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Rocky Flats Site
Fourth Five-Year Review Comments
11025 Dover Street, Ste 1000
Westminster CO 80021

Re: Fourth Five-Year Review Comments

Dear DOE:

On behalf of our client, the Town of Superior, we appreciate this opportunity to comment in anticipation of the Fourth Five-Year Review of the remedy at Rocky Flats.

There are issues we have not emphasized in this comment letter that, while relevant to the adequate performance of the remedies, are not central to scope of the Five-Year Review. For example, we remain very concerned with the continued lack of air monitoring. As discussed below, various land use changes are planned in areas impacted by contamination historically coming from the Legacy Management Area. To justify deletion of the areas now constituting the Wildlife Refuge from CERLCA, assumptions were made about the lack of soil disturbance and human exposures that are now very questionable given plans for a DOE funded visitor center, trail construction as part of the Greenway project and future highway construction. No assessment has been made of the potential for these activities to disturb contaminated soils and mobilize them off of the Site or to create unanticipated exposures of people on the Site. [1]

Guesswork does not suffice to answer these critical questions. That the soils and dusts mobilized during construction will have contamination should be assumed and as DOE is responsible for that contamination, DOE must be in a position, using actual data rather than guesses and

[1] Given the variability in how the various agencies and parties have referred to portions of Rocky Flats over time and for different purposes, this comment letter adopts the term "Site" to include both the Wildlife Refuge and Legacy Management lands.

assumptions, to reassure everyone from construction workers to members of the downwind public, that they are safe.

We are also quite concerned about the ultimate disposal of dirt and other debris removed during construction activities on the Site regardless of whether generated during construction of the visitor's center, Greenway underpass and trails, or the proposed highway. One assumes all of this dirt and debris is potentially contaminated. Will it be evaluated so that fully appropriate and lawful handling and disposal practices will be followed? Where will it be disposed? How will it be hauled if removed off of the Site?

We move now to specific comments on issues for the Five-Year review:

<u>The Adequacy of Remedies at Rocky Flats are Limited by Specific Land Use Assumptions that are No Longer Valid</u>

The history of Rocky Flats as a site being managed under CERCLA is well documented and will not be repeated here. Instead, our focus is on an examination of the assumptions that went into the selection of remedies on the Rocky Flats Site, including both the area under Legacy Management and the Wildlife Refuge, and whether those assumptions are still valid. In particular, the impacts on human use and occupancy in the Wind Blown Exposure Area which runs east from the former industrial zone to Indiana Street. Much of this area was incorporated into the Central Operating Unit now under Legacy Management while the rest is in the Wildlife Refuge. Our primary focus is on those lands within both the Woman Creek and Walnut Creek drainages.

The key assumptions, upon which the foundation for remedy selection within the Legacy Management area rest, all regard land use at the site. The assumed land use drives the analysis of potential human exposures as it allows those exposures to be minimized or even ignored. In evaluation of this assumption within the context of the five-year review we begin with the Site Conceptual Model and other work done as part of the Remedial Investigation and Corrective Measures Study. [2]

> The Site Conceptual Model (SCM) provides an overview of potential human exposures at RFETS [Rocky Flats Environmental Technology Site]. It describes what kind of human populations may be present, through which environmental media humans may be exposed, and through which pathways exposure may occur. The SCM is illustrated on Figure 7.4 and is described in the following sections.

[2] *RCRA Facility Investigation – Remedial Investigation/ Corrective Measures Study – Feasibility Study Report for the Rocky Flats Environmental Technology Site, Section 7.0 Summary and Conclusions of the Comprehensive Risk Assessment*, at §7.5.2, P. 6.

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The future land use for RFETS is a wildlife refuge and, therefore, human populations who may be present include wildlife refuge worker (WRW) and wildlife refuge visitor (WRV) receptors. Workers may staff a visitor center, monitor and maintain the trail system, and track the on-site wildlife populations. Visitors may hike, bike, and bird watch at RFETS. WRW receptors are assumed to be adults, while WRV receptors will likely include both adults and children.

