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Mr. Jeffrey Crawford
RI Department of Environmental Management
235 Promenade Street
Providence, RI 02908-5767

Subject:

Draft Five Year Review Report – Anthony Carnevale Elementary School and Del Sesto Middle School

Date:
March 2, 2012

Dear Mr. Crawford:

Contact:
Donna Pallister, PE

This letter is being submitted to present comments on the Draft Five Year Review Report for Anthony Carnevale Elementary School and Del Sesto Middle School on behalf of the City of Providence.

Phone:
401-738-3887

The objective of the Five Year Review, as stated in the Second Assented to Supplemental Order, quoted in the Five Year Review Report, was to “*conduct a review of the approved remedial action at the Springfield Street Schools Site to assure that human health and the environment are being protected by the remedial action being implemented.*” Based on our knowledge of the Site, which has included conducting quarterly monitoring, we believe that the remedy has been and continues to be protective of human health and the environment. Since the remedy has been implemented, there has been no documented exposure of users of the Site to hazardous materials at the Site, and no evidence that the remedy is not protective of human health and the environment.

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Our ref:
WK012152.0007

Specific comments on various sections of the report are provided below.

Carbon Dioxide Detected on Site

The report notes correctly that carbon dioxide has been detected in soil gas at concentrations that exceed the “action level” established by the *Long-Term Operation and Maintenance Plan and Site Contingency Plan* (O&M Plan) contained in the *Remedial Action Work Plan* prepared by ATC dated April 2, 1999, revised May 3, 1999 and May 9, 1999, and approved by Rhode Island Department of

Imagine the result

Environmental Management in a letter dated June 4, 1999. The action level established in the O&M Plan is 1,000 parts per million (PPM). No rationale was presented in the RAWP or O&M Plan for establishing this action level.

Carbon dioxide is not a toxic contaminant. Carbon dioxide is the fourth most abundant gas in the earth's atmosphere, and is produced through respiration by living things, including people. Carbon dioxide is produced by bacteria during degradation of organic materials, as can occur in a landfill. However, this process also occurs in soil when waste is not present. For example, the reason that lawns and golf courses are aerated by punching holes through the surface is to release carbon dioxide produced by the root system of the grass and allow oxygen to enter the soil. Normal plant root systems take in oxygen and release carbon dioxide. The concentrations of carbon dioxide detected at the Springfield Street schools complex is within the ranges reportedly detected at other grassy areas.

Carbon dioxide is typically monitored as an indicator parameter. Higher concentrations of carbon dioxide correlate with lower concentrations of oxygen and can indicate that a system is becoming anaerobic (oxygen starved). Methane is produced in an anaerobic environment. The "Landfill Gas Primer" from the Agency for Toxic Substances and Disease Registry (ATSDR) describes the landfill gas generation cycle and composition. Typical landfill gas contains 40% to 60% carbon dioxide, far more than has ever been detected at this Site. ATSDR also notes that peak landfill gas generation usually occurs within 10 years of when the waste was deposited in the landfill, and almost all gas is produced within 20 years of when the waste is placed in the landfill, with some exceptions. According to the Site Investigation Report, solid waste was deposited at this Site between 1965 and the mid-1970's. Therefore, the solid waste at this Site has been in the ground for approximately 35 years, and is well beyond the time when significant amounts of landfill gas would be produced. This is consistent with the monitoring, which has not detected any evidence of methane generation at the Site.

We would like to note that on page 14 (Section 3.2.1.1) of the Five Year Review Report it incorrectly states that ARCADIS attributed the "elevated ... concentrations of carbon dioxide in soil vapor and in the system influent / effluent to bacterial respiration associated with natural decomposition of buried solid waste." While we did attribute the presence of carbon dioxide to bacterial respiration associated with natural decomposition processes, we believe these processes could occur in the absence of solid waste.

Carbon dioxide in indoor air is usually measured to evaluate whether an adequate quantity of fresh air is being introduced by the heating, ventilation and air conditioning units. The presence of carbon dioxide inside buildings is typically due to the fact that building occupants exhale carbon dioxide as part of normal respiration. Concentrations detected inside the building have been within normal expected levels of occupied buildings, as noted in the quarterly monitoring reports.

Overall, we believe that the concentrations of carbon dioxide that have been detected in soil gas at the Site are within normal expected ranges and do not present any risks to occupants of the Site or Site buildings.

Comments on Section 3.4.2

The statements in this section inaccurately describe statements supposedly made by Donna Pallister of ARCADIS regarding cracks in the building facades. First, per the monitoring plan, the cap is inspected on a quarterly basis. Since the building façade is not part of the cap, it is not inspected by ARCADIS. Second, I do not have an opinion regarding whether cracks are more prevalent at one building or the other since it is not part of our inspections. Third, I did state that the middle school was constructed on pilings and that the elementary school was constructed on clean fill after the geotechnically unsuitable solid waste and fill were removed. However, I do not believe that the fact that the middle school was constructed on pilings would make it any more prone to uneven shifting or damage due to settling of underlying soil. In fact, I believe that construction of the building on pilings should protect it from potential damage due to settling of the soil.

Comments on Sub-Slab Ventilation System

As noted in the report, each of the buildings at the Site is equipped with a sub-slab ventilation system to prevent soil gas from entering the Site buildings. These systems were installed as a precaution, since no evidence of landfill gases or toxic contaminants have been detected in soil gas or groundwater during the Site Investigation. The Site Investigation Report did not identify a vapor intrusion risk.

The contaminants of concern identified by the Site Investigation were arsenic, lead, and total petroleum hydrocarbons (which exceeded the residential direct exposure criteria in only one of 28 samples analyzed for this constituent). Arsenic and lead are not volatile and therefore do not present any risk to site occupants due to vapor intrusion. Quarterly groundwater monitoring for over ten years has not detected any

concentrations of contaminants in groundwater at concentrations above the RIDEM GB groundwater objectives.

Based on the results of monitoring over more than 10 years, there is no evidence of a vapor intrusion risk at the Site. Therefore, we do not see any reason to perform additional investigation of the sub-slab ventilation system as recommended, since there is no identified risk.

In addition, since no risks have been identified, we do not believe that any additional inspections of the system are necessary to prevent the occasional short interruptions caused by water collecting in the tank of the eastern blower at the middle school. The middle school building has two blowers, one located in the front part of the building and one in the back. Only the blower in the front occasionally shuts down due to water in the knockout tank. Since the second blower in the back is still operating, it continues to evacuate air from the crawl space beneath the building when the other blower is not operating.

Comments on Cap Condition

As noted in the Five Year Review, we have observed small cavities that develop in the cap due to settling of the underlying soil. However, reports from people who were present during construction, and observation of excavations performed for Site repairs, have indicated that the cap thickness at the Site is generally over two feet, and as much as six feet of clean fill was reportedly placed in some areas in order to grade the Site properly.

The depressions that have been observed at the Site have been located primarily along the middle school foundation and near the transformer at the back of the middle school, in areas that are not used by students. Although small depressions have developed in this area due to settling, the current inspection schedule has been adequate to observe and repair these depressions well before the cap is compromised to a degree that would present a risk of exposure.

Conclusion

Overall, we believe the monitoring has shown that the remedy has been and continues to be protective of human health and the environment. Since the remedy has been implemented, there has been no documented exposure of users of the Site to hazardous materials at the Site.

Sincerely,

ARCADIS U.S., Inc.

Donna H. Pallister, PE, LSP
Senior Engineer

Copies:
City of Providence