LEYMASTER ENVIRONMENTAL CONSULTING, LLC

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Long Beach, California 90815
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October 22, 2019

Mr. Wes Fifield
Panorama Development, LLC
2005 Winston Court
Upland, California 91784

Re: Opinion Letter
Northeast and Southeast Corners of State Route 60 & Pyrite Street
(APNs: 171-020-001, 171-020-025 and 171-030-001)
Jurupa Valley, California 92509

Dear Mr. Fifield,

The subject property (Site) is located on the northeast and southeast corners of State Route 60 and Pyrite Street in Jurupa Valley, California. This opinion letter is based on our review of the following documents:

- EnviroApplications, Inc., *Phase I Environmental Site Assessment Report for Proposed Promenade at Glen Avon, Multi-Tenant Commercial Property, North & South Sides of State Route 60, East of the Pyrite Street Exit, Jurupa Valley, (North) Riverside County, CA 92509,* dated August 27, 2019.
- EnviroApplications, Inc., *Limited Soil Vapor Investigation, Promenade at Glen Avon, Riverside, California,* dated August 26, 2019.

The Site was in agricultural use as early as 1931until 1974. The Site has been vacant since 1974 until the present. Planned development for the Site is multi-tenant commercial and residential use.

A Phase I Environmental Site Assessment (ESA) conducted by EnviroApplications, Inc. (EA) for the Site and several adjoin parcels identified two items of environmental concern. The first concern was potential impact to the shallow soil onsite from pesticides used in historical agricultural operations and potential health risks to future occupants. The second concern is due to a Superfund cleanup case located approximately three quarters of a mile north of the Site, identified as the Stringfellow Acids Pits (Stringfellow) site. The Stringfellow site is a former industrial liquid waste disposal facility under California Department of Toxic Substances Control (DTSC) oversight for ongoing remediation. Volatile organic compound (VOC) groundwater contamination originating

from the Stringfellow site has been shown to extend south beneath the Site and further towards the Santa Ana River. Several monitoring wells that are part of a larger well network used to monitor groundwater contamination are located on the Site. Based on this, EA concluded that there exists the potential that VOC contaminated groundwater beneath the Site could represent a vapor intrusion risk to future occupants. To address these concerns, EA recommended that Phase II ESA soil and soil vapor sampling be conducted.

As part of a limited soil vapor investigation that included the Site in addition to several adjoining parcels, EA installed fourteen temporary soil vapor probes onsite. Selected locations were installed with a single probe at five feet below ground surface (bgs) or with two probes (dual nested) at five and fifteen feet bgs. Soil vapor samples were collected and analyzed following United States Environmental Protection Agency (EPA) Method 8260SV for VOCs. Analytical results indicated that concentrations of benzene, toluene and xylene are present in the subsurface soil vapor. There are discrepancies in the limited soil vapor investigation report between analytical results listed in the body of the report and those shown on the figure and table included at the end. Based off the attached laboratory report included at the very end of the report, the highest detected concentrations of benzene at five feet bgs was 20 micrograms per meter cubed ($\mu g/m^3$). Toluene and xylene were not detected at five feet bgs. The highest detected concentrations of benzene, toluene and xylene at fifteen feet bgs were 70, 110 and 40 $\mu g/m^3$, respectively.

To assess the potential health risk to future occupants from vapor intrusion, EA compared the detected concentrations to the DTSC Human Health Risk Assessment (HHRA) Note 3 (April 2019) residential and commercial screening levels for ambient air. Prior to comparison, an attenuation factor was applied to the subsurface soil vapor concentrations to estimate the resulting ambient air concentration. EA used attenuation factors of 0.001 and 0.0005 following the guidance outlined in the DTSC Final Vapor Intrusion Guidance (October 2011) for future residential and commercial buildings. After applying the attenuation factor, all concentrations of benzene, toluene and xylene were found to be below the health risk screening levels. Based on this, EA concluded that no further investigation related to soil vapor was warranted. In their conclusion, EA noted that marked attenuation of soil vapors in multi-depth probes and future soil-disturbing activities during development are likely to reduce the vapor intrusion risk from VOCs.

While the attenuation factors used by EA are taken from DTSC guidance, DTSC HHRA Note 3 also recommends conducting screening assessments using an attenuation factor of 0.03 following guidance outlined in the EPA OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air (June 2015). Following the 2015 EPA guidance, subsurface soil vapor concentrations of benzene exceed the DTSC HHRA Note 3 residential screening levels. To further address benzene concentrations exceeding health screening

levels following the additionally recommended guidance, Leymaster Environmental Consulting, LLC (LEC) conducted a screening level risk assessment on the soil vapor results.