Workers and visitors could theoretically contact contaminants in surface soil, subsurface soil, sediment, surface water, and groundwater. All exposure pathways included in the SCM are identified as complete (meaning that exposure through the pathway is at least theoretically possible). In addition, the pathways are identified as either significant or insignificant. Insignificant pathways are those that are associated with such low exposure that there will be negligible risk even if exposure occurs. The significant pathways were evaluated on an EU [Exposure Unit] basis and risk calculations are only performed for significant pathways in the individual EU volumes (Volumes 3 through 14 of Appendix A of the RI/FS Report). However, pathways considered to be insignificant are evaluated to ensure that the pathways are appropriately identified as such.

The following exposure pathways are identified as potentially complete and significant in the SCM:

- Incidental ingestion of surface soil/surface sediment;
- Inhalation of dust released from surface soil/surface sediment;
- Dermal exposure to surface soil/surface sediment;
- External irradiation exposure from surface soil/surface sediment;
- Incidental ingestion of subsurface soil/subsurface sediment;
- Inhalation of particulates released from subsurface soil/subsurface sediment;
- Dermal exposure to subsurface soil/subsurface sediment; and
- External irradiation exposure from subsurface soil/subsurface sediment.[3]

Each of these exposure pathways was then evaluated against the limited assumptions on human occupants - the wildlife refuge worker and wildlife refuge visitor. Within the Wind Blown Exposure Unit, the focus was on surface soil/surface sediment. Arsenic and plutonium-239/240 were selected as the contaminants of concern and further evaluated quantitatively.[4] For reasons that are not clear, "exposure to subsurface soil/subsurface sediment was not evaluated for the WRV."[5] Apparently, the assumption was that a WRV was never going to touch any dirt or breathe in any dust.[6] This is obviously an error as the documents cited above demonstrate that the exposure pathways to the Contaminants of Concern (COCs) are complete and significant.

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[3] *Id.* at P.6-7.

[4] *RCRA Facility Investigation-Remedial Investigation/ Corrective Measures Study-Feasibility Study Report, Appendix A, Volume 9, Wind Blown Area Exposure Unit* at P. 13.

[5] *Id* at P. 16

[6] Obviously it is impossible to keep children and pets on the trails. They will get in the dirt and will be

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Wildlife refuge worker and wildlife refuge visitor were the only human receptors evaluated in the RI/FS for Rocky Flats. This highly limited view of human receptors and equally limited exposure scenarios were based upon the assumed land use as a wildlife refuge.[7] Other human receptors such as construction workers building highways or bike paths, or volunteers working on trails and other maintenance activities, were never considered and no such exposures have been formally evaluated. These limiting assumptions are no longer valid and "guesses" as to lower exposures to the contrary are not helpful nor reassuring.[8]

The potential use of volunteers to build trails now planned for the first time in the Woman and Walnut Creek drainages is especially concerning. These people would most certainly encounter soils that must be assumed to be contaminated with a variety of contaminants including VOCs, arsenic and radio action elements such as plutonium.

The actual exposure scenarios are important.

> The WRW exposure scenario for the CRA [Comprehensive Risk Assessment] is consistent with the WRW scenario for development of RFETS radionuclide soil action levels (RSALs) (EPA et al. 2002). The CRA assumes that the WRW works 250 days per year for 18.7 years, and spends 50 percent of his or her work day outdoors on the site and the remaining 50 percent in an indoor office.
>
> The WRV scenario is based on the open space scenario used in the RSAL Report (EPA 2002) and is consistent with the preferred alternative presented by the USFWS in the CPP (USFWS 2004a). The WRV includes both a child and adult who visit the site 100 days per year for 2.5 hours per day, for a total of 250 hours per year. The remaining time is spent off site. Outdoor recreational activities will primarily be on and near established hiking trails. Hunting may be allowed on a very limited basis (USFWS 2004a). It is assumed that the WRV will not participate in activities that result in significant exposures to subsurface soil or surface water. In general, the risks to the WRV are less than for the WRW primarily because the exposure time at the site for the WRV is shorter than for the WRW (250 hours per year versus 2000 hours annually). [9]

Several of the cited documents make it clear that exposure assessments assumed neither of these human receptors is engaged in construction activities or will experience substantial exposure to

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exposed to whatever is in that dirt by ingestion or inhalation of blowing dust caused by the routine high wind events.

