



State of Utah

GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

Department of
Environmental Quality

Amanda Smith
Executive Director

DIVISION OF WATER QUALITY
Walter L. Baker, P.E.
Director

Comments and Responses on Human Health Risk Assessment and Ecological Risk Assessment for Red Butte Creek, Salt Lake City, Utah

Part 1: Human Health Risk Assessment Comments and Responses:

- 1) The report mentions Chevron's name only in passing, and I find this to be disturbing on many levels. The entire incident was their fault. They were found to be negligent with their management of Pipeline #2 and that is clearly stated in the fine issued by PHMSA. I think the name "Chevron" needs to be placed in the Executive Summary and in the early comments on the history of the spill, rather than discussing the event in the passive voice. Why is there such a distinct absence of Chevron's name throughout this report? I will return to my past mantra: *Looks like the State is showing, again, favoritism for Chevron.* I must say that there is a distinct voice throughout the paper that makes the entire event seem quite benign, and that there never once was any threat to the health of anyone living on Red Butte Creek, which is inappropriate to those of us who were sickened and who could not even open their windows or run AC for that entire summer, much less make use of their backyards. Is there a way to amend this report to better reflect the how Chevron was the direct cause of the spill?
 - A) *While Chevron is described in the report as the responsible party, we will revise the risk assessment to include Chevron's name in the executive summary and other sections of the document as appropriate.*
 - B) *The focus of this risk assessment report was to evaluate the risk presented by any residual spill-related chemicals found in the Red Butte Creek post clean-up. The purpose was not to assess health risks during or immediately following the Chevron spill. The Utah Department of Health conducted a Public Health Assessment to evaluate the potential health effects during and immediately following the spill. Residents living along the Creek were likely exposed to contaminants in the air during this time. Residents reported pervasive odors of oil and some residents reported feeling ill. No air monitoring data are available for these initial hours to evaluate the potential for health effects. However, once air monitoring started, the concentrations measured were unlikely to pose of a health risk to residents or children. The complete Public Health Assessment is available at: <http://health.utah.gov/enviroepi/activities/hha/redbuttecreekoilspill/frontpage.htm>.*
- 2) The creek was opened to the public, and users were exposed to whatever was in the creek long before the August '11 testing. There is credible data from my property from which to extrapolate the probable condition elsewhere along the creek; however, there is no mention or reference to the health threat presented by the creek between Sept. '10 and Aug. '11. Why is this? Users were there, exposing themselves, and the current report makes no mention of the health risks due to this exposure. Can the final report include a detailed discussion of the potential health threats presented to humans exposed to the creek between Sept. '10 and Aug.

'11?

- A) *Between September 2010 and August 2011, the creek water and sediment were continually sampled to monitor for potential health risks. We compared sample results collected over this time period to human health screening levels in order to determine whether levels found in the creek posed a risk to people spending time in the water or living nearby. When compared to screening levels, concentrations found in the creek during this time did not indicate an immediate threat to the public. All of the sampling results are available on the DWQ website: <http://www.deq.utah.gov/locations/redbutte/samplingresults.htm>.*
- B) *The focus of this risk assessment report was the risk presented by any residual spill-related chemicals found in the Red Butte Creek post clean-up in order to help the Utah DWQ determine if remediation is complete. It was not to assess health risks during or immediately following the Chevron spill. The Utah Department of Health conducted a Public Health Assessment to evaluate the potential health effects during and immediately following the spill. Residents living along the Creek were likely exposed to contaminants in the air during this time. Residents reported pervasive odors of oil and some residents reported feeling ill. No air monitoring data are available for these initial hours to evaluate the potential for health effects. However, once air monitoring started, the concentrations measured were unlikely to pose of a health risk to residents or children. The complete Public Health Assessment is available at: <http://health.utah.gov/enviroepi/activities/hha/redbuttecreekoilspill/frontpage.htm>.*
- C) *The final report will include a reference to the Public Health Assessment and a summary of the results collected prior to the August 2011 HHRA sampling event.*
- 3) In the HHRA there is no mention about the risks presented to pregnant women, the elderly or those with Multiple Chemical Sensitivity. These are important populations, yet they are not included. Is it possible for the final report to address the risks presented to this population?
- A) *The USEPA risk assessment process used in the HHRA has health-protective assumptions about how people are exposed so that the exposure estimates are more likely to overestimate exposures than underestimate. Specifically, for Red Butte Creek the residential exposure scenario assumes exposure to creek contaminants 350 days/year for 30 years. The toxicity values used are USEPA values or were derived using similar methods. These toxicity values are intended to address the potential additional sensitivities of sensitive subpopulations. For example, in determining the noncancer toxicity of chemicals, the USEPA uses uncertainty factors to account for exposure of sensitive subpopulations (e.g. the elderly, pregnant women) to these chemicals. Although there is not explicitly a pregnant woman or elderly receptor in this assessment, the assessment methodology accounts for these sensitive populations. The risk assessment includes one of the single most sensitive populations of concern, a child aged 0-6 years. If the health risks are low for a young child, who is likely to be more exposed to environmental media such as soil and sediment, they will likely be low for other sensitive populations. A discussion of sensitive populations will be added to the final document.*
- B) *The effects of multiple chemicals are assessed in the risk assessment by summing the individual chemical risks. Cancer risks and noncancer hazards are summed across all of the different exposure pathways to present final risks for multiple chemicals and multiple exposure pathways. Multiple Chemical Sensitivity is a controversial diagnosis and is not recognized as a chemical-caused illness by the [American Medical Association](#) or the USEPA, nor is it currently assessed in human health risk assessments.*

- 4) In many sections of the report, the case is made that anything in the creek that is a petroleum contaminant matches the same "background levels" in the other urban creeks. But, Red Butte Creek is not like the other Urban Creeks. It has the only watershed wherein human travel is strictly prohibited, and it flows only a mile half near streets before hitting my property, which is one of the first private residence RBC encounters. Making this comparison may be like comparing apples to oranges. Did your agency deeply consider the nature and amount of urban surface area that actually drains into Red Butte Creek upstream of the sites where sediment testing was done? Frankly, that reading of zero PAH just up from Chevron's spill site better reflects the "pre-spill" nature of the creek. Will your "uncertainty" section include a discussion of this nature? (Your report puts this "background" level as the principle argument that whatever is in the creek may very well have not come from Chevron's mess, and I think this statement stands on very shaky ground.)

The use of "background" levels of contaminants to justify the probable source of stream bed contamination, specifically BaP, is unjustified if one considers both the nature of the headwaters of RBC and the real urban drainage, in square feet and in duration, into RBC from the spill site to my home, or to a home 1/2 a mile further downstream. This "pillar" upon which the report rests needs to be reconsidered.

Saying RBC is now no dirtier than other major creeks in SLC is not a measure of RBC current safety, and essentially disregards the entire impact of the oil spilled into RBC.