The screening level risk assessment was prepared in accordance with DTSC Final Vapor Intrusion Guidance (October 2011) and the EPA OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air (June 2015). The EPA's Vapor Intrusion Screening Level (VISL) Calculator was used to estimate the potential risks and hazards due to the presence of benzene in the soil vapor at the Site. Benzene specific values for Inhalation Unit Risk (IUR) and Chronic Inhalation Reference Concentration (RfC)to be used in the VISL Calculator were taken from the DTSC Human Health Risk Assessment (HHRA) Note 3 (April 2019).

The risk assessment was done for both the northern (APN No. 171-030-001) and southern (APN Nos. 171-020-001 and 171-020-025) portions of the Site. The highest concentration of benzene detected at five feet bgs in each location was used. This corresponded to 10 $\mu g/m^3$ for the northern parcel and 20 $\mu g/m^3$ for the southern parcels.

The VISL Calculator was run using an attenuation factor of 0.03 for "near-source" exterior soil gas (vapor in vadose zone immediately above a vapor source and outside a building footprint) concentrations. The VISL Calculator was run for residential and commercial/industrial scenarios. For the residential scenario, the exposure duration is 26 years, the exposure frequency is 350 days per year and the exposure time is 24 hours a day. For the commercial/industrial scenario, the exposure duration is 25 years, the exposure frequency is 250 days per year and the exposure time is 8 hours a day. For both scenarios, the averaging time is 25 years for non-carcinogens and 70 years for carcinogens.

The outputs for the VISL Calculator are attached to this letter. The calculated residential and commercial/industrial risks are shown in the table below:

Portion of Site	**Residential Risk**	**Residential Hazard**	**Commercial/Industrial Risk**	**Commercial/Industrial Hazard**
Northern	$3.10x10^{-6}$	$9.59x10^{-2}$	$7.09x10^{-7}$	$2.28x10^{-2}$
Southern	$6.20x10^{-6}$	$1.92x10^{-1}$	$1.42x10^{-6}$	$4.57x10^{-2}$

The excess cancer risk estimate is compared to the point of departure of 1×10^{-6}. In general, total risk estimates less than 10^{-6} (e.g., 10^{-7} and 10^{-8}) are unconditionally acceptable (DTSC 2013a, EPA 1990), total risk estimates between 10^{-6} and 10^{-4} are in the risk management range and require the stakeholders to determine whether the risk estimates are acceptable, and total risk estimates greater

than 10^{-4} (e.g., 10^{-3} or 10^{-2}) require further action. The northern portion of the Site is in the low end of the risk management range under the residential scenario, whereas it is in the unconditionally acceptable range under the commercial/industrial scenario. The southern portion of the Site is in the low end of the risk management range under both the residential and commercial/industrial scenarios.

The hazard quotient (HQ) for benzene in each scenario was compared to the DTSC (2013) and EPA (1990) acceptable hazard level. This summation is called a hazard index (HI). A HI of 1 is used as a benchmark level to indicate whether adverse health effects are likely to occur as a result of exposures to chemicals of concern at the subject site. A HI greater than 1 indicates that adverse non-carcinogenic health effects may occur whereas, a HI less than 1 indicates that adverse non-carcinogenic health effects are unlikely to occur, The DTSC and EPA consider a HI less than 1 acceptable. The HI of the northern and southern portions of the Site is below the DTSC and USEPA acceptable level for both residential and commercial/industrial scenarios and is not a concern.

As portions of the Site fall in the risk management range for total excess cancer risks, vapor mitigation measures should be considered for future developments. Vapor barriers are a common mitigation method installed in the subsurface beneath buildings to prevent the migration of vapors into the occupant breathing space. Vapor barriers generally cost between three and five dollars per square foot.

Although soil sampling was recommended in EA's Phase I due to historical agricultural use of the Site, LEC did not review any documentation for any soil sampling events conducted onsite. Soil sampling was recommended to address potential impact to shallow soil from pesticides. In LEC's experience, hazardous compounds from pesticides are degraded through naturally occurring processes and generally do not persist in soil at significant concentrations. Based on the amount of time that has elapsed since the Site has been in agricultural use, LEC believes that concentrations of pesticide compounds representing a health risk are unlikely to be present.

It is important to note that several monitoring wells associated with the Stringfellow site are reported to be present on the Site. Should planned Site development conflict with the locations of these wells, coordination with the responsible party for the Stringfellow site regarding potential abandonment and relocation of these wells will be required.

Please let us know if you have any questions regarding this review.

Sincerely,

Mark Leymaster, P.E.

