.

Your Applicant proposes two alternative relocation sites with different levels of anti-terrorist resilience:

Option 5:[9] The proposed chlorine chemical facility would be moved approximately 2,000 feet north to the approximate location of the historical Brigham Young Empire Mill site,[10] or to such other site as the Secretary and the City may in the future determine is otherwise appropriate given federal anti-terrorist constraints. In the Applicant's proposed concept redesign, Well water would be pumped uphill from the existing wellhead for disinfection at a significantly more costly - but with a DHS anti-terrorist compliant - facility.[11] Vehicle access to this portion of City Creek

---

[6] 6 C.F.R. § 27.205(a) (April 9, 2007).

[7] HAL Report at 5, *infra*.

[8] Point III, *infra*.

[9] These options are numbered 5 and 6 to maintain consistency with options numbered 0 to 4 in the HAL Report, *infra*, at n. 16.

[10] 40°46'58.1"N 111°53'00.1"W (url: https://goo.gl/maps/2t4SWwACnfSk8nE67).

[11] The current Well proposal involves, in part, chlorinating water in a residential neighborhood and then pumping water uphill to a critical infrastructure storage tank at 640 North Victory Road, Salt Lake City, Utah, at approximately 40°47'01.1"N 111°53'29.2"W (url:

Canyon is already restricted by a series of locked gates. The facility design would not require significant hardening against an attack because of the buffer between the facility and populated areas. This alternative will also require a zoning amendment.[12]

Option 6: Your applicant believes that once informed with the potential for a plausible terrorist attack on the DPU proposed Well design, described below, that the Church of Jesus Christ of Latter Day Saints would be willing to donate land at the west end of a vacant lot at the northwest corner of the nearby intersection of State and North Temple Streets[13] for a more terrorist resistant chemical facility. The Church's Worldwide Headquarters that offices over 1,000 persons is across the street and is within one-quarter mile of the DPU's proposed chemical treatment facility. In this option, a water transmission line would be constructed from the existing wellhead to the new site. A utilitarian concrete structure similar in foot print to the DPU's current design, would be surrounded by a 15 feet tall steel re-enforced concrete wall. Street access for sodium hydrochlorite deliveries would be from North Temple Street via an anti-truck bomb resistance entry. A similar anti-truck bomb resistant entry is used at the cash delivery bay at the Federal Reserve Bank at the southwest corner of 100 South and State Street, Salt Lake City. At the Federal Reserve Bank, electrically driven subsurface posts are normally extended upward and are only lowered when armored car deliveries occur. The following figure shows a schematic of this Applicant proposed alternative:

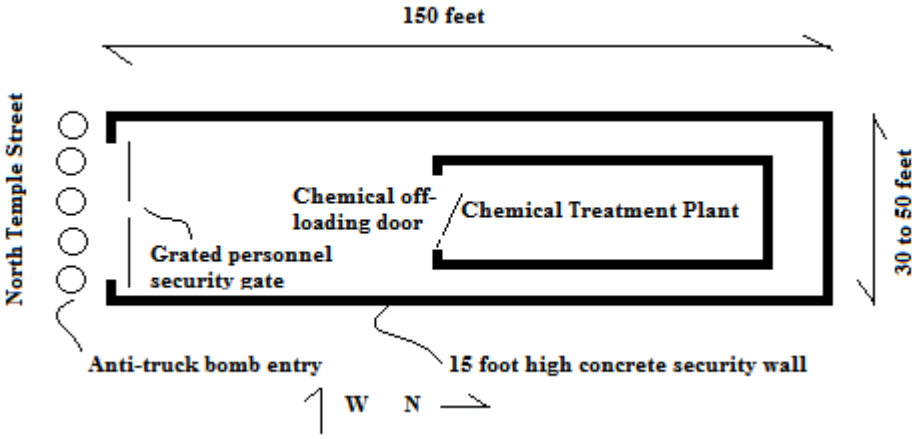


Figure 1 – Schematic of Applicant's Proposed Option B Design near 61 East North Temple. Compare to DPU Architectural Renderings in Figure 3 and Figure 4, below.

https://goo.gl/maps/LNnHGiGBvqJ5P2Cc7) and-or 500 Cortez Street at approximately 40°46'51.7"N 111°53'11.3"W (url: https://goo.gl/maps/VQNQLY257S5f5Ndb7).

[12] Salt Lake City Corporation. (1989, Mar 21). Salt Lake City Ordinance 11-1989 dated March 21, 1989 (establishing portions of City Creek Canyon as a protected natural area). The Well is not within the natural area; the historical Empire Mill site is.

[13] The parking lot at 61 East North Temple, 40°46'18.7"N 111°53'22.0"W(url: https://goo.gl/maps/dox4swxx9Eun4ejX6).

In this option, the chemical treatment facility would also be hardened to survive a an expected magnitude 7.0 earthquake without releasing sodium hypochlorite.

