KURT ALLEN FISHER
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May 28, 2019

VIA EMAIL: council.comments@slcgov.com

Salt Lake City Council
SALT LAKE CITY CORPORATION
451 South State Street, Room 326
Salt Lake City, Utah 84111

Re: Comment in Opposition by Kurt A. Fisher on 4th Avenue Chemical Treatment Plant Allocation (the "Well")[1] in Department of Public Utilities ("DPU") 2019-2020 Budget Request at approximately 200 North Canyon Road, Salt Lake City, Utah
DPU Detailed Project 5132268-2015-0213[2]

Sirs:

Salt Lake City Department of Public Utilities ("DPU") proposed Well at approximately 200 North Canyon Road in Salt Lake City should be moved to the May 9 open house Option 2c site[3] in the park at State and Canyon Road (Tribune 4-30-2019) in a redesigned anti-terrorist and earthquake hardened structure. At the June 4 budget hearing the Salt Lake City Council should defer all or part of $1.5 million in the DPU Reservoir Project 51-01301-2730.06 (about 0.8 percent of the agency's 239 million 2019-2020 budget) to the 4th Avenue Well, Project 5132268-2015-0213 in order fund the move and redesign. Alternatively, the Council should raise DPU rates by 8 mills (about $3 dollars per year or about less than a penny a day for each its 350,000+ customers) to raise the needed funds. At a minimum, Council should condition Project 5132268-2015-0213 authority with a fiscal note that the facility must be moved and relocated from its current site. Funds should be used for the 200 North Canyon Road proposed site.

The grounds for this request is that he DPU's May 9 concept design is a danger to the community and to first responders.

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[1] 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).

[2] Department of Public Utilities 2019-2020 Line Detail Budget, April 28, 2019 (urls https://stories.opengov.com/saltlakecity/published/MSDLeN3_f and File: Attachment 1 - draft Proposed Public Utilities FY2019-20 Budget.pdf at page 33, Attachment "F" hereto.

[3] 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).

The Chemical Treatment Plant is proposed to be constructed in the geologic streambed of City Creek Canyon, at grade, and below the level of known prior floodwaters.

The DPU proposes to build the chlorine chemical treatment plant at level of the existing grade in the geologic streambed of City Creek Canyon. The site was underwater during the 1983 high-snowpack runoff of flooding with a peak flow of 331 cubic feet per second. The structure is vulnerable to foundation undermining, structural failure, chemical release and-or a toxic chlorine gas release from a 2,400 cubic feet per second cloudburst flood. In 1945, a cloudburst flood of that size that can down Perry's Hollow and "M" and "N" streets in 1945 and moved 300 lb boulders, grave headstones and eight cars from the cemetery to South Temple (Salt Lake Telegram August 20, 1945). City Creek is at risk of a similar catastrophic cloudburst flood that destroyed downtown Farmington in 1923. During such a cloudburst flood, residents and first responders also will be at risk for electrocution from the ground-level high-voltage, high-power transformers proposed for the north end of the chemical treatment plant. A cloudburst type flood of 2,400 cubic feet per second is beyond the design abilities of existing flood control measures implemented in the canyon after 1983.

If constructed at the proposed site, the chemical plant is at risk for structural failure from ground liquefaction during an anticipate 6.75 or greater magnitude earthquake.

The soils on which the plant is proposed to be built are susceptible to ground liquefaction and horizontal ground movements of 0.3 to 1 meters during the Wasatch Front's expected to greater than 6.75 magnitude earthquake. The chemical plant's foundation or the outflow connections to its chlorine storage tank could fail during such an earthquake resulting in residents and first responders having to cope with both a 500 to 900 gallon chlorine spill and-or toxic chlorine gas release as they dig their neighbors out from underneath their homes.

The proposed chemical attack is susceptible to a terrorist attack.

Finally, the concept chemical plant design is susceptible to a simple terrorist attack. A would-be terrorist could simply fill a van with several hundred gallons of chemicals easily purchased at a supermarket and janitorial supply stores – household vinegar and concentrated ammonia cleaner. Breaching the chemical plant door and then setting off a hand-grenade sized explosive charge would mix the chemical with the liquid chlorine stored in the structure and release a sizeable cloud of chlorine and chloramine gas. City Creek Canyon's winds would then blow the resulting cloud across the Church Office building and into the central business district that is populated with 48,000 to 70,000 daily residents and visitors.

Supporting backmatter

I have written several comments on the 4th Avenue Chemical Plant that provide back matter for the claims made in this letter in opposition. Those comments are attached as supporting matter.

Rebuttal to DPU Lack-of-Funding Argument

I anticipate that the DPU will claim lack of funds to move the proposed chemical plant. The DPU could move at the Salt Lake City Council the June 4 budget hearing to defer all or part of 1.5 million USD in DPU Reservoir Project 51-01301-2730.06 (about 0.8 percent of the agency's 239 million USD 2019-2020 budget) to the 4th Avenue Well, Project 5132268-2015-0213 in order fund the move and redesign. Alternatively, DPU could apply to the Council to

raise DPU rates by 8 mills (about $3 dollars per year or about less than a penny a day for each its 350,000+ customers for one year) to raise the needed funds.

Conclusion

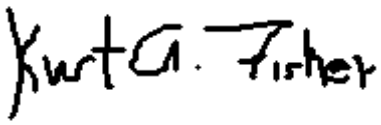
The stasis of this matter is whether the DPU should expend an additional 1 to 1.5 million in public funds to move the proposed chemical treatment plant about 400 feet to a nearby park. This justification for such a move and redesign is that as proposed, the treatment plant is a danger to the community and inconsistent with the neighborhood's historic character. A redesigned facility that provides adequate flood, earthquake, and terrorist resilience would obviously need to be larger and inconsistent with preserving the historic character of the design at the 200 North Canyon Road and 4th Avenue location.