Travis Knight, EIT

*** Inputted values different from Commercial defaults are highlighted.**
Output generated 21OCT2019:17:45:45

Variable	Commercial Air Default Value	Form-input Value
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03	0.03
AT_{w} (averaging time - composite worker)	365	365
ED_{w} (exposure duration - composite worker) yr	25	25
EF_{w} (exposure frequency - composite worker) day/yr	250	250
ET_{w} (exposure time - composite worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	1
LT (lifetime) yr	70	70
TR (target risk) unitless	1.0E-06	1.0E-06

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? (C_{vp} > $C_{i,a}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? (C_{hc} > $C_{i,a}$,Target?)	Target Indoor Air Concentration (TCR=1E-06 or THQ=1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m³)	Toxicity Basis
Benzene	71-43-2	Yes	Yes	Yes	Yes	4.23E-01	CA

Chemical	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=1) C_{sg},Target (µg/m³)	Target Groundwater Concentration (TCR=1E-06 or THQ=1) C_{gw},Target (µg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp}\ (25 °C)\ (µg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (µg/m³)	Temperature for Maximum Groundwater Vapor Concentration (°C)	Lower Explosive Limit LEL (% by volume)	LEL Ref
Benzene	1.41E+01	1.86E+00	Yes (5)	3.98E+08	4.06E+08	25	1.20	U

Chemical	IUR (ug/m³)$^{-1}$	IUR Ref	RfC (mg/m³)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (µg/m³)	Noncarcinogenic VISL THQ=1 $C_{ia,nc}$ (µg/m³)
Benzene	2.90E-05	U	3.00E-03	U	No	4.23E-01	1.31E+01

Chemical	CAS Number	Site Sub-Slab and Exterior Soil Gas Concentration C_{sg}\ ($\mu g/m^3$)	Site Indoor Air Concentration $C_{i,a}$\ ($\mu g/m^3$)	VI Carcinogenic Risk CDI ($\mu g/m^3$)	VI Carcinogenic Risk CR	VI Hazard CDI (mg/m^3)	VI Hazard HQ	IUR $(ug/m^3)^{-1}$
Benzene	71-43-2	10	3.00E-01	2.45E-02	7.09E-07	6.85E-05	2.28E-02	2.90E-05
**Sum*					*7.09E-07*		*2.28E-02*	

Chemical	IUR Ref	Chronic RfC (mg/m^3)	RfC Ref	Temperature (℃)\ for Groundwater Vapor Concentration	Mutagen?
Benzene	U	3.00E-03	U	25	No
**Sum*					

Chemical Properties
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Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref	MCL (ug/L)	HLC (atm-m^3/mole)	Henry's Law Constant (unitless)
Benzene	71-43-2	Yes	Yes	78.12	U	9.48E+01	U	1.79E+03	U	5	5.55E-03	2.27E-01

Chemical	H` and HLC Ref	Henry's Law Constant Used in Calcs (unitless)	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$ \ (cal/mol)	$\Delta H_{v,b}$ \ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Benzene	U	2.27E-01	353.15	U	5.62E+02	U	7340.00	U	1.20	U

*** Inputted values different from Resident defaults are highlighted.**
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Variable	Resident Air Default Value	Form-input Value
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03	0.03
ED_{res} (exposure duration) years	26	26
ED_{0-2} (mutagenic exposure duration first phase) years	2	2
ED_{2-6} (mutagenic exposure duration second phase) years	4	4
ED_{6-16} (mutagenic exposure duration third phase) years	10	10
ED_{16-26} (mutagenic exposure duration fourth phase) years	10	10
EF_{res} (exposure frequency) days/year	350	350
EF_{0-2} (mutagenic exposure frequency first phase) days/year	350	350
EF_{2-6} (mutagenic exposure frequency second phase) days/year	350	350
EF_{6-16} (mutagenic exposure frequency third phase) days/year	350	350
EF_{16-26} (mutagenic exposure frequency fourth phase) days/year	350	350
ET_{res} (exposure time) hours/day	24	24
ET_{0-2} (mutagenic exposure time first phase) hours/day	24	24
ET_{2-6} (mutagenic exposure time second phase) hours/day	24	24
ET_{6-16} (mutagenic exposure time third phase) hours/day	24	24
ET_{16-26} (mutagenic exposure time fourth phase) hours/day	24	24
THQ (target hazard quotient) unitless	0.1	1
LT (lifetime) years	70	70
TR (target risk) unitless	1.0E-06	1.0E-06

Resident Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? (C_{vp} > $C_{i,a}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? (C_{hc} > $C_{i,a}$,Target?)	Target Indoor Air Concentration (TCR=1E-06 or THQ=1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m³)	Toxicity Basis
Benzene	71-43-2	Yes	Yes	Yes	Yes	9.68E-02	CA