[7] *RCRA Facility Investigation – Remedial Investigation/ Corrective Measures Study – Feasibility Study Report, Appendix A, Volume 2 CRA Methodology and Data Description*, §2.2.2 at P. 5.

[8] USFWS has anticipated the use of volunteers in constructing trails from the beginning of its evaluation of the management of the Refuge. The exposures to these people will be much greater than for WRV. *Rocky Flats National Wildlife Refuge Final Comprehensive Conservation Plan and Environmental Impact Statement, September 2004*, (CCP/EIS) §2.23, P. 31.

[9] *Id* §2.2.6 at P. 16

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contaminated soils. These limitations, while convenient, are not consistent with the fashion in which USFWS intends to manage the Refuge which was described as follows:

> Workers may staff a visitor center, monitor and maintain the trail system, and track the on-site wildlife populations. Visitors may hike, bike, and bird watch at RFETS. WRW receptors are assumed to be adults, while WRV receptors will likely include both adults and children.[10]
>
> Hands-On Work: Programs developed to recruit volunteer participation in prairie restoration may include seed collection, weed removal, or seeding. The work activities would include information sessions on restoration techniques and the benefits of restoring prairie habitat. Volunteers also may be involved with Refuge enhancement projects such as trail construction and general maintenance.[11]

The most extensive soil disturbance apparently anticipated for WRW was post-hole digging and vegetation management.[12] The RI/FS did not calculate the risks to construction workers building trails or highways.[13] None of these assessments anticipated that WRW or volunteers would be engaged in construction of trails such as are now proposed as part of the Greenway project.

It is also important to note that the Comprehensive Conservation Plan/Environmental Impact Statement (CCP/EIS) created by USFWS in an attempt to comply with the National Environmental Policy Act (NEPA) at the creation of the Refuge, did not evaluate any land use proposals involving the construction or use of a highway or bike trails across the Woman Creek and Walnut Creek drainages. Apparently because of this limitation, none of the evaluation of exposures or remedies at the site considered these issues.

While the CCP/EIS dealt conceptually only with the size of possible transportation improvements, it did not address any specific proposal. Further, and more importantly, the CCP/EIS makes clear that a "definitive analysis of the direct impacts of potential transportation improvements is outside the scope of this CCP/EIS." In fact, the CCP/EIS specifically excluded what is now being presented as the Jefferson Parkway Public Highway Authority proposal when it stated that "a detailed analysis of any specific type of transportation improvement along Indiana Street, such as creation of a four-lane divided highway, is outside the scope of this

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[10] *RCRA Facility Investigation – Remedial Investigation/ Corrective Measures Study – Feasibility Study Report, Appendix A, Volume 1 Executive Summary*, §5.2.1 at P. 6.

[11] CCP/EIS at P. 31

[12] *Corrective Action Decision/Record of Decision for Rocky Flats Plant (USDOE) Peripheral Operable Unit and Central Operable Unit Jefferson and Boulder Counties, Colorado*, Sept 2006, [CAD/ROD] at P.21.

[13] Letter from Carl Spreng, CDPHE, and Vera Mortiz, EPA, to David Lucas, USFWS, dated September 21, 2011.

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CCP/EIS."[14] Likewise, the only trail systems described in the CCP/EIS accessed the Refuge well North of Walnut Creek and outside of the Wind Blown Exposure Unit.[15]

The performance and adequacy of the remedies for the Central Operating Unit, have never been evaluated in light of the actual and planned land use changes. As the operation of these remedies directly impacts the migration of contamination into the Refuge east of the Central Operating Unit, this Five-Year Review must now require that evaluation.

Elements of the Five-Year Review

The point of a Five-Year Review is to determine whether the remedy at the site is protective of human health and the environment. According to EPA guidance[16,17] there are three key questions to be answered in assessing the protectiveness of the remedy. Of the three, two of the questions must be answered in a fashion reflecting the need for new study and evaluation. These are:

- Question B - Are the exposure assumptions, toxicity date, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

- Question C - Has any other information come to light that could call into question the protectiveness of the remedy?