- A) *The background discussion in the risk assessment is limited to one class of chemicals, polycyclic aromatic hydrocarbons (PAHs). These low level background concentrations primarily are the result of combustion sources (i.e. forest fires, regional car exhaust, etc.). The background evaluation is presented to provide context for the levels of PAHs found in Red Butte Creek, as compared with other nearby urban/ suburban creeks in the surrounding area. The background evaluation did not influence the selection of chemicals assessed in the HHRA, nor the final health risk estimates presented in the HHRA. This means that the risk assessment results include potential health risks from levels of PAHs found in Red Butte Creek, irrespective of potential sources.*
- B) *Background PAHs are found in most soils and sediments in urban, suburban and natural areas. Since PAHs are produced by industrial and vehicular sources, it is possible that natural or suburban areas, which have fewer industrial sources and automobiles, might have lower background concentrations of PAHs than urban areas. This possibility was explored in the background evaluation by comparing PAH levels from natural reaches of Salt Lake City area creeks with more urban reaches; no significant differences were found. The potential difference in background PAHs based on geography and degree of urbanization has also been studied in other areas of the country; for example, no significant differences between natural and urban areas were found in a study of California soils (http://www.dtsc.ca.gov/AssessingRisk/upload/S_CA_PAH_Study.pdf). Discussion of background PAHs in urban/suburban verse natural areas will be added to the HHRA.*
- 5) Missing from the data sets are many very critical items for a report titled "Human Health Risk Assessment": Data and analysis for a.) the *actual* crude oil that Chevron spilled into the creek, b.) the *air shed* along the creek on the morning of the spill (This was the primary thing that made many, many creek residence sick) c.) *water sample* data for the first 5 days of the spill, the time when concentrations of toxic, carcinogenic crude oil was at its peak, and would have had the greatest impact on any humans who may have been exposed. Will your final report address these data, or at the very least discuss them -at length- in the "Uncertainties" section?

- A) *In this case, an analysis of the spilled crude is not a critical item for the human health risk assessment. The study evaluated the potential health risk related to any residual chemicals found after the spill was cleaned-up. All petroleum-related chemicals were included in the risk assessment so the calculated risks represent a worst-case scenario assuming all of these chemicals were related to the spill.*
- B) *The focus of this risk assessment report was the risk presented by any residual spill-related chemicals found in the Red Butte Creek post clean-up. It was not to assess health risks during or immediately following the Chevron spill related to air, water, or sediment impacts. The Utah Department of Health conducted a Public Health Assessment to evaluate the potential health effects during and immediately following the spill. Residents living along the Creek were likely exposed to contaminants in the air during this time. Residents reported pervasive odors of oil and some residents reported feeling ill. No air monitoring data are available for these initial hours to evaluate the potential for health effects. However, once air monitoring started, the concentrations measured were unlikely to pose of a health risk to residents or children. The complete Public Health Assessment is available at:
<http://health.utah.gov/enviroepi/activities/hha/redbuttecreekoilspill/frontpage.htm>.*
- C) *The final report will include a reference to the Public Health Assessment and a summary of the results.*
- 6) Missing from the report are the "Risk Phrases" from the MSDS that appropriately describe the true nature of the petrochemicals Chevron spilled into Red Butte Creek, especially those for BaP. Will your final report display these risk phrases, such that the lay public may better comprehend what they are actually dealing with when they encourage their children to stir up stream sediments?
- A) *It is not appropriate for a human health risk assessment to include risk phrases from Material Safety Data Sheets (MSDS) for a number of reasons, some of which are described below. The final version of the HHRA will present an extended dose response discussion that includes a summary description of what is known about the health effects of polycyclic aromatic hydrocarbons including benzo(a)pyrene (BaP).*
- B) *Assuming that this comment is referring to a Material Safety Data Sheet (MSDS) for crude oil there are several distinctions that should be clarified between what an MSDS is designed to do versus a human health risk assessment. An MSDS is an important component of [product stewardship](#) and [workplace safety](#). It is intended to provide workers and emergency personnel with procedures for handling or working with that substance in a safe manner, and includes information such as physical data ([melting point](#), [boiling point](#), [flash point](#), etc.), [toxicity](#), [health effects](#), [first aid](#), [reactivity](#), storage, disposal, protective equipment, and spill-handling procedures. An MSDS therefore includes health risk phrases that are supposed to represent a worst-case exposure (e.g. occupational or emergency response) to the concentrated material by someone working closely with that material. In contrast, the HHRA conducted for the creek looked at the residual health risk from environmental concentrations of chemicals potentially remaining in environmental media, such as water and sediment, and the unique exposure scenarios associated with recreational or residential use of the impacted areas. A risk assessment provides information on the residual risks in a quantitative manner.*

C) *Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed by burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are also found in coal tar, crude oil, asphalt, creosote, and roofing tar. With so many potential sources, PAHs are common contaminants in the Salt Lake urban environment. The U.S. Department of Health and Human Services (DHHS) concludes that Americans are commonly exposed to PAHs unrelated to any spills or hazardous waste sites. The PAHs in Red Butte Creek likely come from a combination of the spilled crude and urban runoff. The PAHs are among the most persistent of the contaminants in crude oil and urban runoff and some PAHs are carcinogens. The estimated cancer risks from exposure to contaminants in Red Butte Creek or other Salt Lake Creeks are low, and most of the risk is from PAHs. Detailed information for PAHs and potential health effects is available in ATSDR's Toxicological Profile for PAHs.*
[\(<http://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=122&tid=25>\).](http://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=122&tid=25)

7) Missing from the Conclusion is any discussion on ways to prevent another spill from entering this creek. I would hope that DEQ is as Proactive as they are Retroactive. As you all know, Pipeline #2 sits just as it did 2 1/2 years ago, except for the questionable pressure detection system and the removal of that nefarious fence. Chevron has erected not a single structure to prevent a third failure from spilling more toxic, carcinogenic and very flammable crude oil down Red Butte Creek. Has your Department requested that Chevron build a containment/diversion system on the pipeline? Is this the policy of the DEQ, to assist in remediation, fine and measure the contamination but not do anything to prevent future contamination? In your conclusion, will you make a statement that there is a continued threat of another spill because there are no structural elements built by Chevron to prevent a third spill from entering Red Butte Creek, and that it is your recommendation that Chevron remedy this problem within a year of filing the report? The real threat posed is not only the VOC's, which are highly flammable and very toxic, but the fire that could result if that river of crude were to ignite. Neither you, nor anyone from Chevron lives directly on the creek, but I do, and this is a significant issue, and threat to Human Health. Please take the 2 minutes to watch this movie of a river of crude oil that ran down a creek through an urban setting in Mexico just 6 months after Chevron's Red Butte Creek Spill, and you will better understand my position and the validity in presenting this under the title Human Health Risk Assessment, because getting severely burned is a risk to human health. Listed below is that link, please watch it through, because it serves as a model of what could become of the Red Butte Creek corridor if Chevron's pipeline leaks again, and they and never erected the structures I am recommending.

A) *The purpose of the risk assessment was to assess the health risk presented by any residual spill-related chemicals found in the Red Butte Creek post clean-up. Utah DWQ will use information from the risk assessment to determine if cleanup is complete. The risk management process, or the development of measures in place to prevent future spills, is not part of the human health risk assessment process and occurs separately. Utah DWQ continues to work with Salt Lake City and Salt Lake Valley Health Department to improve our responses to future spills and determine what steps can be taken to prevent and respond future spills.*

8) Where is the stream data in ppb or mg/kg? The report has distilled and blended these data into a convenient talking point, but I'd like to have the actual raw data set on display. I think that the lay person is much more able to comprehend and actual amount, than any other particular spin that is currently displayed. Certainly, the mathematical manipulations the report expertly displays are relevant and valid, but I think the public should be presented with data sets in a report that is titled risk assessment. Will your final draft include the ppb or mg/kg for the COPC?

