



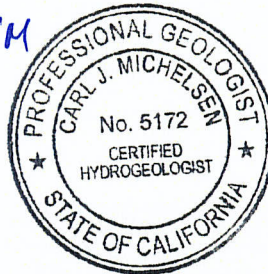
MEMORANDUM

To: Mr. David Hopkins
Regis Homes Bay Area, LLC

From: Carl J. Michelsen, P.G., C.HG. *CM*
PES Environmental, Inc.

Date: April 17, 2015

Subject: Source of VOCs in Soil Vapor
39155 and 39183 State Street, Fremont, California



Project No.: 1098.007.01.012

In PES' memorandum dated February 12, 2015 it was concluded that the pattern and concentration of PCE detections in soil vapor samples collected within State Street adjacent to the sewer line pointed to the State Street sewer as the source of the PCE in soil vapor. Since then, additional evidence has been gathered that further supports this conclusion, as follows:

NORGE CLEANERS, 39067 STATE STREET, OPERATED AS AN ONSITE DRY CLEANER FOR 27 YEARS¹

- Dry cleaning operations began in 1969 and by 1996 all equipment and chemicals had been removed².

RECORDS SHOW THAT NORGE CLEANERS USED AND STORED PCE ONSITE

- PCE was used and stored in 1996, 1994 and 1992 and is implied to have been used/stored on site in 1995 and 1993 based on Hazardous Materials Permit & Storage Fee Invoice records³; and
- PCE was stored in drums onsite (maximum quantity – 100 gallons)⁴.

¹ The location of the former Norge Cleaners has been added to Plate 3 of the February 12, 2015 Memorandum, attached.

² City of Fremont records provided via email from Cliff Nguyen on March 17, 2015.

³ City of Fremont records.

⁴ 1992 Hazardous Materials Management Plan for Norge Cleaners.

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NORGE CLEANERS WAS SERVICED BY A SANITARY SEWER LATERAL THAT DISCHARGED TO THE MAIN SEWER TRUNK LINE LOCATED IN STATE STREET

- Microfiche maps provided to ACWD indicate the sewer lateral is located just outside of the location of the former dry cleaner. The lateral flows northeasterly and connects up with the main sewer line in State Street.

A STORM DRAIN LATERAL SERVICES THE PARKING LOT LOCATED EAST OF NORGE CLEANERS AND DISCHARGES TO THE MAIN STORM DRAIN LOCATED IN STATE STREET

- The storm drain is depicted as a green line on the attached Plate 3.

BOTH THE STORM DRAIN AND THE SANITARY SEWER IN STATE STREET DRAIN TO THE SOUTHEAST, PAST THE SUBJECT PROPERTY AT 39155/39183 STATE STREET

- The active State Street sewer drains to the southeast, as evidenced by the flow of wastewater in a sewer video taken on April 16, 2014⁵; and
- Storm drain maps provided by the City of Fremont depict flow to the southeast, down State Street.

DRY CLEANING EQUIPMENT IS DESIGNED TO DISCHARGE WASTEWATER TO SEWERS. DRY CLEANING WASTEWATER CAN CONTAIN A SUBSTANTIAL QUANTITY OF PCE

- The Central Valley Regional Water Quality Control Board concluded that “In general, information provided by dry cleaner operators, inspections done by staff, and manufacturers’ service manuals show that dry cleaning equipment is designed to discharge wastewater to the sewer. Figures 8 and 9 are schematics showing the two main types of wastewater discharges from dry cleaning equipment: liquid from the PCE-water separators and cooling water”;

⁵ USD sewer video; File: 4124573_X17024X17027.wmv.