Question B must be answered negatively because the exposure assumptions are no longer valid. These assumptions must be reevaluated because the planned land use of the areas of the Refuge impacted by the remedies on the Central Operating Unit have changed. The Site Conceptual Model and assumption that the most conservative exposure scenario for a human receptor is a wildlife refuge worker [18] is no longer valid because of proposed and actual changes to land use, and because of USFWS' plans to use volunteers.

Increased human use is anticipated in the form of the construction activities for the trail/bike path of the Greenway proposal[19] and construction of a highway in the right-of-way granted to

[14]CCP/EIS at §4.16, P. 192.

[15]*Rocky Flats National Wildlife Refuge Record of Decision Final Comprehensive Conservation Plan*, February 2005, P. 5.

[16]*Clarifying the Use of Protectiveness Determinations for Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews, SEP 13, 2012; OSWER 9200.2-111*

[17]*Comprehensive Five-Year Review Guidance (EPA 540-R-01-007), June 2001*

[18]*Third Five-Year Review Report for the Rocky Flats, Colorado Site, US DOE, July 2012, at P. 75.*

[19] In its current form the Greenway proposal would bring a bike path and trail under Indiana and through areas downhill of the Legacy Management Area crossing Walnut and Woman Creeks. All of these areas are known to be contaminated and were further impacted by the flooding events of 2013 and 2015. This type of land use was never evaluated because it was never intended that the public would access these areas. The contamination levels in

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Jefferson Parkway Public Highway Authority during this most recent five-year period. Both of these proposals would place humans routinely in the Walnut Woman Creek drainages and Wind Blown Exposure Unit.

Neither of these proposed land use activities was evaluated in the RI/FS. In fact, the RI/FS and CAD/ROD did not evaluate the specific risks in the wind blown area because none of the then planned land uses involved construction or even meaningful human use in this area. There were to be no trails or facilities, so even visits by a WRW would be rare.

These land use changes are critical because while most of the Peripheral Operating Unit has suffered only small amounts of known impact from the industrial activities at Rocky Flats, "plutonium-239/240 exists above background in surface soil in the Wind Blown EU".[20] There can be no valid assumptions about human exposures from changed land uses in the Wind Blown Exposure Unit, especially in the Woman and Walnut Creek drainages, based upon prior work because these changed land uses and resulting exposures were not previously considered.

Additionally, increased exposures to radioactive materials mobilized during flooding events has not been evaluated. These radioactive materials may be found in sediment or groundwater. The Comprehensive Five-Year Review Guidance at section 4.0 specifically calls out natural disasters, such as a 100-year flood event, as requiring an affirmative answer to Question C from the EPA Guidance. This makes further evaluation of the adequacy of the remedy in light of the flooding event a necessary outcome of this five-year review.

That there has been a 100-year flood event cannot be disputed.[21] Unfortunately this Contact Record minimized the impact of that flooding because it relied only on preliminary data. In fact, much of the desired data does not seem to exist due to equipment limitations, equipment failures and because of road damage on both Indiana and Hwy 93 caused by the flooding.[22]

More recent studies by Wright Water Engineers[23] have documented that the flooding event has had an impact on the distribution of contaminants such as anthropogenic (not naturally occurring) uranium on the site. That extreme storm events can mobilize uranium in unexpected ways seems obvious. The resulting discharge of contaminants was not anticipated when the remedy was selected and due to the equipment failures is unmeasured and unevaluated. Because

these areas are higher than any other part of the Refuge.

[20] CAD/ROD at P. 49.

[21] Rocky Flats Site Regulatory Contact Record 2015-01 at P.2

[22] See May 17, 2016 Letter from S. Surovchak, DOE Legacy Site Manager, to C. Hanson and J. Cirelli, Town of Superior Board of Trustees.