The stasis of this matter *does not* involve balancing the water needs of the downtown which is projected to grow by another 25,000 persons in high-density housing and hotels against a backward-looking home owners. By moving and redesigning the chemical plant both the water needs of the City and the goals of neighborhood for preserving its historic character can be achieved.

If the Council *does not* condition funding on relocation, then the DPU can argue in an upcoming Historic Landmark Commission hearing set on June 6 that it is without funds to effect a move and that the Council has *de facto* approved the 200 North Canyon Road siting. This is not something that can be deferred based on agency representations that it will informally address citizen concerns.

Our able DPU Director Briefer proposes the chemical plant 4th Avenue and Canyon Road out of a desire to conserve public funds. But sometimes engineers get fixated on economic efficiency. That is when citizen oversight, in form of the Council, is most needed. The Council should formally condition the chemical plant's special permit exception request on moving the well to the Option 2c site at the State Street Park in a more flood, earthquake and terrorist resistant design. Please do not approve siting at 200 North Canyon Road. I have proposed a concept schematic, attached, for such a redesigned facility.

Very Truly Yours



Kurt A. Fisher

Attachments

A - Schematic Concept Design by Commenter and the DPU

B - Comment to DPU on Flooding Risk

C - Supplemental Comment to DPU on Earthquake Risk and Liquefaction

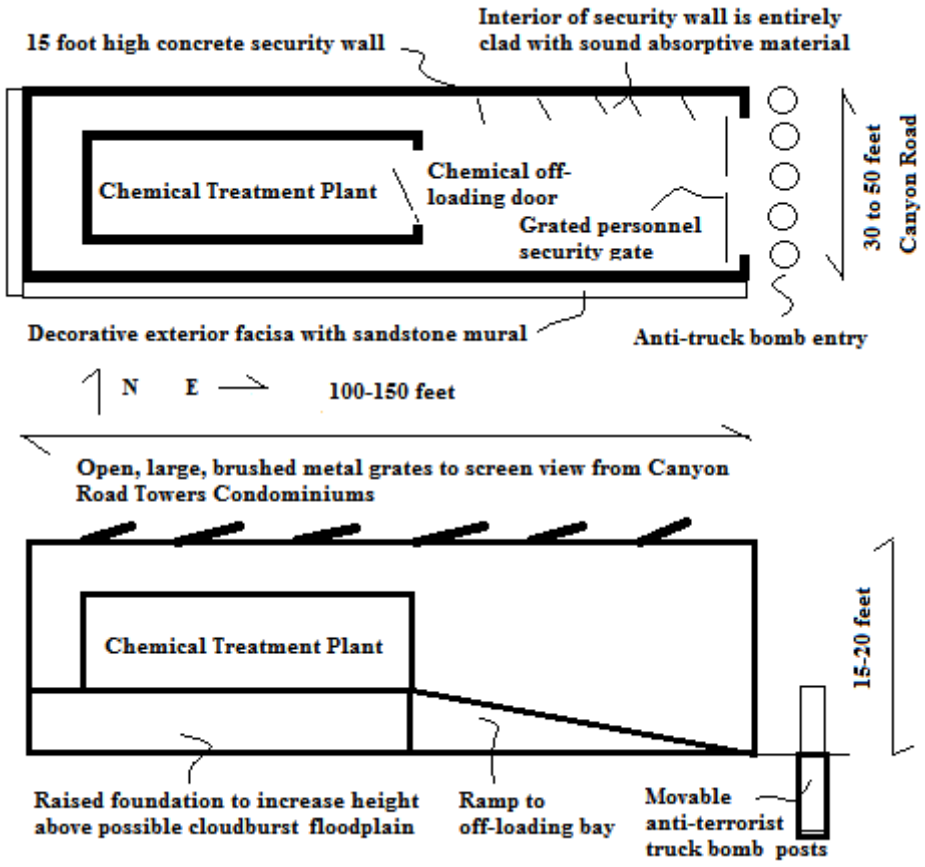
D – Initial Comment on Earthquake Risk

E – Comment on Terrorist Attack Risk

F – Excerpt from DPU Detailed Line Budget

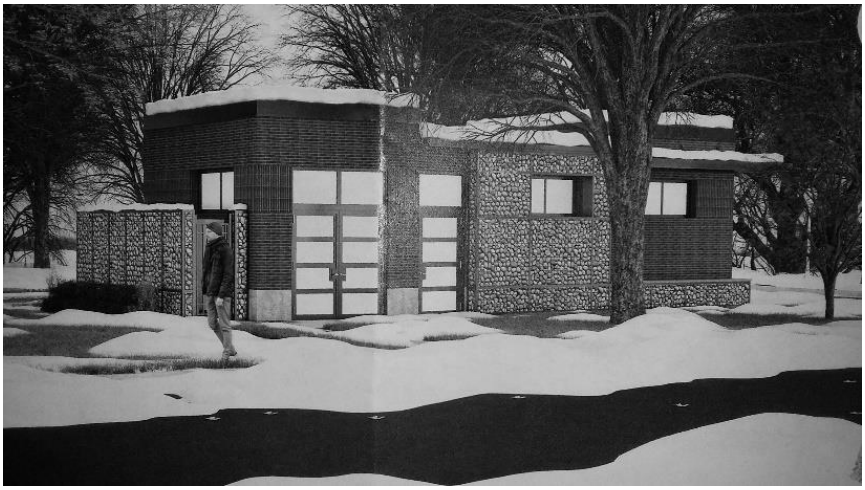
ATTACHMENT A

SCHEMATIC OF PROPOSED FLOOD, EARTHQUAKE, AND TERRORIST RESILIENT DESIGN BY COMMENTER



Not shown: Removable stone windows for fire-fighting.

DPU MAY 9, 2019 CONCEPT RENDERING



ATTACHMENT B

KURT ALLEN FISHER
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May 25, 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

Re: Comment by Kurt A. Fisher ("Applicant") on Proposed 4th Avenue Well Chlorination Project at approximately 400 North Canyon Road, Salt Lake City, Utah (the "Well")[1]
Supplemental Comment Regarding Cloudburst Flooding Risks at the Proposed Site

Sirs:

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. This comment provides background on the geotechnical risk that the foundation of the proposed chemical treatment plant structure might be undermined by a rare, catastrophic cloudburst flooding event, resulting in a building collapse.