I. BACKGROUND AND FACTS

Between 48,000 and 75,000 people live and work in the CBD to the immediate southwest of the proposed Well chlorination facility.[14] The City anticipates through 2040, that current full-time residents will increase from 5,000 to 20,000 persons and that the population of daily commuting workers will increase from between 54,000 to 88,000 persons.[15] In the last three years, the City engaged in aggressive development of multi-family residential and hotel units and has added about 3,000 new units in the CBD. This has resulted in an increased need for sufficient water pressure to service this new and anticipated growth. As a result of this growth and the need to comply with other health, safety and water drinking requirements,[16] the DPU proposed a new pumping house and chlorination facility at the site of an existing underground Well, that has operated principally during the summer months since 1943 (*id*).

In 1943, the Well was developed to a depth of 484 feet during one of Salt Lake City's cyclical periods of drought.[17] The Well taps an aquifer layer the runs beneath the watershed protected hills to the north of City's center and the City Creek Canyon Natural Area – the primary drinking water source of the City's urban core. Between 80 and 100 percent of the northern City's downtown water comes from this well during the summer months (Bowen Memorandum) at a volume of 3 to 7 million gallons per day.[18] Since 1948, the City has not directly chlorinated water from the Well. The DPU has relied upon disinfecting the well's water by mixing it with chlorine treated water from other parts of the City's distribution system.[19] In

---

[14] Salt Lake City Corporation. May 2016. Salt Lake City Central Business District Master Plan (url: http://www.slcdocs.com/Planning/MasterPlansMaps/Downtown.pdf). The 48,000 estimate is based on the 2010 Census and the 78,000 person estimate comes from the local chamber of commerce: the Downtown Alliance.

[15] Ftn. 14 at 5 and 9.

[16] Salt Lake City Dept. of Public Utilities, Undated, Project Notice (hereafter the "Project Notice") (url: https://docs.wixstatic.com/ugd/80b28b_f6fe751ac8f54376970f1e9d5b471440.pdf); Memorandum by B. McIntire to K. Lindquist, Salt Lake City Planning Department dated August 30, 2018, re: Open House Public Comment Responses (hereafter "August 2018 Comments") (url: https://docs.wixstatic.com/ugd/80b28b_0bc4214b1c61450897cfbd5cc5a0e6ee.pdf); Bowen Collins and Associates, circa August 2018, re: Salt Lake City Planning Commission Assessment Memorandum (hereafter the "Bowen Memorandum") (url: https://docs.wixstatic.com/ugd/80b28b_0e07c5f9e8ff4047a4bd9405ee4d95cf.pdf); Memorandum by David E. Hansen, Hansen, Allen and Luce, Inc., to B. Stewart, Salt Lake Department of Public Utilities, re: 4th Avenue Well Assessment (hereafter "HAL Report") (url: https://docs.wixstatic.com/ugd/80b28b_3607f771b2984d63a44ce7a4c3d1c7a9.pdf).

[17] HAL Report.

[18] HAL Report.

[19] Bowen Report at 2; Fisher conversation with DPU Project Manager, May 9, 2019.

1951 as the result of an outbreak of water-borne illnesses at the Union Pacific Station, the City entered into an agreement with United States Public Health Service to construction its current system of water filtration and chlorination plants, including a plant 5 miles north of the Well in City Creek Canyon.[20] The City's practice of disinfection by mixing untreated Well water with the City's general water supply apparently has been done without any adverse health effects to the community since the 1950s.

The proposed facility is within one mile of three secondary geologic faults[21] - the City Cemetery Fault, the Warms Springs Fault and the East Bench Fault - that connect with the 20 mile long segment of the Salt Lake City Segment of the Wasatch Front Fault Zone. It is within one-quarter mile of two fault lines that have been active within the last 15,000 years. [22] The reoccurrence interval for a greater than magnitude 6.75 earthquake on any one of eleven major fault segments, including the Salt Lake City Segment, is between 1,100 and 1,300 years, and the combined probability of a 6.5 magnitude earthquake occurring on one of the eleven Wasatch Front segments is 43 percent in the next 50 years.[23] The facility is located in an area were ground shaking accelerations during an expected 7.0 magnitude are predicted to be between 0.9 and 1.0 horizontal G-force with a Modified Mercalli Intensity of IX.[24] MMI IX ground shaking is described as: "Violent shaking: Considerable damage in specially designed structures; well-

---

[20] Hooten, LeRoy, Jr., Director, SLC Dept. of Public Utilities (deceased). 1986. Salt Lake City's First Water Supply. Salt Lake City, Utah at 30-31 (url: http://www.slcdocs.com/utilities/pdf%20files/story.pdf); Salt Lake Telegram. (1951, Dec 27). Water Posers No Nearer S.L. Solution. Salt Lake Telegram. Salt Lake City, Utah (url: http://digitalnewspapers.org); Salt Lake Telegram. (1952, Jan 5). Plan to Purify Water Wins Salt Lake Approval. Salt Lake Telegram. Salt Lake City, Utah (url: http://digitalnewspapers.org).