[23] *Evaluation of Water Quality Variability for Uranium and Other Selected Parameters in Walnut Creek at the Rocky Flats Site, Revision 1, September 2015, Project 071-091.020*

of these issues whether or not the remedies are protective of human health and the environment, is in question and was discussed at length in the Wright Water Engineers study as follows:

> The effect of very large storms is an initial short-term dilution period caused by increased runoff which first results in lower uranium concentrations in surface water. This is followed by a prolonged long-term effect of increased dissolved oxygen in groundwater entering the Walnut Creek drainages. Where anaerobic waters become aerobic, immobilized U(IV) species can be oxidized to soluble U(VI) species, helping to mobilize and increase concentrations of uranium in surface water.[24,25]
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> At specific monitoring locations, limited isotopic data collected from samples following the September 2013 flood indicate that during the post-flood period the percentage of natural uranium decreased slightly when concentrations of total uranium increased. While this relationship is apparent at several locations, particularly in South Walnut Creek, GS10 is the only location to have more than three sample results to base this observation. Since both natural and anthropogenic uranium respond in the same way to changes in water chemistry, the relatively minor increase in the anthropogenic fraction may indicate contributions from other anthropogenic sources that don't normally contribute to the uranium load in the stream. These other intermittent sources could potentially include sub-surface anthropogenic uranium that is mobilized when exposed to increased levels of groundwater and/or increased contributions from sources with higher than average anthropogenic fractions, such as an increased volume of groundwater from the former Solar Evaporation Ponds area that is not collected by the SPPTS [Solar Ponds Plume Treatment System]. This suggests that during and following the September 2013 flood event, previously immobile anthropogenic uranium sources may have been mobilized, possibly by a rising groundwater table contacting anthropogenic uranium that normally is above the groundwater elevation, and/or by increased mobilization by surface flows of specific anthropogenic sources, such as bed sediments located near anthropogenic inputs to stream flow. [26]
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> In North Walnut Creek, the measured fraction of natural uranium (versus anthropogenic uranium) at SW093 (approximately 90 percent) is higher than at downstream locations GS13 (approximately 71 to 75 percent) and in discharges from Pond A-4 (74 to 75 percent). The decrease of the natural uranium fraction at the further downstream locations reflects inputs of anthropogenic uranium from potentially multiple sources (e.g., SPOUT

[24] Uranium species occur predominantly in the sparingly soluble reduced state U(IV) or in the more highly soluble and mobile oxidized state U(VI). *Id* at P. ES-4

[25] *Id* at P. ES-5

[26] *Id* at P. ES-9

> discharges, groundwater not collected by the SPPTS, and channel sediments with anthropogenic uranium).[27]
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> Isotopic data collected from samples following the September 2013 flood period indicate that, during this period, the percentage of natural uranium decreases slightly when concentrations of total uranium increase, at specific locations (based on limited data). This suggests that previously immobile anthropogenic uranium sources were mobilized during and following the flood event. A potential explanation is that a rising groundwater table might contact anthropogenic uranium that previously existed above the pre-storm groundwater level.[28]
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> In comparison with SPOUT, a more significant source of anthropogenic uranium in North Walnut Creek appears to come from groundwater from the former Solar Evaporation Ponds area that is not collected by the SPPTS. The effect of anthropogenic uranium in groundwater not collected by the SPPTS is reflected at station GS13 and at other monitoring locations further downstream. All of these downstream locations contain substantially less natural uranium (approximately 75 percent) compared to the upper part of the drainage, as measured at SW093, which has approximately 90 percent natural uranium.[29]

There has been no effort to sample sediments or groundwater to the east of the Central Operating Unit along the Walnut or Woman Creek drainages even though the magnitude of the flooding events and the Wright Water Engineering report make it clear that contaminated sediments and water moved from the Central Operating Unit onto the Refuge and perhaps even East of Indiana. The flooding event makes it critical that new sampling activities take place in order to evaluate whether flood control efforts on the Central Operating Unit are adequate to protect the remedies and whether additional remedial efforts to reduce the potential for human exposures east of the Central Operating Unit are necessary.

Of great interest to us is whether or not the flooding events mobilized contamination from the terminal ponds. It's clear that the terminal ponds were intended to and have functioned as locations where contamination from upstream locations is allowed to settle. Data shows that this function is critical as water quality above the ponds has not always met the water quality standards.[30] That, of course, calls into question any decision to breach these ponds, but that is an

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[27] *Id* at P.74
[28] *Id* at P. 75
[29] *Id* at P. 76
[30] https://www.colorado.gov/pacific/cdphe/rocky-flats-water-quality-measure

issue for another day as the ponds are surprisingly not a formal part of the current remedy. Without the ponds, however, we believe that the remedies are much more vulnerable to failure and that consequences would be more significant.