The DPU proposes to build a water chlorination plant directly in what geologically has been the stream bed of the City Creek Canyon[2] near the mouth of the 12 mile long canyon that rises to 9,000 feet above MSL. There is a significant historical pattern of floods coming out of City Creek Canyon and across the Well site from two types of events: spring runoff from high snow packs and cloudburst flooding. In rare cloudburst flooding events, 3 or 4 inches of rain can fall on the foothills of the Wasatch Front Mountain Range in less than one-half hour. If this rare rain event coincides with another rare event – a recent large brush fire on the foothills overlooking the City. Foothill brush fires transform northern Utah's ancient lakebed soils into non-porous hardpan. In a subsequent heavy rain fall, the resulting flash flood flows can range between 1,000 and 2,500 cubic square feet per second. This far exceeds the design capacity of the existing conduit and control structures in City Creek Canyon of about 331 cubic feet per second.

City Creek repeatedly flooded the downtown business district before 1900, principally due to spring high stream runoff. Downtown flooding occurred in 1852, 1854, 1864 (flooding North Temple), 1866, 1869, 1870, 1873, 1874 (flooding Main Street and South Temple), 1876

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[1] 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).

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

(between 600 East and the Jordan River, lands flooded between several inches to several feet), 1882 (possibly flooding downtown), 1884 (flooding North Temple), 1885 (flooding streets), and 1889 (flooding streets).[3].

In 1907, hundreds died in the infamous Heppner, Oregon cloudburst flood, and then City Engineer Kesley noted the impossibility of guarding the City's center from cloudburst floods emanating from City Creek Canyon:

> A part of the city is located at the mouth of City Creek canyon in such a position that a heavy cloudburst in the canyon would send a wall of water into the city that would cause a heavy loss of probably both life and property. . . . . I understand that cloudbursts in former years have done considerable damage, but nothing of that kind has ever happened while I have been here. A cloudburst of any considerable magnitude would do almost incalculable damage, and I cannot see how it could be avoided. There is no possible way to divert such a stream without an enormous expenditure of money. . . . . A wall of water coming down the canyon, similar to that at Heppner, would sweep everything before It. Residences in the canyon's mouth would fall like card houses and the wave would then sweep down North Temple and State streets.[4]

After Kelsey's caution, flooding also occurred in 1907 (flooding North Temple), 1908 (flooding North Temple) and 1909 (flooding North Temple and requiring construction of five foot emergency embankments).[5]

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[3] Woolley, R. R. (1946). Cloudburst Floods in Utah: 1850-1938. Washington, D.C. at 96-120 (url: http://pubs.er.usgs.gov/publication/wsp994); Honker, A. M. (1999). "Been Grazed Almost to Extinction": The Environment, Human Action, and Utah Flooding, 1900-1940. Utah Historical Quarterly, 76(1), 23–47 (url: http://heritage.utah.gov/history/quarterly); Boyce, R. R. (1958). A historical geography of Salt Lake City, Utah. Thesis. Masters. Department of Geography, University of Utah at 41 re 1876).

[4] Salt Lake Telegram, June 9th, 1903.

[5] Woolley at 96-120, Honker 1999.

Figure 1 - Shipler Commercial Photography. June 2, 1909. Flood at 4th (Fourth) Avenue and Canyon Road. (url: https://collections.lib.utah.edu/ark:/87278/s69c7802). The home shown in the photograph is still standing at approximately 220 North Canyon Road.

In 1910 and in response to this flooding, the City and DPU's predecessor began construction to capture the City Creek stream upstream of the proposed Well into an underground conduit[6] with a design capacity of 120 cubic feet per second squared.

Figure 2 – Entombment of City Creek Canyon Stream circa 1909. U.S. Amy Corp. of Engineers. From Love, ftn 22 *infra*.

[6] Salt Lake Herald, March 21st, 1910.

After construction of this first underground conduit, City Creek again flooded across the proposed Well site and into the downtown in 1912 (flooding South Temple with tons of sand) and in 1918 (silting 200 South with 1 foot of mud).[7]

On August 13th, 1923, Kelsey's 1903 prediction came true in a community to the north of Salt Lake's downtown. An extreme cloudburst event along the Wasatch Front sent torrents down Farmington Canyon, destroyed Farmington City, and killed seven.[8] Salt Lake's downtown also flooded.[9] City Creek again flooded across the proposed Well site and into Salt Lake's downtown also flooded in 1925 (flooding basements), 1931 (12 inches of water in streets), and in 1945 (discussed below).

Cloudburst flooding occurs all along the 200 mile north-south Wasatch Front Range. Destructive cloudburst floods were so frequent and destructive in northern Utah communities that in 1930, the State formed to Utah Flood Commission to conduct a formal investigation.[10] The Flood Commission determined that cloudburst flooding was aggravated by human factors. Excessive grazing, lumbering and lack of fire control in canyon headwaters contributed to the force of floodwaters reaching the valley floors (*id*). In response, the City implemented policies to reduce grazing in City Creek Canyon; its firefighting capabilities improved.

Despite the new practices, in 1945 and at approximately 1.5 miles from the proposed Well site, a classic cloudburst flood came out of Perry's Hollow[11] on the south facing slope of the Salt Lake City Salient. In that flood, a three foot wall of water mixed with 300 pound boulders and grave headstones came through the cemetery and down "M" and "N" Streets.[12] The Salt Lake Telegram reported that 200 to 400 lb. boulders and eight cars were washed down "M" Street.[13] An incredible 2,400 cubic feet per second came out of Perry's Hollow in 1945 (*id*). A separate flood also came down State Street (*id*). Damage to the City was estimated at 300,000 USD in 1945, or about 4 million USD today.