[21] Personius, S. F. and Scott, W.E. (2009, 2d). Surficial geologic map of the Salt Lake City Segment and parts of adjacent segments of the Wasatch fault zone, Davis, Salt Lake, and Utah Counties. U.S.G.S. Map I-2106. Salt Lake City, Utah. (url: https://pubs.er.usgs.gov/publication/i2106); Van Horn, R. and Crittenden, Jr., M. D. (1987). Map showing surficial units and bedrock geology of the Fort Douglas Quadrangle and parts of the Mountain Dell and Salt Lake City North quadrangles, Davis, Salt Lake, and Morgan counties, Utah. U.S.G.S. Map I-1762. Salt Lake City, Utah. (url: http://pubs.er.usgs.gov/publication/i1762).

[22] 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: https://geology.utah/hazards/earthquakes-faults/ground-shaking/);

[23] Wong, I., Lund, W., DuRoss, C., Thomas, P., Arabasz, W., Crone, A., … Bowman, S. Earthquake Probabilities for the Wasatch Front Region in Utah, Idaho, and Wyoming, Miscellaneous Publication 1–418 (2016). Salt Lake City, Utah: Utah Geological Survey. (url: https://ussc.utah.gov/pages/view.php?ref=1283).

[24] Wong 2002.

designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse" (*id*). Horizontal displacements are predicted to be between 0.3 and 1.0 meters.[25]

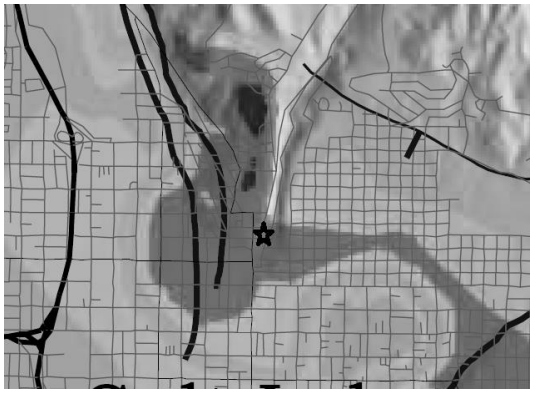


Figure 2 – Excerpt - Ground Shaking Map from Wong 2002. Notes: The proposed DPU facility is marked with a star in an MMI IX predicted shaking region. The faults to the immediate west are extensions of the Warm Springs Fault and have been active in the last 15, 000 years.

The proposed facility is located at the mouth of a 12 mile-long City Creek Canyon that rises to between 7,000 and 9,000 feet above the City at 4,300 feet above MSL. The canyon is subject to morning down-canyon katabatic winds that blow across the Well and into the populated Central Business District. Due to the canyon's unique geographic relationship to the Great Salt Lake, the canyon is also subject to afternoon "anti-winds" in which the wind also blows down-canyon, instead of the normal afternoon anabatic up-canyon direction.[26]

In April and October of each year, the Church of Jesus Christ of Latter Days Saints hold their general conference, and during that conference 26,000 members congregate in the Church's Conference Hall located approximately 2 and one-half blocks (one-third of a mile) from the mouth of City Creek Canyon and the Well. Your Applicant has observed over repeated years that even with City Police providing one-way out-bound traffic flow at the end of a conference session, it takes more than one-half hour to empty the Conference Center of 26,000 persons. Quick evacuation of the Center is impractical.

The neighborhood in which the chlorination facility is proposed to be located is the Memory Grove Area of the Greater Avenues neighborhood. It is in a historic regulated district. A key positive characteristic of these areas is a night they are very quiet. Your Applicant who lives in the Greater Avenues neighborhood about 1.25 miles from the Well has measured night time

---

[25] 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).

[26] Steenburgh, W. J. (2016, April 6). The City Creek Antiwind (Web). Salt Lake City, Utah. Wasatch Weather Weenies (Blog) (url: http://wasatchweatherweenies.blogspot.com/2016/04/the-city-creek-canyon-anti-wind.html). Dr. Steenburgh is the head of the Meteorology Department at the University of Utah.

noise on many occasions using a smart phone application.[27] Early morning nighttime noise levels in this urban environment are between 10db to 20db. Similar noise conditions prevail during the early morning at the Well in the Memory Grove neighborhood. 10db is equivalent to the sound of breathing; 20db is equivalent to the sound of leaves rustling.[28] 40db is considered the lower limit of urban ambient sound (*id*).

An initial meeting for public comment on the proposed Well chlorination facility was held in August 2018.[29] There is one nearby, permitted downstream well, not owned by the City, operated by the Church of Jesus Christ of Latter Day Saints, at their World Office Headquarters within one-quarter mile of the Well.[30] An initial DPU analysis done after the August meeting acknowledged that due to the nature of the proposed site, it was impractical to install security fencing normally required to prevent theft, vandalism or terrorist attacks on the chemical facility:

> Typically, culinary well buildings are completely enclosed with fencing to reduce the threat from potential vandalism, theft, and terrorism. The limited space available significantly prevents the ability to properly secure the location.[31]

The Bowen Memorandum also recognized the infeasibility of erecting security fencing at the site:

> Fencing to restrict access to the well site is normally recommended to prevent vandalism or other unauthorized access. Due to the location of the well and the minimal existing set-backs, fencing does not appear to be feasible (Bowen Memo. at 3).