- A) *The complete data set for the Red Butte Creek used in this risk assessment is presented in Attachment 3. This data set includes data collected in August 2011 and analyzed for a large list of chemicals for sediment (presented as ug/kg or micrograms chemical per kilogram of sediment which is ppb) and surface water (ug/L or micrograms chemical per liter of water). This data set is very large and does not lend itself to presentation in a small summary table – the closest to a summary table is the information presented in Tables 4-1 and 4-2, which present Chemical of Potential Concern Selection Summary for sediment and surface water respectively. All of the creek data can also be accessed online via the DWQ's website: <http://www.deq.utah.gov/locations/redbutte/samplingresults.htm>.*
- 9) The HHRA is a highly technical paper, and I doubt that few in the lay public will be able to comprehend it. It has numerous, and important, missing elements that need to be addressed; and I think that if it is to be titled as it is, then it needs to reflect the threat to human health from the minute of Chevron's spill up to the current condition today, because that is the time frame when humans were exposed and their health put at risk...like that of my son who breathed that toxic atmosphere for 11 hours as he slept.
- A) *Risk assessments are complicated technical documents. Once public comments are incorporated and the HHRA is finalized, we will develop a separate information sheet with a summary of the report and results.*
- B) *The focus of this risk assessment report was the risk presented by any residual spill-related chemicals found in the Red Butte Creek post clean-up. It was not to assess health risks during or immediately following the Chevron spill related to air, water, or sediment impacts. The Utah Department of Health conducted a Public Health Assessment to evaluate the potential health effects during and immediately following the spill. Residents living along the Creek were likely exposed to contaminants in the air during this time. Residents reported pervasive odors of oil and some residents reported feeling ill. No air monitoring data are available for these initial hours to evaluate the potential for health effects. However, once air monitoring started, the concentrations measured were unlikely to pose of a health risk to residents or children. The complete Public Health Assessment is available at: <http://health.utah.gov/enviroepi/activities/hha/redbuttecreekoilspill/frontpage.htm>. Although the post-remediation focus of this risk assessment will not be changed for the final document, the results of Public Health Assessment will be summarized.*
- 10) There are many classes of organic compounds that fall into the broad family of PAH; however, none are as dangerous as Benzo(a)pyrene, and that is why the USEPA has such conservative limits for its exposure. The MSDS clearly lists the hazards presented by this particular PAH, and when I search others in the PAH family, none are as distinctively harmful as BaP. Those risk phrases in the MSDS are not dependent on how one is exposed, be it in a lab or in creek sediments: The warnings are clear and definitive...and frightening. Putting the "acceptable" exposure level of 3 micrograms/day for "all PAH's" next to the .04micrograms/day for BaP is akin to putting apples with the oranges, because BaP stands heads above any of the others in its negative health effects at exceedingly low levels. This is why, and correctly stated in your report, over 50% of the cancer risk in RBC is probably due to the BaP in the sediments. Frankly, I am surprised you are even asking me to interpret your juxtaposition as reasoning to not worry about the BaP on my property:
- I think this dangerous carcinogen is on my land in unacceptable levels.
 - I think it is there in those levels because it was put there by Chevron when they neglected pipeline #2.
 - I am not reassured by yesterday's conversation, the argument you present here nor by the statements in the HHRA.

Benzo(a)Pyrene is one of the top ten most dangerous chemicals (there is a list of these) and I want it off my land, like Chevron promised to me, man to man, on the morning of the spill. They have yet to fulfill that promise.

There is no way to get it off my land, because it continues to be re-deposited there by high water events that carry it there from upstream depositional zones, "Hot Spots", that have not been cleaned by Chevron because it is physically impossible to get rid of it since it adheres, firmly, to the stream sediments.

I do not accept the rationalization I have seen for leaving this on my land and calling it good. I understand Chevron taking this stance, because it is in their best interest to do so; however, I do not understand DWQ accepting these levels, because it is not in my best interest when your department takes that stance. DWQ is supposed to protect me, not Chevron.

I think the inclusion of the risk phrases for BaP directly in the text of the HHRA is completely justified, because it sets the stage for how serious this spill really was, and it clears the way for DWQ to insist on/require/demand that the amount of BaP in RBC be at the lowest levels possible, which is 15ppb.

- A) *It is not appropriate for a human health risk assessment to include risk phrases from Material Safety Data Sheets (MSDS) for a number of reasons, some of which are described below. The final version of the HHRA will present an extended dose response discussion that includes a summary description of what is known about the health effects of polycyclic aromatic hydrocarbons including benzo(a)pyrene (BaP).*
- B) *Assuming that this comment is referring to a Material Safety Data Sheet (MSDS) for (BaP) there are several distinctions that should be clarified between what an MSDS is designed to do versus a human health risk assessment. An MSDS is an important component of [product stewardship](#) and [workplace safety](#). It is intended to provide workers and emergency personnel with procedures for handling or working with that substance in a safe manner, and includes information such as physical data ([melting point](#), [boiling point](#), [flash point](#), etc.), [toxicity](#), [health effects](#), [first aid](#), [reactivity](#), storage, disposal, protective equipment, and spill-handling procedures. An MSDS therefore includes health risk phrases that are supposed to represent a worst-case exposure (e.g. occupational or emergency response) to the pure material by someone working closely with that material. In contrast, the HHRA conducted for the creek looked at the residual health risk from environmental concentrations of chemicals potentially remaining in environmental media, such as water and sediment, and the unique exposure scenarios associated with recreational or residential use of the impacted areas. A risk assessment provides information on the residual risks in a quantitative manner.*

- 11) The principle argument that RBC is "Clean" and that the source of what remains is probably due to "background" levels is made by the artificial creation of a standard that is based on the levels of contamination in other creeks. I think this is an illegitimate basis for "Clean" and for "Source of Contamination". The headwaters of RBC see the least amount of human travel of any of the relevant "urban" creeks, and your own data shows no PAH's *just upstream* from Chevron's spill site. If PAH's are in the creek, then it is because they were put there by Chevron's crude. Additionally, the linear distance from my property to the spill site (and, more importantly, the

"Zero" reading for PAH's) is about a single mile, and if your team is going to use the "background" argument, then they need to validate this approach by quantifying the urban surface area drained per linear distance down river from a "Zero PAH" reading in each creek. Does all of Sunnyside, Foothill and all other side streets actually drain *directly* into RBC, *or is much of it captured in culverts and storm drains and released elsewhere?* Do all parking lots at Research Park actually drain directly and completely into RBC, *or is any of this flow captured in storm drains and deposited elsewhere?* How does the surface area of urban run-off that is emptied directly into a stream bed compare for each of the urban creeks your study refers to? As a starting point, I assume that many miles of I-80 (6-8 lanes with round the clock traffic) have been - for decades- draining directly into Parley's Canyon, which has nothing to do with what has been draining into RBC in the single mile it runs from a "zero PaH" reading to my land. I think that until this work has been verified, using "background" levels to validate the source of what remains in RBC is inappropriate.