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[7] Woolley at 96-120, Honker 1999.

[8] Honker, 35-36.

[9] Woolley at 96-120, Honker 1999.

[10] Utah Flood Commission. (1931). Torrential floods in Northern Utah, 1930. Logan: Agricultural Experiment Station, Utah State Agricultural College (url:.http://www.lib.utah.edu).

[11] Map - location (url: https://goo.gl/maps/qkv9NkUBMravdkjL9).

[12] Craddock, G. W. (1945). The Salt Lake City Flood, 1945. Proceedings of the Utah Academy of Sciences, Arts and Letters, 23, 51–61; Salt Lake Telegram, August 20 and 27, 1945; *see* Salt Lake Tribune, August 19, 1945.

[13] Salt Lake Telegram, August 20, 1945.

Workers and trucks of Salt Lake City streets department continue work of cleaning mud, trees and huge boulders left in wake of a huge storm which reared into the city from the west Sunday night. Workers here are cleaning at 1st ave. and M st.

Figure 3 - M Street and 1st Avenue after 1954 Perry's Hollow Flood. Salt Lake Telegram, August 20, 1945. The house in the background still exists.

Craddock described causes of the Perry's Hollow flood, citing a historical pattern of overgrazing, grass fires and cloudburst rain:

> Inspection of the flood-producing watersheds revealed the plant cover to be in a seriously deteriorated condition notwithstanding many years of protection from livestock grazing and conscientious attempts to control fires. Three stages of impairment were observed. . . . .
>
> Roughly 10 percent of the watershed - including extensive slopes in the lower portion of the basins and parts of the ridge tops, roads, and mined areas - are virtually devoid of vegetation and litter as a result of grazing abuse in earlier years, old and new mining activity, and both old and recent fires. . . . .
>
> Fully 80 percent of the area, including all but patches of headwater slopes and portions of lower benchlands, was burned last fall. This fire killed many of the native bunchgrasses which had reinvaded the area since its closure to grazing. . . . [14]

Craddock estimated that in 1945, runoff from East and West Valley View Canyons (at the top of North Terrace Drive) did not show any increased runoff because those canyons did not burn. In comparison, to the 2,400 feet per second of flows seen in 1945, the 1983 snowmelt flood of City Creek peaked at 331 cubic feet per second. (In the 1990s, as part of road improvement, the City constructed a flood control dam across lower Perry's Hollow to prevent a reoccurrence.[15])

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[14] Craddock at 58.

[15] Along Chandler Drive; Map (url: https://goo.gl/maps/vvkQW7beNdfABTWu5).

A 1946 U.S.G.S. report by Ralf R. Woolley of the Intermountain Forestry Research Station examined cloudburst flooding in northern Utah from 1850 to 1938.[16] Woolley listed numerous cloudbursts floods that have come across the Avenues District and from City Creek and across the proposed Well site and into the downtown: (Woolley 1946). Summer cloudburst floods included: June 13th, 1854 (city streets flooded), September 11th, 1864 (heavy flooding of North Temple from City Creek), August 25th, 1872 (downtown flooded), July 23rd, 1874 (downtown flooded from City Creek), August 1st, 1874 (Lindsey Gardens areas flooded as in 1945), August 8th, 1884 (North Temple flooded from City Creek), July 26th, 1893 (cloudburst flooded basements in city), July 19th, 1912 (1 inch fell in 1 hour filled South Temple with sand and mud from above), July 25th, 1916 (cloudburst sent a 10 foot wall of water into city along with mud, boulders and cattle), July 30th, 1930 (cloudburst over Emigration, Red Butte, and Parley's Canyons washed out highway north of Salt Lake and washed away three homes with damages of 500,000 USD), and August 13th, 1931 (four to 12 inches of water swept through streets and 12 feet of debris washed over road near Beck Hot Springs).

In April 1952, City Creek again flooded the downtown during high spring runoff.[17]

Catastrophic high-spring run-off again occurred in 1983 with ground failures near the proposed Well site. On May 26th, 1983, City officials proclaimed a flood emergency in Salt Lake City after a winter of heavy snowfall followed by a late season warming.[18] The city pre-ordered 250,000 sandbags (*id*). Sandbagging State Street kept City Creek from flooding underground parking at ZCMI Mall (*id*). On May 28th, 1983, Mayor Ted Wilson learned that rock and tree debris from City Creek Canyon were clogging up the 1910 underground culvert down State Street and a second pipe system along North Temple (*id*). The flood waters swept fallen trees that had accumulated in the 12 miles of City Creek stream bed above Memory Grove Park and down into the lower canyon, about 600 feet north of the proposed Well site (Figure 4).

Figure 4 – Tree debris in Memory Grove Park after flood waters receded. Salt Lake City Tribune, July 22, 1983. "Restoration of Memory Grove will be a joint project."

[16] "Cloudburst Floods in Utah: 1850-1938", *supra*, at ftn. 3.

[17] Salt Lake Tribune, April 30, 1952; Salt Lake Tribune, April 29, 2011 (retrospective article in which Salt Lake Councilperson describes sandbagging efforts to control 1952 flood).

[18] Salt Lake Tribune, April 29, 2011.

The first nearby ground failure associated with the 1983 flood was at the clogged culvert about 400 feet south of the proposed Well site. The underground culvert carrying City Creek burst, and a city worker had to be lowered into the pipe full of swirling flood waters to set dynamite charges and to free the blockage.[19]

Nevertheless, flood waters were so great that the creek also flooded above its entry point

Figure 5 – Flood waters passing Ottinger Hall 300 feet north of proposed Well in June 1983. Source: KUTV News. Remembering the Floods of 1983. Web. Accessed May 2019 (url: https://kutv.com/news/local/gallery/photo-gallery-remembering-the-floods-of-1983#photo-28).

into the underground culvert (Figure 5).

A second ground failure associated with the 1983 flood was a 12 foot deep sinkhole that formed north of the proposed Well site, shown in Figure 6:

[19] Salt Lake Tribune, June 3, 1983.

