

Managing a catastrophic release to achieve rapid decision making and minimize long term impacts

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- Release description
- Immediate characterization
- High resolution characterization
- Understanding receptors and pathway
- Rapid Corrective Action design and implementation



The release

- September 18, 2017: 200 gallon of product found in a STP sump. Leak has been repaired, but technician thinks there may be cracks in the sump, as the fuel level appears to be going down
- September 19, 2017. Three apartment buildings affected: fire departments from two counties on scene.....



Video of release





- Estimated 5,600 gallons released over four days after repairs on September 15
- Sump liquid sensor alarm on
- Leaked through STP sump
- 1982 system



- Free phase gasoline identified in two subsurface dewatering sumps
- Next door subsurface gym closed due to petroleum vapors
- Lowest underground parking level on nearest apartment building evacuated. Odors in stairwells and lower floor corridors

Third apartment building with slight petroleum odors in lowest garage level but no restrictions needed



Stakeholders

- Gas station owners
- Three property owners
- Gym business and users
- 200+ Residents of three multistory buildings
- Two counties: fire departments, environmental services, health department, storm water management



- Indoor Air
 - Residents
 - Workers
 - Customers
- Surface water
 - Storm drains
 - Nearby streams

Lobby/Elevator shafts 200-400 ppm in air Sump Water • TPH 130 mg/l • Benzene 5.2 mg/l • MTBE 1.1 mg/l



Emergency response Initiated

- Ventilating structures September 20
- Soil Investigation September 22
- Diverting sump discharges to treatment system on gas station – October 4
- Subsurface vacuum extraction system September 22 to October 6
- Monitoring storm water systems and discharges September 20
- Weekly updates to stakeholders from RP consultant



Site History

Gas station from 1950s
Surrounding Area developed in 1970s
Neighboring properties developed 2003-2006
1991, 1994 and 2008 cases no corrective

action



Changing Building Receptors

Surface water receptors









Geology and Hydrogeology from old cases

- Weathered bedrock, or Clay, or Potomac Formation "sandy clay" ?
- Groundwater either absent (to 50 feet) or present at 9', then 15' then 25' ?
- Recharge to east, flow to west/south west toward streams



Initial conceptual model







Long Screen Emergency Response 50' Wells: September 20-22



High Resolution Site Characterization October 30 to November 3







High Resolution Site Characterization October 30 to November 3





Revised conceptual model

• Two, perhaps three, permeable zones:

- 5-15' (dry but most petroleum "stored" here)
- 25-30' (offsite, water at 30', dissolved phase plume)
- 35-40'
- Permeable zones divided by clay
- Contaminant movement in discrete seams



Corrective action Plan January 2018

- Replace long screen wells
- Excavate soil
- Remove old UST infrastructure
- Install vacuum extraction system
- Expand monitoring well network
- Develop Remedial objectives



Corrective Action Plan Objectives

Offsite residential exposure and surface water standards

Sump water (ug/l) Subslab soil gas (ug/m³)

Benzene	12	103
Toluene	43	17,300
Ethylbenzene	4.3	367
Xylenes	33	333













New UST excavation





UST excavation ready



Reg Mid Prem 86100 UST Ready to lift in place





Soil vapor extraction point installation



Post excavation

- SVE points monitored for vapor and dissolved phase
- Additional investigation and sentinel wells installed

Shallow Groundwater Plume





Shallow Groundwater Depths 8 -18'







Monitoring and SVE wells May to June





Monitoring and SVE wells May to August

- Two definitive groundwater bodies: shallow (10-15) and deep (35-50)
- Deeper groundwater mounded against Halstead or third deep groundwater unit?







New Impacts to neighbors, August

- Residents complaining of odors in lobby, elevators and ground floor residences
- Discovered roof storm drain with vents within building with petroleum vapors
- Influenced by rising shallow groundwater?
- Apparent communication failure as complaints went unreported to DEQ







Refined conceptual model

- Multiple water bearing units broadly divided into shallow and deep
- Deeper groundwater channeled between structures, flowing north to King St
- Shallow groundwater flowing to buildings
- Rapid shallow contaminant flow during recharge events (release, heavy rain)



Corrective Action Revisions

- Control groundwater in "shallow" aquifer to reduce offsite migration
- Maximize SVE effectiveness requires shallow dewatering
- Revised communication plan to ensure offsite residents kept informed



Conclusion

- Modern Urban Built Environment: "new" receptors / affects hydrology
- Develop and sustain stakeholder communications
- Evaluate and refine conceptual model continuously
- Receptor impacts lead investigation and remediation objectives and design



Questions?

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