Certainly there could have been a very low level (probably less than 15 ppb) for BaP, in RBC prior to 6/12/10, and this level would not have disrupted the riparian ecosystem, which is why it thrived prior to Chevron's mess. Currently, there are numerous places with this stuff in amounts exceeding 200ppb, and this is only in the places your teams have unearthed. Invariably, there are many more places, like the sand that gathers under every single stone, however little that may be, in the entire length of the creek, from spill site to Liberty pond and beyond. There are many stones in 4.7 miles of RBC, and not every one was cleaned. I know, because I watched, and the household brooms or the cold water squirt gun held at 2-8 feet from the hydrophobic oil pockets were surprising "advances" in stream cleaning technology.

- A) *The background discussion in the risk assessment is limited to one class of chemicals, polycyclic aromatic hydrocarbons (PAHs). These low level background concentrations primarily are the result of combustion sources (i.e. forest fires, regional car exhaust, etc.). The background evaluation is presented to provide context for the levels of PAHs found in Red Butte Creek, as compared with other urban, suburban, and natural creeks in the surrounding area. The background evaluation does not influence the selection of chemicals assessed in the HHRA, nor the final health risk estimates presented in the HHRA. This means that the risk assessment results include potential health risks from levels of PAHs found in Red Butte Creek.*
- B) *Background PAHs are found in most soils and sediments in urban, suburban and natural areas. Since PAHs come from industrial activities and vehicle emissions, it is possible that natural or rural areas, which have fewer industrial sources and automobiles, might have lower background concentrations of PAHs than urban areas. This possibility was explored in the background evaluation by comparing PAH levels from natural reaches of Salt Lake City area creeks with more urban reaches; no significant differences were found. The potential difference in background PAHs based on geography and degree of urbanization has also been studied in other areas of the country; for example, no significant differences between natural and urban areas were found in a study of California soils (http://www.dtsc.ca.gov/AssessingRisk/upload/S_CA_PAH_Study.pdf). Discussion of background PAHs in urban verse natural areas will be added to the HHRA.*
- C) *The DWQ has not made a final determination on whether the cleanup was adequate. Both the human health and ecological risk assessments provide essential information for determining if the cleanup is complete. In addition to the risk assessment results, other factors such as compliance with environmental regulations, effectiveness, implementability, and cost are considered in determining the need for additional cleanup or other actions. Background polycyclic aromatic hydrocarbon*

concentrations are just one of many factors used to decide when sufficient cleanup has occurred.

- 12) I assume that your team will be seriously considering the suggestions we made in the meeting yesterday, especially the need to place Chevron's name squarely as the cause of the (both) oil spill. That spill did not cause itself, and using a passive voice in the history section of the HHRA obviously needs attention. Also missing from that History section is the real nature of the headwaters of RBC, and how it is radically different from that of any of the other urban creeks. That human access is completely restricted to within a few hundred yards of the spill site is very important when considering the possible sources for the pollution that remains in RBC.

We also made the case that it is important for DWQ to - at the very least- make suggestions to prevent any future leaks in Chevron's Pipeline #2 from entering RBC. That may be out of your jurisdiction, but we feel that it is an important step in the right direction of protecting human health. I hope you have had the opportunity to view the fire hazard for us that was realized in San Martin Texmelucan, Mexico just 6 months after Chevron's first spill into RBC. That blaze, due to a broken crude oil pipeline that drained into an "urban" creek (sound familiar) killed 27 people, including entire families who were dropped where they stood in the safety of their own homes by the blast of those igniting VOC's. This threat needs to be addressed, and by making a recommendation the DWQ has at least weighed in on the matter.

We do not care if this matter is "not in your jurisdiction", only that the message needs to be heard, or passed to those who may force Chevron to do the right thing, regardless of the cost of the structure. Chevron needs to build a seismically robust containment/diversion system for Pipeline #2 where ever it crosses any urban creek or drinking water source. The argument about "jurisdiction" ended the moment Gov. Herbert put Mayor Becker in charge of Chevron's oil spill. Mayor Becker never had any "jurisdiction" then, which is why Chevron re-started the pipeline on the first day of February, 2011 following the second spill: Mr. Becker's request to postpone the re-start was completely ignored. We'd like you to make a statement in this regard, and we think you could do so even though it is "not in your jurisdiction". Besides, having such a structure in place is in the best interest of DWQ. I am quite certain that no one in that entire department wants to go through all of this, again.

- A) *The final version of the risk assessment will be reviewed to ensure that Chevron's name is added to the executive summary and other sections of the document as appropriate.*
- B) *Background PAHs are found in most soils and sediments in urban, suburban and natural areas. Since PAHs are produced by industrial and vehicular sources, it is possible that natural or suburban areas, which have fewer industrial sources and automobiles, might have lower background concentrations of PAHs than urban areas. This possibility was explored in the background evaluation by comparing PAH levels from natural reaches of Salt Lake City area creeks with more urban reaches; no significant differences were found. The potential difference in background PAHs based on geography and degree of urbanization has also been studied in other areas of the country; for example, no significant differences between natural and urban areas were found in a study of California soils (http://www.dtsc.ca.gov/AssessingRisk/upload/S_CA_PAH_Study.pdf). Discussion of background PAHs in urban verse natural areas, and how this relates to the nature of Red Butte Creek, will be added to the HHRA.*

C) *The purpose of the risk assessment was to assess the health risk presented by any residual spill-related chemicals found in the Red Butte Creek post clean-up. Utah DWQ will use information from the risk assessment to determine if cleanup is complete. The risk management process, or the development of measures in place to prevent future spills, is not part of the human health risk assessment process and occurs separately. Utah DWQ is currently reviewing all of the various reports that have been completed as a result of the spill and is exploring options to help prevent and/or contain future spills.*

13) As per the other topics in our meeting, we'd like to have in hand a hard copy of the newly revised response protocols for any future oil spill from Chevron's Pipeline #2, such that we may know exactly what to expect from DWQ the next time it happens.

The "Uncertainties" section of the report needs to be more global in nature. It needs to state clearly that there remains along the entire length of RBC, from spill site to the confluence with the Jordan River, unknown quantities of Chevron's crude oil, and that there is no certainty of what is in those undiscovered pockets of Chevron's crude oil, and that because of this DWQ is not fully prepared to say that every section of RBC poses no Human Health Risk. This is a perfectly legitimate statement given the complexity of the stream bed and the fact that it was not dredged to 2 feet and replaced with perfectly clean sediments. Frankly, that is what had to be done, from spill site down, and that is exactly what was done in Liberty Pond. I made that suggestion to Central Command on a conference call they made to me a week after the spill, but it fell on deaf ears. I made the case that hundreds of workers needed to remove, by hand, all of the contaminated sediments, and then fresh sediments had to be put in place. I noted that this would be very expensive, and that the stream would need constant maintenance thereafter to reduce erosion of the banks. Everybody balked, and now we are left with specific "Uncertainties" that have a valid place in the "Uncertainties" section of your HHRA.