Figure 6 – Twelve Foot Deep Surface Failure North of Ottinger Hall and 400 feet north of proposed Well site, looking south, June 9, 1983. Salt Tribune. 1983. Spirit of Survival: Utah Floods of 1983.

Figure 7 – Ground failures at Memory Grove entrance during 1983 flood about 600 feet from the proposed Well looking north. SLC Fire Tech. 1984. Salt Lake City Flood of 1983. Video. At min. 5:44. (url: https://youtu.be/WCU_AymQ6J0?t=344).

Figure 8 – Ground failures at Memory during the 1983 flood about 600 feet from the proposed Well. Writh, Craig (KUTV News). May 12, 2014. Remembering the flood of '83. KUTV News. At min. 1:35. (url: https://www.abc4.com/wirth/wirth-watching-remembering-the-salt-lake-city-flood-of-83/204262974).

The force of the 1983 waters at a peak of 331 cubic feet per second, the waters had sufficient force to topple stone columns in Memory Grove.

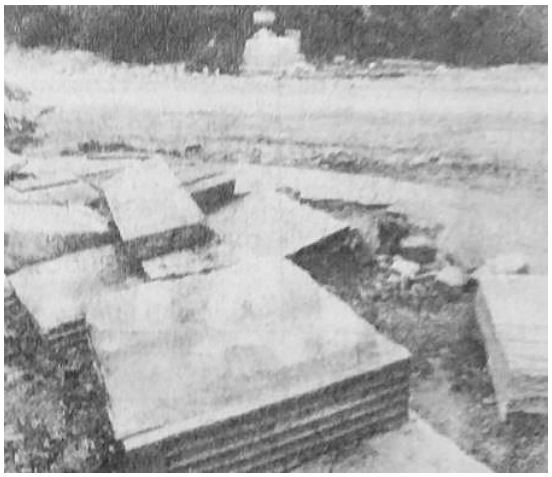

Figure 9 – Stone blocks in columns moved by water flows. Salt Lake City Tribune, July 22, 1983.

A third ground failure occurred along Spencer Court, also about 500 feet northeast of the proposed well project, not shown.[20]

Although the 1983 flood damages were a natural disaster, the severity of the damage was aggravated by human management factors. In the 1983 flood, the flood down State Street started when logs jammed the underground City Creek conduit near North Temple and State Streets about 600 feet south of the proposed Well (*supra*). In the 1890s and 1900s, the predecessor to the

[20] Fisher, personal observation, 1983. Map-location (url: https://goo.gl/maps/EN19iZK1V8bnch6NA).

DPU maintained City Creek by hiring gangs of men to remove the many dead and overhanging trees from the streambed.[21] In the 1910s, that practice ended. Before the 1983 floods and currently, the City only removes dead and fallen trees that might fall on the road, but not from the streambed.

Following catastrophic runoff of 1983, the DPU installed a redesigned conduit sufficient to capture more than the peak 1983 flood flow of 331 cubic feet per second. Two small flood control basins, about one-acre each in size, were installed upstream of the proposed Well facility at the intersection of Bonneville Drive and City Creek Canyon Road. These are designed to catch trees that might be swept downstream in a future flood. But these improvements are in no way designed to deal with a reasonably anticipated 2,400 cubic per second cloudburst flood such as occurred at Perry's Hollow in 1946.

In 2003, the Army Corps of Engineers proposed a permanent, higher capacity solution to carry City Creek storm flows. The Corps envisaged moving City Creek along North Temple from 300 West to the Jordan River on a proposed abandoned railway right-of-way.[22] But the City decided not to pursue that 20 million USD project, and instead used the proposed route for an interurban railway. The 2003 Corps of Engineer's proposal would have reconstructed the geologic City Creek streambed with an outflow connected to the Great Salt Lake.

In addition to the underground conduit and flood basins added after 1983. The City has adopted other practices to reduce the risk of grassland fires in City Creek Canyon that might lead to a severe cloudburst flood event. Fire roads have been constructed along the canyon's ridgelines. A vigorous fire prevention regime for recreation users in the canyon is enforced. The City Fire Department responds to over 900 grass fire calls, principally on the valley floor, and on the foothills.

There are some key lessons from the 1983 floods. First, the rare event where cloudburst flooding would cause a 2,400 cubic feet per second flood is a reasonable geotechnical planning criteria. Second, preventative measures that rely on human management are not fully reliable. Each facility in the flood path must fail safe. Third, the recent Paradise fire in California illustrates who natural forces are sometimes beyond human control. Once a large uncontrolled fire occurs in City Creek, the risk of a cloudburst flood is real.

The risk of cloudburst flooding continues and is not abstract. Flooding, after a large 2008 grass fire in Skull Valley west of Salt Lake City, sent a wall of mud down a canyon that created at 3 foot high alluvial fan on the valley floor.[23]

In May 2019, DPU proposed a concept design for the chemical treatment plant to be located in City Creek Canyon's geologic streambed.

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[21] Salt Lake Tribune, January 4, 1908; Salt Lake Herald, January 31, 1894.

[22] Deseret News, August 1st, 2003; Love, Ron. 2007. Bankside Salt Lake City. Chap. 5 in Rivertown: Rethinking Urban Rivers (at 101); U.S. Army Corps of Engineers. Dec. 2003. Draft City Creek Section 206, Aquatic Ecosystem Restoration Project Report.

[23] Nicoli, K. and Lundeen, Z. J., University of Utah. (2016). A case study: geomorphic effects of the 2009 Big Pole fire, Skull Valley, Utah (Vignettes: Key Concepts in Geomorphology). Northfield, Minnesota. (url: http://serc.carleton.edu/47063).