The proposed design will use sodium hypochlorite liquid batch processing (CAS 7775-09-9 or CAS 7681-52-9) for disinfecting water.[32]

With respect to noise, the August 2018 Memorandum recites the County noise standard of "limited to no more than 5 dB above ambient sound, not to exceed 50 dB between 10:00 PM and 7:00 AM" (at 3). The August analysis then goes on to adopt an inaccurate maximum summer ambient sound level as the baseline of: "similar [to] residential A/C units outside homes in the neighborhood" (*id*). A residential A/C emits 60db of sound at 100 ft.[33] Your applicant agrees that ambient sound levels at the site are higher during the peak summer heating months, but the DPU analysis misstates

---

[27] Physics Toolbox Suite (url: https://play.google.com/store/apps/details?id=com.chrystianvieyra.physicstoolboxsuite&hl=en).

[28] Purdue Chemistry Dept. 2000. Noise Sources and Their Effects. Web. (url: https://www.chem.purdue.edu/chemsafety/Training/PPETrain/dblevels.htm).

[29] August 2018 Comments; Bowen Memorandum.

[30] August 2018 Comments at 1.

[31] August 2018 Comment at 4.

[32] Bowen Memo. at 2 ("Due to the City's desire, all three alternatives . . . include a batch liquid chlorine storage and dosing system.").

[33] Purdue, ftn. 28.

that for the other eight months of the year, ambient noise levels are much lower. The proposed facility will exceed ambient nighttime baseline noise by more than 5db for most of the year.

After initial community opposition[34] and a second December 2018 open house, a consulting water engineer was retained.[35] The Well chlorination facility was redesigned with a smaller footprint.[36] No agency reports or documents indicate that the facility is designed to withstand a reasonably expected magnitude 6.75 earthquake.

DPU Architectural Renderings of the exterior of the current design of the facility show that it has typical large metal garage door facing the street and no surrounding security fencing. The metal garage door is the building access through which sodium hypochlorite will be unloaded. This door can be easily breached:

Figure 3 - Excerpt from DPU Architectural Rendering showing garage door for hypochlorite delivery at north west building corner (image left) at night. May 9, 2019.

[34] Semerad, T. May 7, 2019. The fight over pump house pits needs of Salt Lake City's thirsty downtown against a quiet neighborhood in Memory Grove. The Salt Lake City Tribune. (url: https://www.sltrib.com/news/2019/04/30/residents-mouth-memory/).

[35] HAL Report.

[36] Architectural Renderings in "Design Elements" at Salt Lake City Department of Public Utilities, 4th Avenue Well Project Website (url: https://www.slc.gov/utilities/fourth-avenue-well-project/); Salt Lake City Department of Public Utilities, Architectural Rendering dated May 9, 2019 (handout at May 9, 2019 open house, copy in Applicant's possession) (hereafter the "Architectural Renderings").

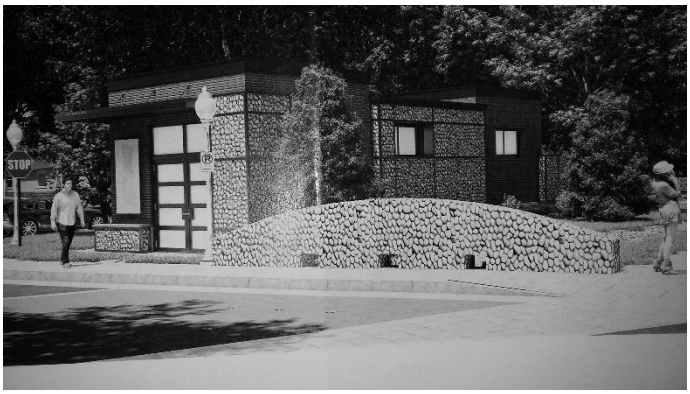


Figure 4 - Excerpt from DPU Architectural Rendering showing daytime view from south east. May 9, 2019.

On May 9, 2019, a third open house was held. The focus of this third public open house was the HAL Report. Exterior architectural Renderings were provided but no information was provided in the internal water treatment facilities. Consulting Professional Engineer David E. Hansen concluded on cost grounds that relocation of the Well facility by extending a transmission line (as suggested by your Applicant) was not optimal from a cost perspective:

> It has been suggested by some local residents that the chlorine facility be moved to another location. To move the chlorine facility off-site a full-size transmission line would need to be extended to the off-site facility where the chlorine would be injected, then tied back into the distribution system. This increases capital cost for the pipeline and secondary facility as well as operation and maintenance on two separate facilities. *It is clear based on the Pro's and Con's listed later in this report that such a move is not optimal.* . . . The estimated cost for this option is $2,688,000 (*id* at 5, emphasis added).

Under another rejected alternative, the HAL Report estimated the cost of moving the "chlorine facility to a new building at a location yet to be determined" at $3,632,000 (*id*. at 6) or complete abandonment of the Well at $ 5,463,256.00 (*id*. at 15).