Mentioned yesterday was the need to make a statement that this specific report is about the creek condition as it stands now, and that it is not meant to address the real health risks presented on the critical day of the spill or the week thereafter. You need to make a statement that the Human Health Risks for that period when contamination levels for the air shed, the creek water, and the bank sediments were at their maximum are unknown, because nobody was there to measure the contamination in a relevant way. The "Uncertainty" section needs to state that any exposure to creek contaminants from the period between opening the creek to the public, September 2010, and the sampling dates of August 2011, pose uncertain Human Health Risks. I'd refer the concerned public to any relevant resource for that information, because that is the information most of us are truly interested in.

A) *The purpose of the risk assessment was to determine whether the contamination remaining after the cleanup presents an unacceptable health risk. The risk assessment concluded that the contamination does not pose an unacceptable risk. Additional removal of the remaining residual contamination is contraindicated because it could cause more adverse impacts to the creek and local residents for little benefit. Digging up the creek would cause serious short-term adverse impacts to insect and fish life in the creek because of the physical disturbance. Residents would have to tolerate noise, construction workers, and earth moving equipment during the removal. Many parts of the creek have difficult access resulting in serious technical challenges for any large-scale removal actions. The objective of the August 2011 sampling event was to collect soil and sediment samples that are representative of the environmental conditions found along Red Butte Creek. A significant source of uncertainty in risk assessment is commonly the quality and quantity of data upon which the risk estimates are based.*

The spatial coverage and quantity of samples collected for use in the HHRA, and the associated uncertainties, are discussed in Section 8.2.1 of the HHRA. Based on a statistical evaluation of sample size adequacy, it was determined that the creek-wide health risk estimates are a reliable measure of potential exposure to residual chemicals during residential and recreational activities in any of area of Red Butte Creek. The standard USEPA approach to data quality objectives was used in this statistical evaluation.

B) The Utah Department of Health conducted a Public Health Assessment to evaluate the potential health effects during and immediately following the spill. Residents living along the Creek were likely exposed to contaminants in the air during this time. Residents reported pervasive odors of oil and some residents reported feeling ill. No air monitoring data are available for these initial hours to evaluate the potential for health effects. However, once air monitoring started, the concentrations measured were unlikely to pose of a health risk to residents or children. The final report will include a reference to the Public Health Assessment and a summary of the results.

14) Not discussed at our meeting, and what may be relevant to another report you have yet to write, is the need to weave into the discussion the findings from the group who studied the post-exposure physiology of the Spanish teams who worked on cleaning a spill in that country. This article was published in "The Journal of Internal Medicine" and has withstood rigorous peer review...and it is completely relevant to any credible discussion of the Human Health Risks posed by Chevron's oil spill into RBC. I assume your department has read this article, and if you have not, I will send you a link.

A) Based on past discussions, we assume the comment refers to G. Rodríguez-Trigo et al. (2010) Health changes in fishermen 2 years after occupational exposure during clean-up of the Prestige oil spill (Annals of Internal Medicine, Oct 19; 153(8):489-98). In reviewing this study, we failed to identify findings that would be applicable to the Red Butte crude oil spill human health risk assessment. The conclusions of Rodríguez-Trigo et al. (2010) were:

*CONCLUSION: Occupational exposure during clean-up of a major **oil** spill was associated with persistent respiratory symptoms, elevated markers of airway injury in breath condensate, and possible chromosomal damage. LIMITATIONS: The clinical significance of exhaled biomarkers and chromosomal findings are uncertain. The association between **oil** exposure and the observed changes may not be causal. The findings may not apply to spills involving other types of **oil** or to different populations of **oil** spill **workers**. The findings are limited to occupational exposure where by a person is exposed to high concentrations of petroleum hydrocarbons via various routes.*

Major deficiencies of this study include that a lack of exposure data to determine a dose-response relationship, potential differences between the oil spilled in Spain versus the oil spilled Red Butte Creek, and the lack of defined adverse health effects. As the author's noted, the observed associations may not be causal. We have extensively reviewed the recent petroleum literature, including articles in the Journal of the American Medical Association, which relate to the Deep Water Horizon spill, and have found no information that would change the approach we used to assess the risk from residual petroleum hydrocarbons and/or individual petroleum-related chemicals.

15) Including the MSDS "Risk Phrases" for BaP in the body of the report (not in a reference) is both germane and critical to properly inform the public about the true hazards it poses.

A) *It is not appropriate for a human health risk assessment to include risk phrases from Material Safety Data Sheets (MSDS) for a number of reasons, some of which are described below. The final version of the HHRA will present an extended dose response discussion that includes a summary description of what is known about the health effects of polycyclic aromatic hydrocarbons including benzo(a)pyrene (BaP).*

B) *Assuming that this comment is referring to a Material Safety Data Sheet (MSDS) for BaP, there are several distinctions that should be clarified between what an MSDS is designed to do versus a human health risk assessment. An MSDS is an important component of [product stewardship](#) and [workplace safety](#). It is intended to provide workers and emergency personnel with procedures for handling or working with that substance in a safe manner, and includes information such as physical data ([melting point](#), [boiling point](#), [flash point](#), etc.), [toxicity](#), [health effects](#), [first aid](#), [reactivity](#), storage, disposal, protective equipment, and spill-handling procedures. An MSDS therefore includes health risk phrases that are supposed to represent a worst-case exposure (e.g. occupational or emergency response) to the concentrated/pure material by someone working closely with that material. In contrast, the HHRA conducted for the creek looked at the residual health risk from environmental concentrations of chemicals potentially remaining in environmental media, such as water and sediment, and the unique exposure scenarios associated with recreational or residential use of the impacted areas. A risk assessment provides information on the residual risks in a quantitative manner.*

16) The MCL (Maximum Contamination Limit) I have seen in multiple references for BaP in residential soil is 15ppb. Please do not juxtapose BaP to the host of other PAH's, saying that 3,000ppb is acceptable, because this one PAH is particularly nasty, and a level that is three times (or more) than the MCL for BaP in the sediments of RBC is unacceptable. How this level, 15ppb for BaP, sits in regard to a statistical approach to "Risk" is irrelevant to us.

A) *The maximum contaminant level or MCL is a term that applies specifically to drinking water. It is the level that is protective of human health. The MCL for benzo(a)pyrene or Bap is 0.2 ug/L or 0.2 ppb. The soil screening level that is most frequently used is the USEPA Regional Screening Level, or RSL, which is 15ppb. The soil RSL is a screening level, typically used when a site-specific risk assessment has not been conducted and/or site-specific risk-based screening levels have not been derived. This RSL is based on an acceptable level of risk of 1×10^{-6} (one excess cancer per million people exposed) which is at the lower end of the USEPA risk management range.*

B) *Benzo(a)pyrene is one of the more toxic polycyclic aromatic hydrocarbons. The RSL is a starting point for what can be left safely in place. Typically, USEPA will use an acceptable level of risk higher than 1×10^{-6} (one excess cancer per million people exposed) in some cases as high as 1×10^{-4} (one excess cancer per ten thousand people exposed) especially when it is chemical for which there is clear influence of anthropogenic background.*

C) *The background evaluation is presented to provide context for the levels of PAHs found in Red Butte Creek, as compared with other urban creeks in the surrounding*

area. The background evaluation does not influence the selection of chemicals assessed in the HHRA, nor the final health risk estimates presented in the HHRA. This means that the risk assessment results include potential health risks from levels of PAHs found in Red Butte Creek.