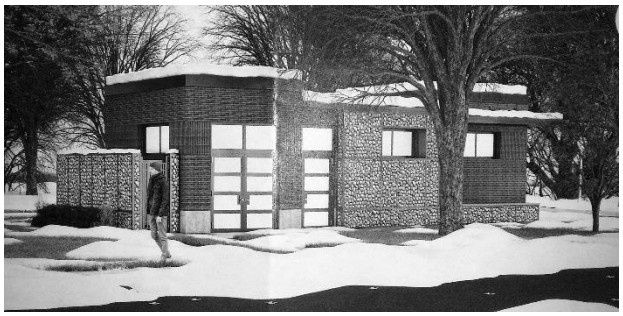

Figure 10 – DPU Architectural Rendering showing that despite known flooding risk power transformers are located at the north-upstream end of building and that proposed structure is built at grade. May 9, 2019.

The concept design (Figure 10) does not consider the flooding history at the 400 North site. The chemical plant is built at grade and not above the last known flood levels. The rectangular north end of the plant includes high-power transformers at ground level. The transformers will put residents and first responders in future floods at risk of accidental electrocution. Because the building is rectangular, the north narrow end will be susceptible to having its foundation undermined and suffering a structural collapse. If a collapse occurs during a flood, the chemical storage tank inside the building may fail and release 500 to 900 lbs. of sodium hypochlorite into floodwaters. Such a spill, in addition to creating a risk for chemical burns, may by simultaneous mixing of large a volume of sodium hypochlorite into water may release a cloud of chlorine that would be a health risk to the surrounding neighborhood.

In conclusion, there are significant flood related risks at that site which indicate that the proposed chemical treatment plant should be relocated, for example as proposed in Option 2c of the DPU-HAL Report.

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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Kaf

ATTACHMENT C

KURT ALLEN FISHER
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May 26, 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

Re: Fourth Comment by Kurt A. Fisher on 4th Avenue Well Chemical Treatment Plant
Supplemental note on sodium hypochlorite and seismic risk

Ms. Mullen:

It occurs to me that my letter of May 24 regarding seismic risk and the need to design the chemical treatment plant building to resist a 7.0 magnitude earthquake did not properly describe the failure modes. The first seismic risk letter suggested that the connections to storage tanks would fail.

Additionally, the proposed chemical treatment plant is located in area that is at high risk for ground liquefaction during a magnitude 7.0 earthquake. [1] During liquefaction ground water mixes with surface soils resulting in 1) pooling of water on the surface and 2) liquefying the ground so it no longer supports buildings. In a 7.0 magnitude earthquake, the chemical plant building could structurally fail and puncture the sodium hypochlorite tanks. A liquid chemical would then flow and mix with ground water that has pooled at the surface. Whenever a large volume of sodium hypochlorite and water quickly mix, a chlorine gas cloud results. During a catastrophic earthquake event, residents that live within the immediate neighborhood and first responders should not be burdened with also dealing with a toxic chlorine gas cloud as they digging their neighbors out of the rubble of their homes.

The proposed chemical plant building design is intrinsically inconsistent with the surrounding residential neighborhood. A magnitude 7.0 resilient design would have a larger bulk and be even more inappropriate. These factors weigh to moving the chemical building to the April 2019 Hansen, Allen and Luce Option 2c site, making the structure larger and more resilient to terrorist and seismic failure, and spending the increased public monies to do so.

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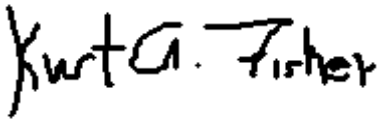
[1] Bartlett, S. F., Hinckley, D. W., and Gerber, T. M. (2016). Figure C-1 in: Liquefaction-Induced Ground Displacement Hazard Maps for a M7.0 Scenario Event on the Salt Lake City Segment of the Wasatch Fault Zone, Salt Lake County, Utah. Salt Lake City, Utah. (url: http://www.civil.utah.edu/~bartlett/ULAG/Liquefaction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

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

ATTACHMENT D

KURT ALLEN FISHER
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Salt Lake City, Utah 84147-0753
fisherka@csolutions.net
(801) 414-1607 (cell)
May 24, 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

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]

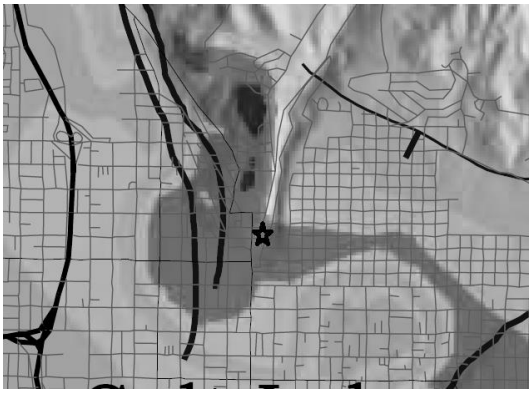

Figure 1 – Excerpt - Ground Shaking Map from Wong 2002. Notes: The proposed DPU facility is marked with a star in an MMI IX predicted shaking region. The faults to the immediate west are extensions of the Warm Springs Fault and have been active in the last 15, 000 years.

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.