These key conclusion of the HAL Report are summarized in a table at page 15 titled "4th Avenue Preliminary Well Cost Estimates". The key four options are summarized as follows:

Table 1 - Summary of HAL Report Cost Options

Option	Description	Agency Internal Cost (millions USD)
2b	Rehabilitate Well with new well house and on-site chlorination	2.7
2c	Rehabilitate Well with new well house and off-site chlorination in nearby park	3.3
2d	Rehabilitate Well with new well house and off-site chlorination at undetermined new site	3.6
3	Drill new well and build chlorination facility at new undetermined location	5.5

DPU considers Option 2b as the best lowest-cost option based principally on minimizing agency internal costs.

The reasonably foreseeable external social costs of the facility includes declines in property values given that a nighttime 60db chemical facility will be located nearby to homes. As contended in Point III, below, the facility is a likely target for a terrorist attack. These factors can potentially reduce real estate values, and are external social-economic costs are not considered in the DPU consulting expert analysis. A first-order estimate of the reduced property value external cost is as follows: Reviewing Google Maps, there are approximately 20 single family homes within 300 feet of the Well, two apartment buildings and some the 4th Avenue facing Terrace Falls Condominiums. In May, a Coldwell real estate broker reported average home sale price in the 84103 zip code, in which the Memory Grove neighborhood is located, during April 15 to May 15 at about 612,000 USD over 37 sales.[37] An online source, Neighborhood Scout.com, reports for a median sale price for a narrower 1st-A Street neighborhood, which includes Memory Grove, at about 350,000 USD.[38] Condominiums at the nearby Canyon Road Towers condominium are asking $300,000.

Using a working assumption of 20 homes valued at 500,000 USD each and 8 condominiums at 300,000 USD each (for a total value of 12.4 million) USD, the external social cost by percent point decline in price can be estimated in USD: -1%: 124,000; -2%-248,000, -5%-600,000, -8%-992,000. Although speculative, considering such external costs are useful for making judgment calls about which option will minimize total (agency internal and community external costs). Table 2 adjusts Table 1 for property value losses using the 8% decline property estimate:

[37] Nextdoor Neighbor Post, May 18, 2019.

[38] url: https://www.neighborhoodscout.com/ut/salt-lake-city/a-st .

Table 2 – HAL Options Adjusted for Property Value External Cost

Option	Description	Internal Agency Cost (USD M)	External property value cost (USD M)	Total social costs (USD Millions)
2b	Rehabilitate Well with new well house and on-site chlorination	2.7	1.0	3.7
2c	Rehabilitate Well with new well house and off-site chlorination in nearby park	3.3	0.0	3.3
2d	Rehabilitate Well with new well house and off-site chlorination at undetermined new site	3.6	0.0	3.6
3	Drill new well and build chlorination facility at new undetermined location	5.5	0.0	5.5

Table 2 is not adjusted for the expected cost of the concept, rare probability terrorist attack discussed in Point III. That further adjustment to Table 2 is discussed further in Point V, below.

On June 14, 2019, the DPU plans to seek approval of the redesigned facility from a historic district commission within which the proposed Well facility is located.[39]

II. THE DPU FAILED TO CONSIDER FEDERAL CHEMICAL FACILITY ANTI-TERRORISM STANDARDS IN THEIR ANALYSES OF THE PROPOSED FACILITY.

During the May 9, 2019 open house, your Applicant discussed the redesigned facility with Engineer Hansen, with a DPU system-wide water quality engineer and the DPU Project Construction Manager. Engineer Hansen was unaware of the requirement to design the facility, including site selection, to be resistant to terrorist attacks under 6 C.F.R. Part 27.[40] He did not consider the cost of a potential terrorist attack on the proposed chemical facility when concluding that an alternative site with an extended transmission line was not optimal[41] or when considering the total cost of the four alternative redesign scenarios.[42]

Your Applicant similarly found that the DPU's water process engineer and the Project Construction Manger were unaware of anti-terrorist design requirements imposed by 6 C.F.R. Part 27. Engineer Hansen, the Project Manager and the DPU water process engineer did not know whether the DPU had submitted the proposed design to the Secretary of DHS pursuant Part 27. Holly Mullen, Communications and Engagement Manager, speculated in response to your Applicant's inquiry that since the project was only thirty percent into the design phase, perhaps it was too early for the design to have been submitted to DHS. However, the August 2018

[39] Applicant's recollection of public official statements at May 9, 2018 open house.

[40] Fisher, paraphrasing Hansen: "In the 20 years that I [Hansen] have been doing these wells, no one has ever commented that security issues were a concern."

[41] Applicant recollection of May 9, 2019 meeting.

[42] HAL Report, Summary Table at 15.

Memorandum and the Bowen Memorandum, *quoted above* at page 7, indicates DPU awareness of the federal antiterrorist resilience design constraint.