For the purpose of the five-year review, the question is more fundamental. It is clear that the engineering features in place did not function well during the flooding event. Sampling systems were off-line and overwhelmed, so there is simply no data from which any conclusion can be reached about the degree to which contaminants were mobilized and, therefore, redeposited in areas where the land use changes will create public contact and exposure. The lack of data does not justify the cavalier assumption that nothing bad has happened. In fact, the opposite is true and because DOE has not bothered to look, we do not know whether substantial contaminant levels now exist in areas where increased human contact and use is planned. The inability of the remedies to cope with the flooding event must be corrected or nobody can have faith in whether or not public health and environment is being adequately protected.

Given the changes in proposed land use in these areas and the flooding event, it is not reasonable to conclude that exposure assumptions conducted ten or more years ago are still valid. New exposure pathways now exist that have never been evaluated due to changes in land use and the 100-year flooding event. Both of these very significant changes happened within the last five years and directly impact the reliability of the human exposures scenarios previously used to select the remedies.

These new land use activities each will involve substantial construction and dirt moving activities in areas certainly impacted by the flooding conditions. DOE and EPA specifically rejected remedies for the Wind Blown Exposure Area and Central Operating Unit that involved soil removal because of the increased risk posed to workers involved in the removal of contaminated soil (associated with the operation of heavy equipment), and the risk posed to the public from transportation of these soils to disposal sites.[31] These concerns pre-dated the flooding event which may well have deposited additional contaminated soils and mobilized contamination in groundwater potentially magnifying the problems.

In rejecting a soil removal option, the CAD/ROD notes:

> Even though standard earthmoving and transportation equipment is readily available, implementing the alternative without impacting surface water quality is difficult. Weather, wind, and precipitation will increase the potential for soil erosion and sediment loads to the Rocky Flats drainages.[32]

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[31] These risks still exist and cannot now be ignored due to the land use changes. See *Third Five-Year Review Report for the Rocky Flats, Colorado Site, USDOE Doc. No S07693, July 2012 at P. 29;* CAD/ROD at P. 65

[32] CAD/ROD at P. 62

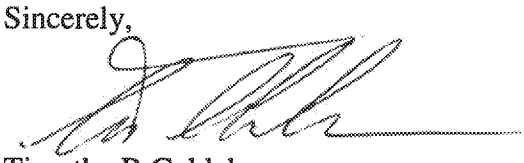
Certainly these concerns are still valid and we see no reason that DOE, EPA, FWS or CDPHE can now simply ignore their earlier positions. The planned new land uses make it impossible to ignore these risks as they will involve precisely the same uncontrolled exposure risks previously noted. There is no data or other information sufficient to establish that the current remedies are adequate to protect human health in the face of the planned land use changes or the impacts of the flooding event. The Five-Year review must recommend either a reevaluation of the remedies to address these issues or call for a halt to the land use changes.

Conclusion

Only a "Short-Term Protective" finding is appropriate under the Comprehensive Five-Year Review Guidance.[33] It is clear that much more must be done before it is reasonable or appropriate to conclude that the remedies will be protective in the long-term. These additional activities must include sampling of soils and sediments in the areas downstream of the Central Operating Unit along Woman and Walnut Creeks in anticipation of construction activities and the resulting human exposures. Protection of the sampling equipment and other aspects of the remedies so that they function during flood events must also occur.

The point of a Five-Year Review is to determine whether or not the remedies are still adequate to protect human health and the environment. That new standards, new data, new technologies and new land use might result in the need to reevaluate the remedy under CERCLA is a given. In this case, that reevaluation must occur. *Ohio v. United States EPA*, 997 F.2d 1520, 1536 (D.C. Cir. 1993)

Sincerely,



Timothy R Gablehouse
for Gablehouse Granberg LLC

TRG/tg

ec: Town of Superior

[33] *See sections 4.2 and 4.3 of the Comprehensive Five-Year Review Guidance.*

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