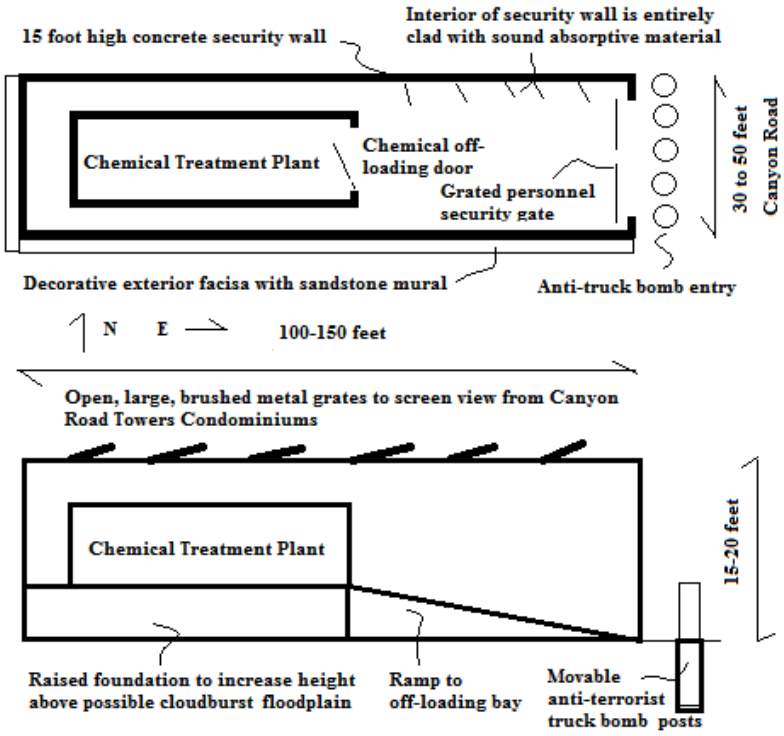


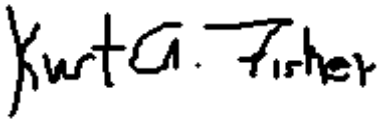
Figure 4- Concept schematic of the proposed facility from above and side.

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

Kaf

ATTACHMENT E

KURT ALLEN FISHER
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May 21, 2019

VIA EMAIL: holly.mullen@slcgov.com
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SALT LAKE CITY DEPARTMENT OF PUBLIC UTILITIES
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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]

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[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

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[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:

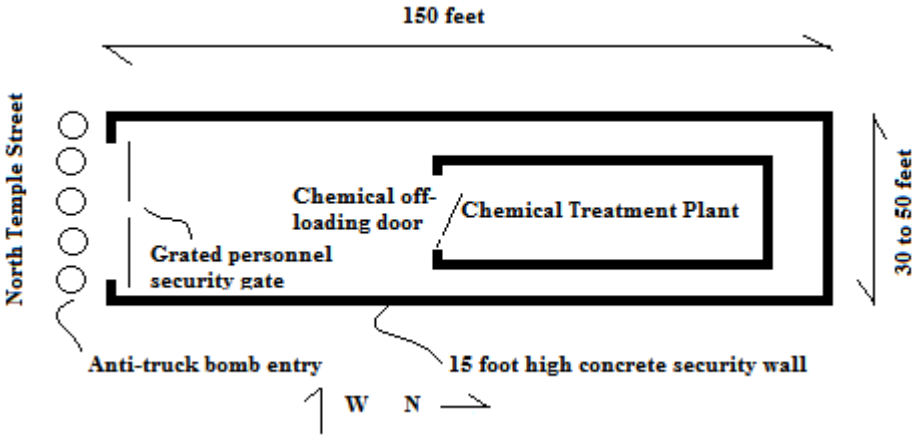

Figure 1 – Schematic of Applicant's Proposed Option B Design near 61 East North Temple. Compare to DPU Architectural Renderings in Figure 3 and Figure 4, below.

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

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[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-

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[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]

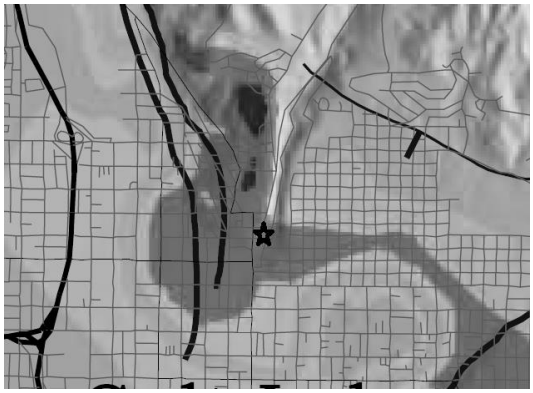

Figure 2 – Excerpt - Ground Shaking Map from Wong 2002. Notes: The proposed DPU facility is marked with a star in an MMI IX predicted shaking region. The faults to the immediate west are extensions of the Warm Springs Fault and have been active in the last 15, 000 years.

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

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[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

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[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").

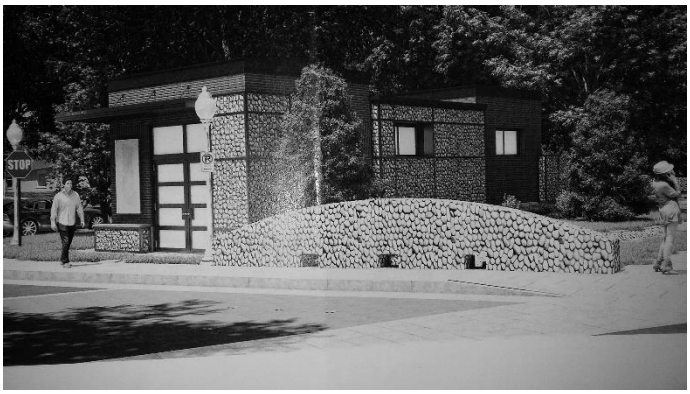

Figure 4 - Excerpt from DPU Architectural Rendering showing daytime view from south east. May 9, 2019.

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.

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[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

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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

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[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]

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[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]

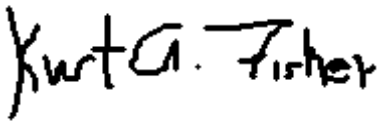
VIII. CONCLUSION

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).