In response to your Applicant's inquiries at the May 9 open house, Engineer Hansen, the Project Manager and the DPU water process engineer did not know the form of chlorine – liquid or dry sodium hypochlorite – to be delivered to the completed project or the volume of each delivery or the volumes involved. This was also attributed to the project being in an early design phase.[43] (Although liquid sodium hypochlorite is mentioned in the Bowen Memo., *supra*, this could be delivered in a dry form and then hydrated.) Your Applicant, who is not an expert in these matters, understands that sodium hypochlorite is delivered to water treatment plants in one of two forms: a liquid bleach of densities between 10 and 30 percent in volumes between 1,000 to 5,000 gallons or as a concentrated solid in batches of about 400 to 900 pounds. The Project Manger stated that deliveries of sodium hypochlorite would occur once each week.

The significance of liquid verses dry hypochlorite is the relative concentration and reactivity of the compound during a hypothetical, but plausible, terrorist attack, is discussed in the following point.

III. THE PROPOSED WELL CHLORINATION FACILITY PRESENTS A HIGH RISK OF SIGNIFICANT ADVERSE CONSEQUENCES FOR HUMAN LIFE OR HEALTH, NATIONAL SECURITY, AND-OR CRITICAL ECONOMIC ASSETS, IF THE STRUCTURE IS SUBJECTED TO A REASONABLY PLAUSIBLE TERRORIST ATTACK.

As currently proposed, the Well reasonably could be subjected to a plausible terrorist attack. In a working conceptual attack, a would-be domestic terrorist would load a small truck with 500 to 800 gallons of ordinary household cleaning vinegar (acetic acid) costing about 3.60 USD per gallon. This would be supplemented with 100 gallons of industrial strength cleaning ammonia costing 55 USD per gallon that is available at any janitorial supply house. The truck would then be backed up to the delivery door, the door would be breached, and a small high explosive charge would be detonated into order breach the hypochlorite holding tank and plastic gallon containers, causing the chemicals to mix.

It is common knowledge that mixing acetic acid and sodium hypochlorite (liquid bleach) creates toxic chlorine gas. Similarly, in the United States there are approximately 4,400,000 janitors and custodians.[44] Those occupations are routinely trained not to mix ammonia and bleach: mixing ammonia and liquid bleach (sodium hypochlorite) creates an explosive gas mixture containing chlorine and chloramine.[45] Chloramine gas is much more toxic than chlorine gas.

---

[43] Oral comment by DPU Communications Manager Holly Mullen to Applicant, May 9, 2019.

[44] Bureau of Labor Statistics. 2019. May 2018 National Occupational Employment and Wage Estimates United States (url: https://www.bls.gov/oes/current/oes_nat.htm).

[45] Science ABCs. 2018. What Happens When You Mix Ammonia and Bleach? Web. (url: https://www.scienceabc.com/pure-sciences/what-happens-when-you-mix-bleach-and-ammonia.html). A disturbing Youtube video posted by irresponsible teenagers shows what

It is reasonable to assume that several hundred janitors and custodians of those 4.4 million persons are members of white supremacist or other domestic terrorist groups. This type of conceptual terrorist attack – using an existing sodium hypochlorite facility as one component of a binary chlorine-chloramine chemical weapon is not a new idea. It is well within the ability of members of domestic terrorist groups who do not have a high-school education to conceive and execute. Your Applicant has omitted chemical molar and reagent volume computations that might lend additional credibility to this concept attack. Those computations are within the skill level of any high school level chemistry class student.

IV. FEDERAL JURISDICTION: IT IS UNCLEAR WHETHER THE PROPOSED WELL FACILITY IS A PRESUMPTIVE HIGH RISK FACILITY. NONETHELESS, THE SECRETARY HAS DISCRETIONARY AUTHORITY OVER THIS MATTER.

Based on the foregoing, the proposed Well chemical treatment facility should be classified as a high risk facility. It is unclear whether the facility has a DHS presumptive high risk facility status.[46] Whether a chemical facility is presumptively high risk depends on whether specific chemicals listed in Appendix A of 6 C.F.R. Part 27 are used at a facility in volumes above specified levels and concentrations. Appendix A refers to "sodium chlorite" and not to "sodium hypochlorite." Appendix A also applies byproducts of industrial processes including "chlorine". As noted above, at the May 9 public information meeting, a DPU representative indicated that the project was in an early design phase, and therefore whether the facility is presumptively high risk cannot be determined with certainty based on currently available information. Nonetheless, DHS Secretary McAleenan or his delegates have the discretionary authority to declare the Well project a high risk facility pursuant to 6 C.F.R. § 27.205(a).

Based on the facts as described above, the Well project should be declared a high risk chemical facility.

V. WHETHER A REVIEWER BELIEVES THAT HAL REPORT DESIGN OPTION 2B IS OPTIMAL DEPENDS ON ONE'S PERCEPTION OF THE EXPECTED PRESENT VALUE OF THE COSTS OF A RARE AND UNLIKELY FUTURE TERRORIST ATTACK.

No United States drinking water chlorination facility has been subjected to the conceptual terrorist attack described in Point III. Legitimate use of sodium hypochlorite in industrial settings is safe if used with appropriate training. The CDC's National Toxic Substance Incidents Program

---

happens when ammonia and solid sodium hypochlorite (pool disinfectant) are mixed (url: https://youtu.be/56hxLYWIKfs).

