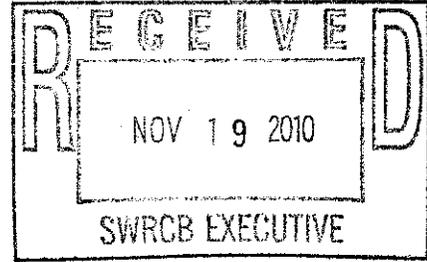


From: Danny & Jan Hayes
RCH Corporation
c/o Taber Consultants
3911 West Capitol Avenue
West Sacramento, CA 95691



To: Jeanine Townsend, Clerk to the Board
commentletters@waterboards.ca.gov

Subject: Draft Order WQ 2010-XXXX-UST
Petition of RCH Corporation for Review of Denial of Petroleum
Underground Storage Case Closure at 7891 Stockton
Boulevard, Sacramento
Sacramento, California

Dear Ms. Townsend:

Enclosed are comments to the Draft Order in the above referenced matter from RCH Corporation, which consists of my wife Jan and myself. The corporation was formed when the Hayes River City Truck Plaza was operating and now consists of my wife Jan and myself. The corporation has been kept active during the assessment/remediation activities at the site.

Thank you for your concern regarding this matter.

Sincerely,

RCH Corp

Danny Hayes
Jan Hayes

**CONSULTANT RESPONSE TO
DRAFT ORDER WQ 2010-XXXX-UST
RCH CORPORATION
DENIAL OF PETROLEUM UST CASE CLOSURE
7891 STOCKTON BOULVD
SACRAMENTO, CALIFORNIA**

BACKGROUND

Free product beneath site

We acknowledge the presence of residual petroleum hydrocarbon free product at depth beneath the vicinity of the UST area in the west-central portion of the site. We believe a petroleum product release occurred sometime around 1980. The basis for this conclusion is the presence of free product only in wells perforated between about 70 and 75 feet below ground surface. This means the release was able to migrate vertically downward until it encountered a barrier. At that time the release spread out, like a pancake, over the barrier. Normally the barrier at a site like this would be the water table. This takes place because petroleum hydrocarbon constituents are generally lighter than water and will tend to float on the water table. Petroleum compounds are not very soluble, so they tend to have limited movement.

If a large volume of free product were released at a site, the free product would tend to depress the water table somewhat. The larger the release, the greater the depression that is generated. Otherwise the water table limits the free product's vertical downward migration. The amount of free product at the Dhami site appears to be limited, thus resulting in little to no depression of the water table.

Historical Groundwater Elevations

The California Department of Water Resources maintains a well monitoring program throughout the state. There is a well located near Hwy 99 and Mack Road, just northwest of the site. Water elevations in this well are within about one foot of the elevations of onsite well, and have been measured twice a year since 1963. The deepest water level in this well was measured in October 1979 at -51.2 feet below mean sea level. That corresponds to a depth of about 75 feet to groundwater beneath the site.

The depth to free product and the historical groundwater elevation correspond exactly. At no other time since the Dhami site began operations in 1961 has groundwater been at that depth. Thus the release had to have occurred sometime around 1980 or slightly before then. We provide this discussion to help you understand how we arrived at some of our conclusions.

Free product is only found in a limited number of wells around the center of the UST area, both former and current UST areas. Before continuing with this discussion we need to provide some additional information, and that has to do with the direction of groundwater flow and the gradient, the angle from horizontal, which helps us understand how quickly groundwater is moving beneath the site and beyond.

Direction of Flow

The Dhami site lies within the Elk Grove pumping cone. This cone is a depression in the water table is caused by long term over pumping of the aquifer creating a hole in the top of the aquifer. The deepest hole was just south of Elk Grove at a depression elevation of -80 feet below mean sea level in 1979, or about 30 feet below the elevation of the water table at the site in 1979. This depression controls groundwater flow in the area around it.

At the Dhami site groundwater has been flowing in an east southeasterly direction since the County began publishing monitoring data in 1979 and about the time of the deep release. There have not been any changes in flow direction for the past thirty years, and likely many years before then.

What does this mean? Essentially it says any movement of petroleum materials would be in this same direction.

Groundwater Gradient

A further piece of information is something called the gradient. The gradient is defined as the angle from horizontal that influences the velocity the groundwater moves. If you filled a bathtub with water the gradient for the water surface would be 0.00 or zero, because the water is not flowing anywhere. The elevation is the same at both ends of the bathtub.

Now move to the American River at the lower end near Sacramento. The water is flowing very slowly because the gradient of the river is very low, measured in feet per mile. If you went up into the mountains the river would be flowing much faster because the gradient was much steeper.