ATTACHMENT F

WATER UTILITY CIP BUDGET
Five Year Projected Budget FY2020-2024

COST CENTER	PROJECT NUMBER	CAP REQUEST NUMBER	PROJECT DESCRIPTION	CRITICALITY RATING	CONDITION RATING	PAST YEAR SPENT 2018-19 (Calc'd from P6)	BUDGET YEAR 2019-20	2020-21	2021-22	2022-23	2023-24	DELAYED
51-01301-	2730.04		**DEEP PUMP WELLS**									
01301	5132245	2015-0429	WELL ASSESSMENT AND UPGRADES	5	5	100,000	200,000	200,000	200,000	200,000	200,000	
01301	5132270	2015-0430	WELL BUILDING STRUCTURE UPGRADES	5	5	100,000	100,000	100,000	100,000	100,000	100,000	
01301	5132268	2015-0213	MP3.4 - 4TH AVENUE WELL ELECTRICAL IMPROVEMENTS	5	5	393,481	3,000,000					
01301	5132269	2015-0212	MP3.4 - 4TH AVENUE WELL/BRICK TANK IMPROVEMENTS	5	5	71,155						
01301	51322336	2015-0171	WELL TREATMENT PROJECT - 1500 EAST WELL	4	4	100,000	100,000					
01301		2016-0820	DYERS INN	4	4	0			550,000			
01301		2017-2071	DYER'S INN WELL FLUSH LINE	4	4	0			100,000			
01301		2016-0911	1300 E WELL CHLORINATION	3	4	0						400,000
01301		2015-0408	1300 EAST WELL FLUSH LINE	2	2	0			95,000			
01301	5132255	2015-0571	ARTESIAN WELL 2 REHAB	4	0	0						250,000
01301	5132249	2015-0565	19TH AND 27TH SOUTH WELL - VFD	3	0	0						60,000
01301	5132246	2015-0570	TREATMENT OF PCE AT WELLS	3	0	0						12,000,000
01301	5132241	2015-0569	RED BUTTE	2	0	0			2,500,000	60,000		2,500,000
01301	513223419		MT OLIVET IRRIGRATION FEASIBLITY STUDY			3,464						
01301		2018-1038	4TH AVENUE WELL INSPECTION	4	2	0						40,000
01301		2018-1091	VAN WINKLE PROPERTY FENCE	1	5	0					20,000	
						$ 768,100	$ 3,400,000	$ 300,000	$ 3,545,000	$ 360,000	$ 320,000	$ 15,250,000
51-01301-	2730.06		**STORAGE RESERVOIRS**									
01301	5134506	2017-1290	MOUNTAIN DELL RESERVOIR SEDIMENT SAMPLING AND BASIN PRE DESIGN	5	4	1,588						
01301	5134510		PARLEY'S DIVERSION STRUCTURE - IMPROVE BOOM DEPLOYMENT LOCATION	5	3	5,000						
01301	5134476		CHEVRON OIL SPILL PROTECTION PROJECT			3,000						
01301	5134458	2015-0155	REHABILITATION OF MOUNTAIN DELL DAM	5	4	853,333	2,165,000					
01301	5134455	2015-0167	RED PINE DAM REHABILITATION	5	4	30,000						484,000
01301	5134467	2015-0154	MOUNTAIN DELL RESERVOIR - BYPASS PIPE LITTLE DELL TO PARLEY'S	5	0	1,003,384						
01301	512450071	2017-2094	NEW ACTUATORS FOR THE PARLEYS CREEK DIVERSION STRUCTURE	5	0	17,714						
01301	5134468	2015-0607	LITTLE DELL RESTORE PARLEY'S DIVERSION EXTERIOR COATING	4	4	4,725						
01301	5124512	2015-0209	REPLACE VALVES ON MT. DELL DAM	4	4	0						320,000
01301	512700001	2017-2080	REABILITATION OF THE LAKE MARY GAUGE	3	5	1,161						
01301	512700005	2016-1272	CECRET DAM REHABILITATION - DESIGN	4	3	32,525						2,000,000
01301	512700002	2017-2082	REPAIRS TO TWIN LAKES DAM GAUGE	3	4	1,545						
01301	512700003	2017-2079	REPAIRS AND IMPROVEMENTS TO RED BUTTTE DAM ROAD	3	4	30,000						
01301	5134478	2015-0164	LITTLE DELL DAM - INSTALL NEW DRAINS ON THE PORTAL	3	3	0						27,000
01301		2016-1278	SECURITY CAMERAS AT LITTLE DELL	3	3	0						50,000
01301	5134457	2015-0166	NEW STAFF GAGE AT LITTLE DELL DAM	3	3	0						153,000
01301	5124509	2015-0451	STAIRS MT DELL DAM	2	3	0						75,000
01301		2015-0208	CONDUIT FROM DAM TO OLD ICB TO PLANT	2	2	0						20,000
01301	5134466	2015-0156	PARLEY'S CANYON HYDROPOWER PROJECT	1	0	0	100,000	900,000	200,000			
01301	512700006		LITTLE DELL PENSTOCK: PHASE 2			1,000,054						
01301		2018-1034	SPILL PROTECTION PROJECT - I-80 AT LAMB'S CANYON	5	0	0						240,000
01301		2018-1100	LAKE MARY DAM CREST REHABILITATION	5	5	0	20,000					100,000
01301		2018-1101	TWIN LAKES DAM GAUGE RELOCATION	3	4	0						20,000
01301		2018-1102	TWIN LAKE AND LAKE MARY OUTLET CHANNEL IMPROVEMENTS	5	5	0	15,000	50,000	50,000			
01301		2018-1103	PARLEYS CANYON CONDUIT AND FIBER INSTALLATION	4	0	0	100,000					100,000
01301		2018-1104	TWIN LAKES DAM DRAIN CLEANOUT INSTALLATION	4	5	0	40,000					40,000
01301		2018-1105	TWIN LAKES AND LAKE MARY LOG BOOMS	3	5	0						10,000
01301		2018-1106	MOUNTAIN DELL DAM SPILLWAY REHABILITATION	5	4	0	100,000					100,000
01301		2018-1107	LITTLE DELL DAM RODENT ERADICATION	4	4	0	50,000					30,000
01301		2018-1108	LITTLE DELL DAM STAFF GAUGE	3	0	0						175,000
01301		2018-1109	CECRET LAKE FLOW METER AND TELEMETRY	4	0	0						60,000
						$ 2,984,028	$ 2,590,000	$ 950,000	$ 250,000	$ -	$ -	$ 4,004,000