[46] 6 C.F.R. § 27.203 (c)(1) (April 9, 2007).

data for 2013-2014 reports 26 hypochlorite incidents.[47] The CDC reports 24 illegal chemical bomb incidents between 1996 and 2003 – all minor - mostly involving teenagers.[48]

Terrorist acts are qualitatively different. Anti-terrorist protection planning should be based on Bayesian probability analysis of extremely remote events. Such analysis in turn informs the boundaries of our reasonable estimation of the present value of a future unlikely terrorist attack on the DPU's proposed Well design. The expected value of a future unlikely events informs decision making on the efficient allocation of public funds.

The lesson of the 9-11 terrorist attack, implemented using box cutters and airliners by relatively uneducated individuals, taught United States citizens an important lesson: it is necessary to anticipate and to spend public monies to make critical infrastructure facilities resistant to remotely probable, but reasonably plausible terrorist attacks. Some may consider the conceptual attack described in the preceding points to be an outlandish, speculative scenario that will never occur. Again, in the United States no such attack has occurred. In this view, it would a waste of public monies to, for example, spend public funds to guard against an unlikely chemical attack on the proposed Well. In part Congress has resolved this dilemma: In 2006, Congress empowered the Secretary of the Department of Homeland Security to "reduce the vulnerability of the United States to terrorism"[49] and pursuant to that authority the Secretary adopted 6 C.F.R Part 27 that requires the hardening of critical public water facilities that use large volumes of toxic chemicals.

How should we evaluate the likelihood that extremely rare, remotely probable events might occur? The answer is Bayesian analysis: a probability process by which our present understanding of the likelihood of rare events occurring is continuously updated with our prior understanding of those events. The 9-11 attacks are illustrative. Prior to 9-11 terrorist attack, two airplanes had crashed into Manhattan's Empire Building and both where accidental. A B-25 bomber struck the building in 1947 and later a small airplane hit the building. Given the millions of airliner flights over Manhattan between 1947 and 2001, a reasonable estimate in the spring of 2001 of the probability that an airliner would be intentionally flown into a skyscraper was 1 in millions. After 9-11 as a culture, we updated our prior estimation of the risk. Statistician Nate Silver of 538.com fame mathematically estimated our updated, current probability estimate of someone intentionally flying an airliner into a skyscraper to 99.99%.[50]

It is the bias of our past experience that make conceptually, simple and obvious terrorist attacks such as the hypothetical attack described in Point III seem unlikely. Now that a simple, conceptual attack has been described to the reader, have you updated your probability estimate of

---

[47] CDC. 2019. NTIS Report and Data. (url: https://www.atsdr.cdc.gov/ntsip/reports.html, file NTSIP_Public_Use_Data_2013.xlsx).

[48] CDC. July 18, 2003. Homemade Chemical Bomb Events and Resulting Injuries --- Selected States, January 1996--March 2003. MMWR. 52(28):662-664. (url: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5228a3.htm).

[49] 6 U.S.C. § 111(b)(1) (2006), Pub. L. 109–295, sec. 550.

[50] Silver, Nate. 2012. The Signal and Noise. Penguin Press at 247-248.

such a domestic terrorist attack on the DPU's proposed well design over the next 25 years to 1-in-millions to 1-in-three or 1-in-four? This is Bayesian statistical reasoning in action.

Whether one believes that public monies should be expended to guard against rare, unlikely terrorist attack scenarios depends on who the present expected value of such a future attack is quantified. There is no guidance for such estimates in the instant matter other than personal judgment, supplemented by expert advice. For example, you may reasonably feel that the future damages of the concept terrorist attack on the DPU proposed facility are 100 million USD with a 1 percent change of occurrence in the next 25 years. The present expected value of such an attack could reasonably be estimate at 1 million USD. An equally reasonable argument could be made that the present expected value at an occurrence probability of 1-in-10,000 is less than 1,000 USD. Others might reasonably argue the present expected value is zero dollars. The point of such thought exercises is that is provides a language to discuss and quantify the risk of a rare, unlikely terrorist attack scenario.

For example, assuming for discussion purposes, the present expected value of the concept scenario described in Point III is 1 million USD. Then the total social costs of proposed DPU chemical treatment facility, adjusted from Table 2, are:

Table 3 – HAL Options Adjusted for Property Value and Terrorist Attack External Costs

Option	Description	Internal Agency Cost (USD M)	External property value cost (USD M)	External terrorist attack present value (USD M)	Total social costs (USD Millions)
2b	Rehabilitate Well with new well house and on-site chlorination	2.7	1.0	1.0	4.7
2c	Rehabilitate Well with new well house and off-site chlorination in nearby park	3.3	0.0	0.0	3.3
2d	Rehabilitate Well with new well house and off-site chlorination at undetermined new site	3.6	0.0	0.0	3.6
3	Drill new well and build chlorination facility at new undetermined location	5.5	0.0	0.0	5.5

If you reasonably believe as in Table 1, above at page 10, that the present expected value of a future terrorist attack on the proposed Well is zero dollars, then Option 2b minimizes total project cost. If you reasonably believe that the present expected value of a future terrorist attack is 1 million USD, then Option 2d minimizes total internal and external project costs.