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- “The water from the PCE-water separators has been in direct contact with PCE. Water samples from separators at some cleaners have had such high concentrations of PCE that after the sample bottle sat for a day, solvent had separated out. As much as 30 percent of some samples have been pure solvent. PCE-water separator waste liquid has had PCE levels up to 1,119,300 ug/l (ppb), with an average of 151,800 ppb and median 64,000 ppb (Figure 11). Cooling water samples at dry cleaners have usually ranged from 3 to 70 ppb PCE, but some have been as high as 4,000 ppb (Figure 12)⁶”; and
- In Santa Clara Valley, the Santa Clara Valley Water District has concluded that “PCE has been used for dry cleaning in the Santa Clara Valley groundwater subbasins for more than fifty years. Hazardous waste laws governing handling and disposal of PCE were adopted in the mid 1980s. Air pollution regulations required that dry cleaners operate under permit and control emissions beginning in the late 1970s. Therefore, the 1946 through 2001 period for this study includes at least three decades of unregulated use, handling, and disposal of PCE at dry cleaners and other facilities using solvents in Santa Clara County. The practice of discharging dry cleaning condensate wastewater to sewer lines was legally permissible and commonplace for at least forty years of the period during which dry cleaning with PCE was prevalent. Other unregulated practices, which were not illegal at the time but are viewed today as unwise, include disposal of PCE soaked filters in garbage dumpsters, dumping of waste PCE to storm drains, in dry wells, and on the ground, and bringing drummed wastes to unlined landfills and burn dumps. These practices, where employed, present a significant threat to groundwater, and may be the cause of substantial PCE contamination”⁷.

THE SEWER VIDEO SHOWS EVIDENCE OF A SAG IN THE SEWER PIPE AND TREE ROOTS THAT ENTER THE PIPE VIA JOINTS

- At between approximately 10 to 48 feet upstream (northwest) of Manhole 17027 an apparent sag is present in the main trunk line as evidenced by a higher water level in the pipe (indicative of water accumulation). Up and downstream of this interval the water level is lower. Tree roots are present on the upper portion of pipe joints located approximately 142 and 177 feet northwest of Manhole 17027. Manhole 17027 and the

⁶ Izzo, Victor J. California Regional Water Quality Control Board, Central Valley Region, 1992. *Dry Cleaners – A Major Source of PCE in Ground Water*. March 27.

http://www.swrcb.ca.gov/rwqcb5/water_issues/site_cleanup/dry_cleaner_rpt.pdf

⁷ Mohr, Thomas K.G., *Study of Potential for Groundwater Contamination from Past Dry Cleaner Operations in Santa Clara County*.

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approximate location of the sag and the tree roots have been added to Plate 3 (attached) from our February 12, 2015 memorandum.

THE LOCATION OF THE SAG AND THE TREE ROOTS COINCIDE WITH THE LOCATION OF THE ELEVATED PCE CONCENTRATIONS DETECTED IN SOIL VAPOR SAMPLES COLLECTED WITHIN STATE STREET AND THE ADJACENT PROPERTY. PCE RELEASES FROM THESE DEFECTS IS CONSISTENT WITH PUBLISHED METHODS BY WHICH PCE CAN LEAK FROM SEWER LINES

According to the CVRWQCB (Izzo, 1992), “there are five likely methods by which PCE can penetrate the sewer line:

1. Through breaks or cracks in the sewer pipes
 2. Through pipe joints and other connections
 3. By leaching in liquid form directly through sewer lines into the vadose zone
 4. By saturating the bottom of the sewer pipe with a high concentration of PCE-containing liquid and then PCE volatilizing from the outer edge of the pipe into the soils
 5. By penetrating the sewer pipe as a gas.”
- “Many of the sewer lines have low spots in which liquids accumulate. These low spots are caused by settlement or poor construction which causes the sewer line to bend. Sewer pipes are brittle, so when the line bends, fractures are likely to occur, increasing the leakage of the pipe. Since PCE is heavier than water (1.63 times the weight of water at 20°C), it tends to collect in these low spots and then flow through the pipe fractures into the vadose zone.”;
 - PCE can penetrate through breaks or cracks in the sewer pipes (Method 1). “Leakage through small fractures in Method 1 is likely in most of these brittle pipes as they settle. Small fractures occur causing an increase in the permeability of the pipe. This would cause a constant leakage. These small fractures cannot be seen by video taping the inside of the sewer pipe.”; and
 - “Methods 1 and 2 also apply to PCE in vapor form which can move easily through breaks, cracks, joints, and other connections.