17) We'd like a hard copy of the revised "Response Protocols" for a future oil spill into any of the urban creeks traversed by Chevron's Pipeline #2. Report should address how oil companies in area plan to avoid future oil spills. Even if other Utah govt agencies have jurisdiction, this report should reference those agencies and their specific responsibilities re: human health risk going forward. Should describe inadequacies in immediate response to clean up recovery and restoration.

A) We understand the importance of adequate response protocols and support all pollution prevention efforts. DWQ has changed the way we respond to spills as evidenced by the recent Holly Refinery oil spill where samples of the spilled crude were immediately obtained for forensic analyses. DWQ cannot speak for other agencies who are the first responders to an incident such as the Red Butte oil spill. The commenter will have to contact the specific agencies, such as the Salt Lake City Fire Department, the Salt Lake Valley Health Department, and the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Agency.

18) We request that you include in the "Conclusion" section a request that Chevron build a seismically robust containment/diversion system at every point Pipeline #2 traverses any of Salt Lake City's "Urban Creeks".

B) The purpose of the risk assessment was to assess the health risk presented by any residual spill-related chemicals found in the Red Butte Creek post clean-up. Utah DWQ will use information from the risk assessment to determine if cleanup is complete. The risk management process, or the development of measures in place to prevent future spills, is not part of the human health risk assessment process and occurs separately. Utah DWQ is currently reviewing all of the various reports that have been completed as a result of the spill, including the health risk assessment with the other agencies that have jurisdiction to help prevent and/or contain future spills.

19) Your charts that discuss the "Incremental Cancer" risks need to clearly address those parameters for Pregnant women, the elderly and people suffering from Multiple Chemical Sensitivity, because the current charts do not do this, nor is there any mention of this in the body of the text.

A) The USEPA risk assessment process used in the HHRA has health-protective assumptions about how people are exposed so that the exposure estimates are more likely to overestimate exposures than underestimate. Specifically, for Red Butte Creek the residential exposure scenario assumes exposure to creek contaminants 350 days/year for 30 years. The toxicity values used are USEPA values or were derived using similar methods. These toxicity values are intended to address the potential additional sensitivities of sensitive subpopulations. For example, in determining the noncancer toxicity of chemicals, the USEPA uses uncertainty factors to account for exposure of sensitive subpopulations (e.g. the elderly, pregnant women) to these chemicals. Although there is not explicitly a pregnant woman or elderly receptor in this assessment, the assessment methodology accounts for these sensitive populations. The risk assessment includes one of the single most sensitive populations of concern, a child aged 0-6 years. If the health risks are low for a young child, who is likely to be more exposed to

environmental media such as soil and sediment, they will likely be low for other sensitive populations. A discussion of sensitive populations will be added to the final document.

- B) *The effects of multiple chemicals are assessed in the risk assessment by summing the individual chemical risks. Cancer risks and noncancer hazards are summed across all of the different exposure pathways to present final risks for multiple chemicals and multiple exposure pathways. Multiple Chemical Sensitivity is a controversial diagnosis and is not recognized as a chemical-caused illness by the [American Medical Association](#) or the USEPA, nor is it currently assessed in human health risk assessments.*
- 20) The "Uncertainty" section needs to address the reality that because of the exceedingly complex nature of the stream bed in RBC, there will be unmeasured, un-remediated pockets of Chevron's crude along the creek, and that exposure to this lingering contamination poses an "uncertain" human health risk.
- A) *A significant source of uncertainty in risk assessment is commonly the quality and quantity of data upon which the risk estimates are based. The spatial coverage and quantity of samples collected for use in the HHRA, and the associated uncertainties, are discussed in Section 8.2.1 of the HHRA. Based on a statistical evaluation of sample size adequacy, it was determined that the creek-wide health risk estimates are a reliable measure of potential exposure to residual chemicals during residential and recreational activities in any of area of Red Butte Creek. While this statistical evaluation of sample adequacy and sufficiency was completed, we recognize there is still a level of uncertainty associated with not being able to sample every location along the creek. We will clarify this uncertainty in the final HHRA.*
- 21) Please consider the findings, which are the most up to date and relevant to this disaster, the article on the physiological effects of exposure to crude oil published in The Journal of Internal Medicine. Your references regarding risk and "acceptable" are based on out-dated information.
- A) *Based on passed discussions, we assume the comment refers to G. Rodríguez-Trigo et al. (2010) Health changes in fishermen 2 years after occupational exposure during clean-up of the Prestige oil spill (Annals of Internal Medicine, Oct 19; 153(8):489-98). In reviewing this study, we failed to identify findings that would be applicable to the Red Butte crude oil spill human health risk assessment. The conclusions of Rodríguez-Trigo et al. (2010) were:*
- CONCLUSION: Occupational exposure during clean-up of a major oil spill was associated with persistent respiratory symptoms, elevated markers of airway injury in breath condensate, and possible chromosomal damage.*
- LIMITATIONS: The clinical significance of exhaled biomarkers and chromosomal findings are uncertain. The association between oil exposure and the observed changes may not be causal. The findings may not apply to spills involving other types of oil or to different populations of oil spill workers. The findings are limited to occupational exposure where by a person is exposed to high concentrations of petroleum hydrocarbons via various routes.*
- 22) Major deficiencies of this study include that a lack of exposure data to determine a dose-response relationship, potential differences between the oil spilled in Spain versus the oil spilled Red Butte Creek, and the lack of defined adverse health effects. As the author's noted, the observed

associations may not be causal. We have extensively reviewed the recent petroleum literature, including articles in the Journal of the American Medical Association, which relate to the Deep Water Horizon spill, and have found no information that would change the approach we used to assess the risk from residual petroleum hydrocarbons and/or individual petroleum-related chemicals. It seems to me this report is somewhat misleading. I do not believe sampling only 13 sites along entire creek is adequate to come to the conclusions in this report.

A) *For the thirteen location-specific exposure areas, exposure point estimates were based on maximum COPC concentrations. The use of maximum values is health protective and likely results in an overestimate of associated health risks. Realistically, receptors will move around the specific sample locations, and are more likely to be exposed to concentrations less than the maximum.*

B) *A significant source of uncertainty in risk assessment is commonly the quality and quantity of data upon which the risk estimates are based. The spatial coverage and quantity of samples collected for use in the HHRA, and the associated uncertainties, are discussed in Section 8.2.1 of the HHRA. This section discusses specifics of the sampling approach and its relevancy to calculating health risk estimates. Based on a statistical evaluation of sample size adequacy, it was determined that the creek-wide health risk estimates are a reliable measure of potential exposure to residual chemicals during residential and recreational activities in any of area of Red Butte Creek. The standard USEPA approach to data quality objectives was used in this statistical evaluation.*

23) The clean-up in my backyard took over 2 years to begin because of untoward financial negotiations between a neighbor and Chevron. This clean-up project won't even be completed until Sept 2012. Why is this report being released without definitive results from this location?