The same gradient applies to groundwater flow and velocity. The gradient has been on the order of 0.0015 feet per foot at the Dhami site for the period of record. This means the groundwater is dropping about 1.5 feet for every 1,000 feet of lateral flow. This gradient is typical for a Central Valley aquifer in the middle of the valley.

Unlike the river, groundwater moves in the open spaces between the grains of the soil, pore spaces. The coarser the grains, the faster the water can potentially flow. Velocity is a function of open pore spaces and the gradient. The larger the pore spaces, and the steeper the gradient, the faster the groundwater flow.

A review of the boring logs for the site indicates there are some sands present beneath the site. These sands are the coarsest materials present and thus the most permeable materials present. These materials have a permeability which is generally accepted to be about 10^{-3} cm/sec. At the Dhahi site groundwater is moving at a velocity about 15 feet per year. Since the assumed release occurred about 1980, or thirty years ago, the maximum distance a water particle or a compound like MTBE or 1,2-DCA might have moved is 450 feet in the downgradient direction. The closest domestic well east of the site is approximately 700 +/- feet from the UST area, or about 45-50 years before TPH could physically reach that well.

Natural Attenuation

When petroleum hydrocarbon compounds are released, they immediately begin to degrade. The degradation occurs in many ways, like volatilization, sorption onto or into soils, solution into pore water or groundwater, to mention a few.

Naturally occurring organisms begin breaking down the petroleum compounds for food. As long as the concentration of the petroleum compounds is not too high to overwhelm the organisms, the degradation process will continue. A migrating petroleum plume will stop moving with the groundwater, and as the organisms continue to degrade the petroleum compounds, the plume will not only stop growing, but is actually begin to recede back to the source area where the release originated.

The opposite can also occur. If the petroleum concentrations are too high for the organisms to survive, the organisms will die and the release will stop degrading or the degradation will be greatly slowed down. That is the case at the Dhahi site. The circa 1980 release migrated to the 70-75 foot zone and then over a few year period, the groundwater level rose to trap the petroleum below the water table in what is called a smear zone. The existing nutrients necessary for degradation to take place were used up, and the trapped plume was restricted to a relatively sterile environment, where little degradation could take place. Hence, we have the continued presence of free product at the 70-75 foot interval. This non-degraded material can sit essentially unchanged for decades, and has.

With the above basic information, here are specific comments related to the draft order.

...the SWRCB draft order requires the completion of a site assessment to address: "a. The extent to which groundwater affected by the Petitioner's unauthorized petroleum release migrated to depths greater than the screened intervals of the existing monitoring wells: and b. The vertical and lateral extent of MTBE and 1,2-DCA in groundwater down gradient of wells, MW-103 and MW-104."

RCH is contesting this requirement in the draft order. We believe the vertical and lateral extent of MTBE and 1,2-DCA, and for that matter, all other released petroleum hydrocarbon compounds, are adequately delineated with the existing site data.

Let's first address the vertical delineation. We know the deepest groundwater level was approximately at a -50 msl or 75 feet below ground surface. This conclusion is based upon the historical groundwater elevation data generated by Sacramento County for the nearby long-term monitoring well and the data on the well logs. We have free product present in MW-2 (perforated 60-80), MW-3 (perforated 60-80), EW-1(55-75), AS-2 (73-75) and AS-5 (73-75). These wells are all clustered around the UST area.

We have demonstrated the direction of groundwater flow has been to the east southeast, using the County's historical water elevation database, the Elk Grove pumping cone, and thirty years of water elevation data. If we step off about 30-50 feet in the down gradient direction to well AS-1 (installed 1999 and perforated between 78-80 feet), we find a well that according to the well log, did not have any TPH odor at any of the depth intervals evaluated. Furthermore, when the well was sampled, the TPH constituents present in the samples were orders of magnitude less than the nearby well within the free product zone.

This well is perforated just slightly below the zone where free product is present just to the west in MW-2 (perforated 60-80 feet) and AS-2 (perforated 73-75 feet). As this well is located immediately down gradient from the free product area and is monitoring the aquifer slightly deeper where the free product has been documented, it seems reasonable to conclude no free product has migrated to or past this location so close to the free product. This well appears to provide a vertical limit to free product migration in the easterly down gradient direction.

With respect to the lateral extent of the TPH, we need to look at wells MW-103, MW-104 and AS-1 to get an indication of the lateral extent of the TPH plume in an eastern and northeastern directions. These wells are located about 50 feet plus or minus east of the UST area, the free product area and in a generally down gradient direction. Actually MW-103 is about 50 feet northeast of AS-2, not down gradient, but side gradient in a direction of concern to both regulators and concerned citizens.