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THE SEWER VIDEO SHOWS EVIDENCE OF LEAKAGE INTO THE SEWER LINE

At approximately 21 feet upstream of Manhole 17027 a plastic pipe lateral enters the State Street sewer from the left (southwest). This pipe lateral is consistent with a mapped lateral that was installed as part of construction of the Fremont Bank at the subject property in 1988⁸. At the base of the mastic or tar-filled joint between the plastic lateral and the main sewer line there is apparent seepage into the sewer. The distance between this lateral at 21 feet and the location of the pipe joint at 177 feet that has the largest tree roots is 156 feet. Given this distance and the mapped gradient on USD's map of 0.003, there is a vertical elevation difference between these two locations of about 6 inches. Consequently, wastewater leaking out of the sewer at the tree root joint would have a 6 inch difference in head compared to the pipe lateral. This head difference explains why water is leaking from the backfill back into the sewer at the pipe lateral location. Additionally, the presence of water in the sewer backfill and the higher head explains how PCE wastewater leaking from the sewer could have spread laterally onto the subject property and led to the detection of PCE in onsite soil vapor samples, such as at boring locations B21 and B30.

AN ADDITIONAL POTENTIAL SOURCE OF PCE IN SOIL VAPOR IS RELEASES FROM THE STORM DRAIN SYSTEM

- As noted above, dumping of waste PCE to storm drains is a recognized unregulated past practice at dry cleaning facilities. A storm drain lateral, and associated catch basin inlets, is located about 100 feet southeast of the rear of the former Norge Cleaners facility and discharges to the State Street storm drain;
- Review of a USD storm drain videos taken April 14, 2015⁹ shows evidence of water seepage/wicking at virtually every pipe joint, indicating the joints are places where water can move into the pipe from the backfill or out of the pipe into the backfill (depending on the head in the pipe, relative to the backfill). There are also two locations where small roots are present at pipe joints, as shown on Plate 3. One of the tree root locations is adjacent to boring B37, wherein 5,000 $\mu\text{g}/\text{m}^3$ PCE was previously detected in soil gas; and
- The detection of PCE at boring locations B15 and B27, northwest of the subject property, is most likely due to releases of PCE to the nearby storm drain lateral, which services the parking lot behind the former Norge Cleaners.

⁸ Utility Site Plan prepared by Balch Enterprises, Inc., dated September 28, 1988.

⁹ USD videos taken April 14, 2015: State St. – Storm Drain – MH3-MH4.wmv and State St. – Storm Drain – MH3-MH2.wmv.

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**THERE IS NO EVIDENCE THAT A DRY CLEANER OCCUPIED THE BUILDINGS
AT THE 39155/39183 STATE STREET LOCATION**

- The original building located on the property was constructed in 1966 and was occupied by a Payless Drug Store and later by a Nob Hill General Store. Another building, constructed in the late 1980s, was occupied by Fremont Bank¹⁰. The remainder of the subject property was a paved parking lot, driveways, and associated landscaped areas.