A) *Work is ongoing at this area of the creek (Remund property). However, extensive sampling was conducted at this location although these samples were not included in the risk assessment database. The results of these samples showed similar levels of contamination as the data used for the risk assessment. Remaining residues at this location will be considered prior to DWQ making a final determination on whether the cleanup was adequate. If levels of residual chemicals in Red Butte are ever found to be significantly different than those evaluated in the HHRA, then a separate health risk evaluation will be necessary at that time. Regardless of the decision on the adequacy of the cleanup, Chevron continues to be liable for any additional spill oil we may find in the future.*

24) Judgment Based Sampling Methods Should Have Been Employed. The draft human health and ecological risk assessments depend on a data set that was generated using random sampling methodology instead of on judgment based sampling methods. The U.S. Environmental Protection Agency and the U.S. Coast Guard, in their sampling directives for oil releases, require that engineering judgment be used to find the maximum impact locations at a release site, in order to be most protective of human health and of the environment. See Emergency Response Quality Assurance Sampling Plan For Hurricane Katrina Response Screening Level Sampling For Sediment In Areas Where Flood Water Receded Southeast, Louisiana; U.S. Environmental Protection Agency Region 6, September 2005. In petroleum contaminated environments, random and systematic sampling necessarily generate a larger number of samples that show no detections

compared to judgment-based sampling. When averaged with other samples, such "non-detect" samples have the effect of generating invalid risk assessment results.

- A) *A random sampling methodology was not used. First, the minimum number of sample locations was determined by a statistical evaluation. Sample locations were initially selected with the goal of providing even spatial coverage. These locations were modified after considering previous analytical results, visual observations during creek inspections, land use, and accessibility of sample location. Fine-grained soil and sediment were targeted at each sampled per the Sampling Plan because fine grained soil and sediment are anticipated to have higher concentrations of contaminants than coarse grained soil such as gravel.*

DWQ disagrees that averaging non-detect analytical results invalidate the risk assessment results. Nondetect results were used to estimate exposure point concentrations consistent with USEPA (2002) Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites.

The U.S. Environmental Protection Agency and the U.S. Coast Guard's document entitled "Emergency Response Quality Assurance Sampling Plan For Hurricane Katrina Response Screening Level Sampling For Sediment In Areas Where Flood Water Receded Southeast, Louisiana; U.S. Environmental Protection Agency Region 6, September 2005" do not apply to the Red Butte Creek release.

- B) *The spatial coverage and quantity of samples collected for use in the HHRA, and the associated uncertainties, are discussed in Section 8.2.1 of the HHRA. This section discusses specifics of the sampling approach and its relevancy to calculating health risk estimates. A statistical evaluation of sample size adequacy determined that the creek-wide health risk estimates are a reliable measure of potential exposure to residual chemicals during residential and recreational activities in any of area of Red Butte Creek (Section 2.1.2.2 of the Human Health Risk Assessment). The standard USEPA approach to data quality objectives was used for this statistical evaluation.*
- C) *Site-wide health risk estimates are based on central tendency estimates in order to provide an estimate of typical exposure for a resident or recreational user spending time at multiple locations along the creek. For the thirteen location-specific exposure areas, exposures were estimated without averaging the COPC concentrations. The resulting risk estimates are health protective and likely result in an overestimate of associated health risks. Realistically, residents will move around the specific sample location. For instance the Human Health Risk Assessment assumed that a resident, for the purpose of risk exposure, would be exposed at one location in the Creek 350 days/year for 30 years.*

25) Actual Creek Conditions Do Not Support the Risk Assessment Conclusions. The conclusions reached in the risk assessment (e.g., that residual petroleum poses no risk to human and biological receptors) are not supported by the actual conditions of Red Butte Creek. The data from direct biological studies of Red Butte Creek reported by DWQ shows a persistent and significant absence of animals and insects. Given this clear demonstrated impact, existing levels of crude oil components show a demonstrated environmental impact to the animal community as a whole. This is above and beyond the loss of individual organisms, and represents a significant loss of biological resources. The contaminants of concern in animal health impact need to be identified, and appropriate reductions put in place until these biological resources are restored. The actual

ecological conditions of Red Butte Creek also are contrary to the conclusion that residual contaminant levels are the same as comparable systems, where ecological conditions are presumably much better.

A) *See response to this comment in “Part 2: Ecological Risk Assessment Comment and Response,” below.*

26) Human Health Screening Levels Are Not Adequately Protective. The environmental screening levels adopted in the human health risk assessment are insufficiently protective and failed to consider a large number of relevant screening levels for petroleum contamination adopted in other jurisdictions that have more experience dealing with crude petroleum contamination in residential settings than the State of Utah. By way of example, the State of Louisiana, a major oil and gas producing jurisdiction, regulates petroleum hydrocarbons as diesel range and gasoline range organics at a level of 65 mg/Kg. Louisiana regulates oil range organics at 180 mg/Kg. These are more protective standards than the level adopted for this document, which is 1,800 mg/kg as total petroleum hydrocarbons.

A large number of other examples can be derived through a comprehensive review of relevant published screening criteria. Also by way of example, residual contaminant levels detected in Red Butte Creek also exceed the US EPA 2009 National Recommended Water Quality Criteria for benzo(a)pyrene, chrysene, and benz(a)anthracene. Sediments in the creek exceed US EPA freshwater sediment quality guidelines as determined by USEPA 90S/R-00/007, June 2000 revision, for phenanthrene, chrysene, pyrene, fluoranthene, and anthracene. Apparently, these standards, and a number of other relevant published standards were not considered in developing the risk assessments.

A) *DWQ disagrees that human health screening levels or the risk estimates in the Human Health Risk Assessment are inadequately protective. The process used in this risk assessment for assessing the potential human health risk from total petroleum hydrocarbon (TPH) uses the most widely accepted and utilized process in the U.S. It is our understanding that the same process is used in Louisiana for risk assessment of TPH. A number of other states, including Utah, have after thorough review, adopted this process. Petroleum hydrocarbon mixtures consist of hundreds of different types of hydrocarbon compounds. This makes risk assessment for petroleum hydrocarbons a complex undertaking, given that each hydrocarbon compound exhibits a particular set of physical characteristics (solubility, sorption, etc.) and each can have a particular toxicological effect. The Utah DEQ Guidelines for TPH Fractionation provides an overview of protocols used to assign representative toxicity criteria to each fraction by using a specific chemical surrogate (UDEQ 2005). The Utah’s TPH fractionation process builds on approaches previously described by the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) and the Massachusetts Department of Environmental Protection (MADEP). In this guidance, Utah DEQ recommends a streamlined approach that allows for the use of EPA analytical methods that are already certified in Utah. Previous analytical results for TPH in sediment samples from nearby Liberty Park Lake and Red Butte Creek have been low; all well below the risk-based health screening level for no further action of 1,800 mg TPH/kg sediment.*

B) *The State of Louisiana TPH numbers that are cited are from the Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program and are used as conservative screening levels. If these levels are exceeded in Louisiana, a site-specific human health risk assessment is one of the options. The LDEQ*

recommends following the TPH Working Group methodology for assessing risk from residual TPH. That is what was done in this assessment to derive the 1800 mg TPH/kg soil value.