AS-2 has had free product in it since it was constructed in 2002. And yet nearby MW-103 has never had free product, nor for that matter any significant amount of TPH constituents in it since it was constructed in comparison to AS-2. MW-103 was drilled to 70 feet, the top of the zone containing the free product just a short distance to the west of this well's location. When this well was constructed in 2002, about twenty-two years after the release, there was no indication of TPH odor in any samples or free product observed in this well. A review of the water quality sample results for this well shows natural attenuation is an active process in this area.

MW-104 is located about 60 feet east of AS-2 and about 70 feet from MW-2, both wells with free product and high concentrations of TPH constituents. And yet, well MW-104 has consistently contained very low concentrations of TPH compared to the nearby wells just to the west of this well.

Wells MW-103 and MW-104, while being perforated near the current water table, also extend to 70 and 65 feet below ground surface, respectively. The deeper screened interval should

intercept the free product or high TPH concentrations, if they were present in the area of these wells. Actually the concentrations are consistently orders of magnitude lower than the plume wells, but still perforated essentially in similar intervals. This demonstrates the plume is not moving in these directions, and for that matter not moving at all.

AS-1, as mentioned earlier, is only about 30-50 feet east of MW-2 and it's perforations are equivalent to the bottom of the perforations for nearby MW-2. And yet, this well has had orders of magnitude less TPH in it than in the nearby wells to the west in the area of residual free product.

These three wells demonstrate the TPH plume is limited to the immediate vicinity of the UST area. Natural attenuation processes are very active within close proximity of the UST area, rapidly reducing TPH concentrations as the TPH migrates out of the source area. The draft order concurs that natural attenuation is degrading TPH constituents as they migrate from the submerged source area. If they are degrading so much within the first fifty or so feet from the source area, how can TPH constituents from this source be expected to reach potential receptors 500, 700 or 1,000 feet from the UST area? They can't.

The draft order required the sampling and analysis of the groundwater from domestic supply wells within a 1,000-foot radius of the subject site.

We are questioning the need for this groundwater sampling. The hydrology indicates no TPH constituents from this site can reach any of the domestic wells before natural attenuation processes reduce the concentrations to water quality acceptable levels.

Groundwater flow calculations made by my consultant indicate groundwater is moving at a velocity of about 15 feet per year in the downgradient direction, south southeast. There are not any receptors (domestic wells) in this direction.

The closest well is about 550 feet to the northeast, in a cross gradient direction. It would be virtually impossible for any TPH from the UST area to ever reach this well for two reasons. The first is natural attenuation would degrade the TPH to agency acceptable water quality levels long before the TPH could move to this well, even if it was in a downgradient direction. And second, the fact the well is cross gradient means a particle of TPH from the UST area could never reach this well. The TPH would also have to move vertically downward another thirty feet through at least two low permeable layers before reaching the zone the well is drawing from. The next closest well is located about 700 feet east of the UST area. At a groundwater velocity of 15 feet/year it would take a minimum of about 45 years for a TPH particle to move laterally to this well, assuming natural attenuation did not totally degrade all TPH during the migration. This does not consider the TPH also would have to move vertically downward and penetrate a twenty-five foot clay layer to reach the zone this well is drawing from.

Closure of this appears to be consistent with Resolution 92-49. And since any TPH released from the site would be cleaned up by natural attenuation processes, there is no threat to any of

the domestic water supplies in the area. Resolution 92-49 allows leaving material in place if it can be demonstrated that the action does not threaten human health or the environment and the material will eventually meet water quality objectives within a reasonable length of time. This length of time can be on the order of decades or even hundreds of years.

With the introduction of Sacramento City water to the local water district's water supply about 2005, and now with the Freeport intake and the new Vineyard water treatment plant going on line, which will provide up to an additional 80 million gallons of surface water to this south area, the likelihood that there will be a need for significantly more groundwater than is currently utilized in the area of the site is remote. The groundwater elevation near the site has been rising at a rate of almost a foot per year since 1980 and with the introduction of the imported water mentioned above, this rise is expected to continue. The rise in water levels further minimizes the potential for any of the residual TPH at the Dhami site to impact any domestic wells near the site.

We believe this site meets all the criteria necessary for a low risk closure consistent with Resolution 92-49 and we respectfully ask the Board Members to vote no on this draft order. We further request the Board Members direct staff to reconsider the petition and present a new order recommending site closure.

Thank you for your consideration of these comments.