CONCLUSION

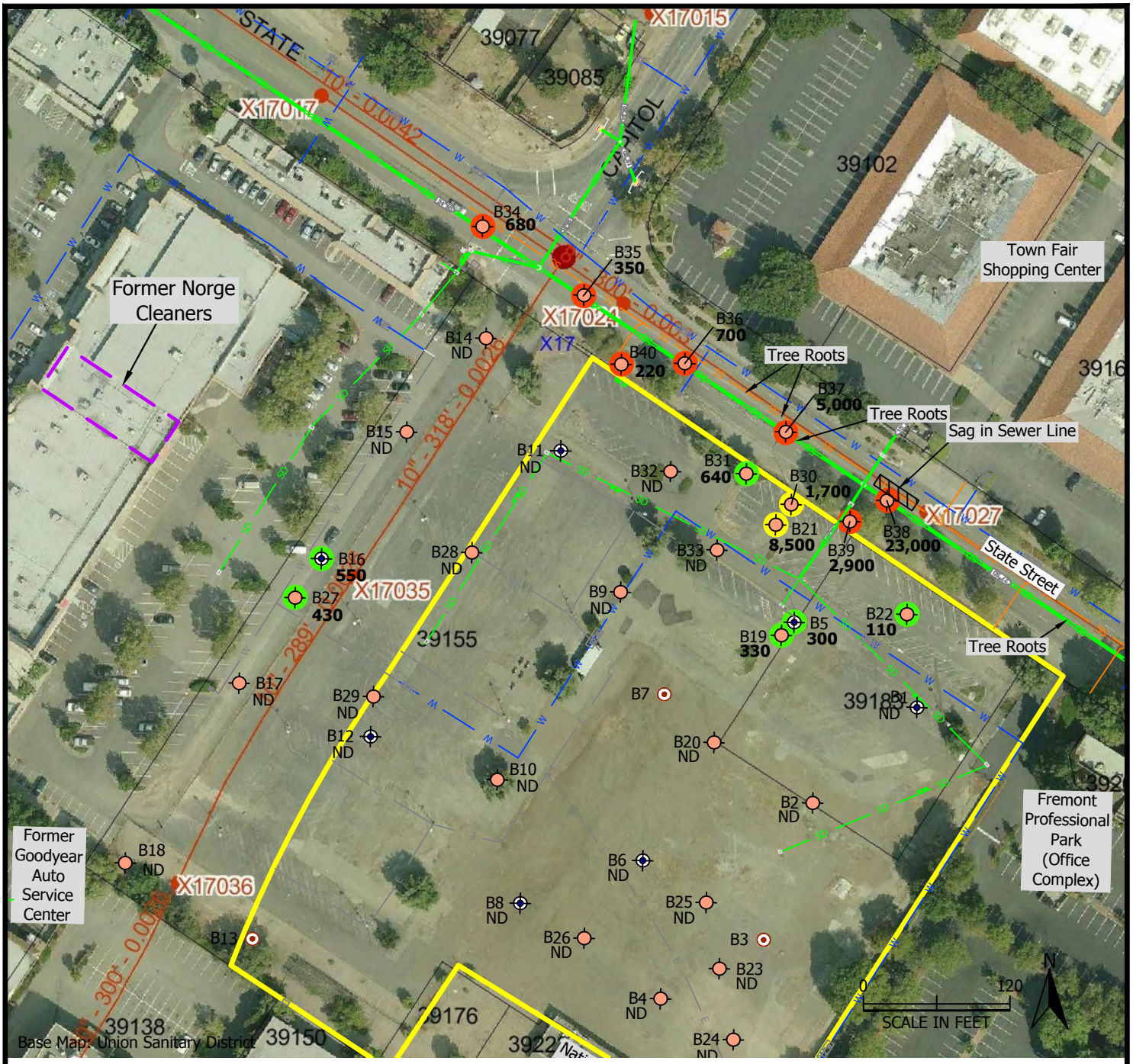
Norge cleaners operated a dry cleaning business for 27 years and used and stored PCE on-site. In the past it was common practice to dispose of PCE-containing wastewater to the sewer. The sewer lateral at the former Norge cleaners drains to State Street.

The sewer line within State Street has tree roots in pipe joints and an apparent sag at the location where elevated PCE concentrations were found in soil vapor samples collected within State Street. These defects represent preferential pathways for PCE laden wastewaters to have migrated from the sewer pipe at some point in the past into the sewer backfill and surrounding native soils. Disposal of PCE wastewater at Norge Cleaners and leakage from the sewer represents the best explanation for the presence of elevated PCE concentrations in soil vapor samples collected within State Street and on the subject property. Past releases from the storm drain may also have contributed, particularly the detection of PCE near the storm drain lateral that serviced the rear parking lot of the former Norge Cleaners.

Furthermore, there is no evidence that a dry cleaner occupied any of the buildings at the 39155/39183 State Street location.

Consequently, the subject property is not the source of PCE detections in soil gas that impinge onto the site. No further action is warranted, other than to appropriately incorporate vapor mitigation measures into the design of future buildings to be constructed at the site.

¹⁰ PES, 2014. *Phase I Environmental Site Assessment, 39155 and 39183 State Street, Fremont, California.* July 15.



Explanation

- Approximate Property Boundary
- B13 Soil Sampling Location
- B17 Soil Vapor Sampling Location
- B6 Soil Vapor and Soil Sampling Location
- W Water Line
- E Electrical Line
- SD Storm Drain Line
- SS Sanitary Sewer Line

- 680** Concentration of tetrachloroethylene (PCE) in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)
- ND Not detected at or above laboratory reporting limit.
- Concentration is greater than residential ESL ($210 \mu\text{g}/\text{m}^3$).
- Concentration is greater than site-specific vapor intrusion screening level for residential land use ($1,260 \mu\text{g}/\text{m}^3$).
- Concentration is less than site-specific vapor intrusion screening level for residential land use.



PES Environmental, Inc.
Engineering & Environmental Services

PCE Concentrations in Soil Vapor
39155 and 39183 State Street
Fremont, California

PLATE

3