Such decision-making regarding rare events has previously guided other DPU expenditures. As noted above, it has long been known that the probability of a magnitude 6.75 or greater earthquake on the Salt Lake City Segment of Wasatch Front Fault Zone is 1 every 1,100 years and the combined probability on one of the 11 segments of the Fault Zone is 43% in the next fifty years. In 1999, the DPU began a multi-million program to seismically harden all of its

water treatment plants[51] against this low probability event. The City's primary historical water supply dams in Big Cottonwood and Little Cottonwood, for which the City paid millions in the 1920s, where decommissioned during the 2000s out of fear of failure during an earthquake. The Metropolitan Water District of Salt Lake and Sandy, of which the City is the leading member, recently completed a multi-million dollar replacement with seismic upgrades to the Terminal Reservoir near 3300 South and I-215.[52] That rare, unlikely events guide DPU decision-making is nothing new.

VI. THE PROPOSED WELL CONTROVERSY PRESENTS AN OPPORTUNITY TO SEEK SUPPLEMENTAL PRIVATE AND-OR PUBLIC FUNDING TO FINANCE THE DIFFERENCE BETWEEN THE OPTION 2B DESIGN THAT THE DPU IS WILLING TO PAY AND A MORE ANTI-TERRORIST RELISENT CHEMICAL PLANT DESIGN AT ANOTHER LOCATION.

The stasis of the controversy between DPU and City residents is "Who will pay for the 1 to 2 million USD difference between the agency's preferred Option 2b and a more terrorist resistant chemical treatment at a non-residential location?" The DPU is unwilling to pay the additional expense from its 122 million USD annual operating revenues.[53]

One solution is to seek supplemental revenues. The DPU, the City, and citizens could approach the L.D.S. Church for donation of land and-or monies at the 61 East North Temple parking lot to host a terrorist hardened chemical treatment facility consistent with Option 6, above.

The DPU, the City, and citizens could approach Utah's federal congressional delegation for a federal appropriation to harden the proposed Well facility against a terrorist attack. The availability of grants or loans from DHS is unclear.

Alternatively, citizens can lobby the DPU's Advisory Committee to convince the Department to pay the incremental cost of terrorist security from rate increases.[54]

---

[51] Salt Lake City Corporation. (1999b, May 25). Wasatch Front Earthquake Preparedness. Salt Lake City, Utah. (url: http://www.slcdocs.com/utilities/NewsEvents/news1999/news5251999.htm).

[52] MWDSL&S. 2019. Terminal Reservoir Project. Web. (url: http://www.mwdsls.org/terminalresproject.html).

[53] Salt Lake City Department of Public Utilities. 2019. 2018 Annual Report (url: http://www.slcdocs.com/utilities/PDF%20Files/Annual%20Reports/Annual%20PU%202018.pdf).

[54] The members of Advisory Committee of the Salt Lake City Department of Public Utilities are Kent Moore, Sydney Fonnesbeck, Tom Godfrey, Colleen Kuhn, Ted Wilson, Lynn Hemingway, Roger L. Player, and Ted Boyer. DPU. 2019. Public Utilities Advisory Committee. (Web) (url: https://www.slc.gov/boards/boards-commissions/public-utilities-advisory-committee/).

VII. STANDING

Your Applicant has lived in the Greater Avenues Neighborhood about 1.25 miles from the Well for approximately 20 years. I travel on roads within 600 feet of the Well one to three times each day, principally along Third Avenue. I have exercised in City Creek Canyon above Bonneville Drive, about 1.25 miles north of the Well, two to five times per week for the last eight years. I am the author of 2018 book concerning, in part, Salt Lake City residents' one-hundred and twenty year opposition to the development of City Creek Canyon titled "The Natural History of a City Creek Canyon Year."[55]

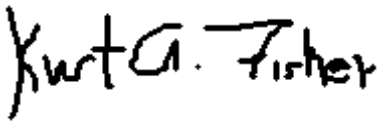
VIII. CONCLUSION

The DPU proposed Well chemical facility design is too vulnerable to a simple, conceptual terrorist attack. The proposed design does not comply with anti-terrorist resistant design principles of 6 C.F.R. Part 27. The DHS Secretary or his delegates should, based on the facts as described above, declare the proposed Well project a high risk chemical facility.

The DPU should defer action on this matter until its obligations to design an antiterrorist resistant chemical treatment facility are better defined. The temporary pause in the project's schedule could be used to search for alternative, supplemental private or public funding to fill the financing gap between the 2.7M USD that the agency is willing to pay and the 3.6M USD for a more terrorist resistant structure built at a more appropriate non-residential location.

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

Kaf

[55] Fisher, K. A. 2018. The Natural History of City Creek Canyon Year (url: https://www.amazon.com/Natural-History-City-Creek-Canyon-ebook/dp/B079RY7CTD).