- C) The highest concentrations of diesel range TPH measured in the Human Health Risk Assessment samples was 165 mg/kg and for oil range organics TPH was 200 mg/kg. If Utah had adopted the Louisiana screening values, then the exceedance would be followed by a site-specific risk assessment which was done.*
- D) The risk assessment was conservative and health protective in that it assessed the toxicity of individual chemicals that could be in crude oil (e.g. polycyclic aromatic hydrocarbons) as well as assessing the potential toxicity of TPH as a whole. This “double counting” of toxicity means that the actual risks are likely to be less than those derived in the risk assessment.*
- E) Although the comment fails to identify what USEPA water quality criteria were exceeded, DWQ disagrees with the assertion because petroleum hydrocarbons were not detected in water samples in August 2011.*
- F) The USEPA sediment criteria referred to in this comment are for ecological receptors, not human populations. The Ecological Risk Assessment evaluated the potential risks for all detected hydrocarbons which supercedes the generic screening values referenced from USEPA Region 3. Please refer to the Ecological Risk Assessment for a full discussion of the risks found for ecological receptors from residual contamination along the Red Butte Creek.*

27) The Conclusions are Premature and Data Set Inadequate. Red Butte Creek is a dynamic natural system with constant transport and redistribution of petroleum contaminants. For example, recent testing has shown (See: BCD2011 data and 2012 State of Utah DEQ data) that Liberty Pond Park has become recontaminated by transported petroleum-containing sediments at the headwall where Red Butte Creek enters this pond. The time-frame of these draft risk assessments, and the quantity of the underlying data, is not sufficiently long or large to guard against recontamination of lower reaches of the creek over time, as contaminated upstream sediments are resuspended.

- A) Sampling since the spill does not indicate that significant recontamination is likely. This conclusion is based on our current understanding of contaminant residues in Red Butte Creek. If new information becomes available that contaminant concentrations are higher or if previously unidentified areas of oil contamination are discovered, this conclusion will be revised as appropriate. Chevron continues to remain liable for any remaining oil contamination from the spill in Red Butte Creek.*

28) The Use of Averaging over the Entire Red Butte Creek System Is Inappropriate. Had any single residential property experienced a crude oil release, and that release had been limited to that property, any risk assessment would have had to consider that single property as an exposure unit. In this case, the draft risk assessments employ system-wide averaging. This approach results in hot spots on specific residential properties that pose higher risks to existing and future residents than is indicated in the final dose figures.

- A) The risk assessment calculated potential health risks by both averaging over the impacted area of Red Butte Creek and by calculating point-by-point health risks for each sample location without any averaging. This approach takes into consideration*

that residents and recreators may either 1) spend a significant amount of time at a discrete location, or 2) spend time at various locations along Red Butte Creek. Therefore, risks are presented for the range of residual chemical concentrations that were found at different locations of Red Butte Creek.

29) The Data Set Is Inadequate. Based on our review of the data set, only the following properties of the Impacted Property Owners were ever sampled: Barton, Callahan, Hayes, Vought. Given the dynamic nature of the Red Butte Creek system and the reported variability in the presence of "hot spots" of contamination, the data set is insufficient to reach valid conclusions about the conditions of impacted residential properties. This is particularly true in light of the prevalence of "non-detect" samples that are generated through random sampling, as noted above. Given the large number of individual residential properties involved, and the fact that the contamination is located at the surface in a water feature that is highly attractive to children in particular, the lack of data as to specific residential properties is striking and inappropriate to protect residents

A) Hotspots do not have standard definition. From our perspective, a hotspot would be a localized, contiguous area of contamination that is higher than surrounding areas. The concentrations would have to be high enough to result in a different management decision. We are unaware of any unaddressed hotspots and the commenter does not identify any specific hotspots.

B) A significant source of uncertainty in risk assessment is commonly the quality and quantity of data upon which the risk estimates are based, therefore DWQ requested that a data quality assessment be performed to evaluate the data adequacy. The spatial coverage and quantity of samples collected for use in the HHRA, and the associated uncertainties, are discussed in Section 8.2.1 of the HHRA. Based on a statistical evaluation of sample size adequacy, it was determined that the creek-wide health risk estimates are a reliable measure of potential exposure to residual chemicals during residential and recreational activities in any of area of Red Butte Creek. The standard USEPA approach to data quality objectives was used in this statistical evaluation.

30) The Lack of Source Oil Samples is Prejudicial. The lack of source petroleum data-for this release means that there is no direct comparison material against which current samples are measured. The assessment concludes that oil in the RBC system is not from the Chevron release, but does not provide a source sample for comparison. With no valid physical evidence that the remaining oil in the RBC watershed is not from Chevron, this conclusion is not based on sound science. U.S. EPA, Coast Guard, NORDTEST, and other spill response strategies require that a source sample be used to show if any petroleum is unrelated to a known release. Therefore any crude oil range petroleum in the RBC must be presumed to be spill-related.

A) Samples taken after the cleanup was completed showed very low residues of petroleum hydrocarbons and polycyclic aromatic hydrocarbons (PAHs) in creek waters and sediment. These chemicals are related to crude oil from the spill and/or urban runoff. As evidenced by the fact that no hydrocarbons were eliminated from evaluation, all hydrocarbons were assumed to be potentially from the spilled oil. The risk assessment does not state "that oil in the RBC system is not from the Chevron release" as stated in this comment. However, such low levels of residual petroleum hydrocarbons are not, as shown by the risk assessment, a significant health threat and are representative of concentrations typically seen in suburban and urban environments. DWQ has not made a final determination on whether the cleanup was adequate.

B) Samples of the original oil are not needed to complete a human health risk assessment of the residual risk from potential chemicals remaining in the environment after the spill. This type of data may be useful from a forensic perspective, which is determining where the PAHs came from (background or the spill) but has no bearing on the levels of risk determined in this assessment.

Part 2: Ecological Risk Assessment Comment and Response:

1) Actual Creek Conditions Do Not Support the Risk Assessment Conclusions. The conclusions reached in the risk assessment (e.g., that residual petroleum poses no risk to human and biological receptors) are not supported by the actual conditions of Red Butte Creek. The data from direct biological studies of Red Butte Creek reported by DWQ shows a persistent and significant absence of animals and insects. Given this clear demonstrated impact, existing levels of crude oil components show a demonstrated environmental impact to the animal community as a whole. This is above and beyond the loss of individual organisms, and represents a significant loss of biological resources. The contaminants of concern in animal health impact need to be identified, and appropriate reductions put in place until these biological resources are restored. The actual ecological conditions of Red Butte Creek also are contrary to the conclusion that residual contaminant levels are the same as comparable systems, where ecological conditions are presumably much better.

A) Conclusions reached in the SLERA were based on several lines of evidence. These lines of evidence evaluated chemical and biological data that were recently collected from both Red Butte Creek and background urban creeks (i.e., creeks not affected by the spill).

Findings include:

1) Concentrations of petroleum-related chemicals (i.e., PAHs) are comparable between Lower Red Butte Creek and background urban creeks

2) In-creek benthic communities are comparable between Lower Red Butte Creek and background urban creeks

3) In-creek benthic communities are less impacted at locations immediately downstream of the spill site as compared to locations farther downstream in the more urbanized portion of Lower Red Butte Creek.

When considered together, these lines of evidence suggest that potential exposures/risks are unlikely to be attributable to residual spill-related petroleum hydrocarbons (see Section 9).