Chemical	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=1) C_{sg},Target (µg/m³)	Target Groundwater Concentration (TCR=1E-06 or THQ=1) C_{gw},Target (µg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp}\ (25 °C)\ (µg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (µg/m³)	Temperature for Maximum Groundwater Vapor Concentration (°C)	Lower Explosive Limit LEL (% by volume)	LEL Ref
Benzene	3.23E+00	4.27E-01	Yes (5)	3.98E+08	4.06E+08	25	1.20	U

Chemical	IUR (ug/m³)$^{-1}$	IUR Ref	RfC (mg/m³)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (µg/m³)	Noncarcinogenic VISL THQ=1 $C_{ia,nc}$ (µg/m³)
Benzene	2.90E-05	U	3.00E-03	U	No	9.68E-02	3.13E+00

Chemical	CAS Number	Site Sub-Slab and Exterior Soil Gas Concentration C_{sg}\ ($\mu g/m^3$)	Site Indoor Air Concentration $C_{i,a}$\ ($\mu g/m^3$)	VI Carcinogenic Risk CDI ($\mu g/m^3$)	VI Carcinogenic Risk CR	VI Hazard CDI (mg/m^3)	VI Hazard HQ	IUR $(ug/m^3)^{-1}$
Benzene	71-43-2	10	3.00E-01	1.07E-01	3.10E-06	2.88E-04	9.59E-02	2.90E-05
**Sum*					*3.10E-06*		*9.59E-02*	

Chemical	IUR Ref	Chronic RfC (mg/m^3)	RfC Ref	Temperature (℃)\ for Groundwater Vapor Concentration	Mutagen?
Benzene	U	3.00E-03	U	25	No
**Sum*					

Chemical Properties
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Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref	MCL (ug/L)	HLC (atm-m^3/mole)	Henry's Law Constant (unitless)
Benzene	71-43-2	Yes	Yes	78.12	U	9.48E+01	U	1.79E+03	U	5	5.55E-03	2.27E-01

Chemical	H` and HLC Ref	Henry's Law Constant Used in Calcs (unitless)	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$\ (cal/mol)	$\Delta H_{v,b}$\ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Benzene	U	2.27E-01	353.15	U	5.62E+02	U	7340.00	U	1.20	U

*** Inputted values different from Commercial defaults are highlighted.**
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Variable	Commercial Air Default Value	Form-input Value
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03	0.03
AT_{w} (averaging time - composite worker)	365	365
ED_{w} (exposure duration - composite worker) yr	25	25
EF_{w} (exposure frequency - composite worker) day/yr	250	250
ET_{w} (exposure time - composite worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	1
LT (lifetime) yr	70	70
TR (target risk) unitless	1.0E-06	1.0E-06

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? (C_{vp} > $C_{i,a}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? (C_{hc} > $C_{i,a}$,Target?)	Target Indoor Air Concentration (TCR=1E-06 or THQ=1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m³)	Toxicity Basis
Benzene	71-43-2	Yes	Yes	Yes	Yes	4.23E-01	CA

Chemical	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=1) C_{sg},Target (µg/m³)	Target Groundwater Concentration (TCR=1E-06 or THQ=1) C_{gw},Target (µg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp}\ (25 °C)\ (µg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (µg/m³)	Temperature for Maximum Groundwater Vapor Concentration (°C)	Lower Explosive Limit LEL (% by volume)	LEL Ref
Benzene	1.41E+01	1.86E+00	Yes (5)	3.98E+08	4.06E+08	25	1.20	U

Chemical	IUR (ug/m³)$^{-1}$	IUR Ref	RfC (mg/m³)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (µg/m³)	Noncarcinogenic VISL THQ=1 $C_{ia,nc}$ (µg/m³)
Benzene	2.90E-05	U	3.00E-03	U	No	4.23E-01	1.31E+01

Chemical	CAS Number	Site Sub-Slab and Exterior Soil Gas Concentration C_{sg}\ ($\mu g/m^3$)	Site Indoor Air Concentration $C_{i,a}$\ ($\mu g/m^3$)	VI Carcinogenic Risk CDI ($\mu g/m^3$)	VI Carcinogenic Risk CR	VI Hazard CDI (mg/m^3)	VI Hazard HQ	IUR $(ug/m^3)^{-1}$
Benzene	71-43-2	20	6.00E-01	4.89E-02	1.42E-06	1.37E-04	4.57E-02	2.90E-05
**Sum*					*1.42E-06*		*4.57E-02*	

Chemical	IUR Ref	Chronic RfC (mg/m^3)	RfC Ref	Temperature (℃)\ for Groundwater Vapor Concentration	Mutagen?
Benzene	U	3.00E-03	U	25	No
**Sum*					

Chemical Properties
Output generated 21OCT2019:17:43:32

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref	MCL (ug/L)	HLC (atm-m^3/mole)	Henry's Law Constant (unitless)
Benzene	71-43-2	Yes	Yes	78.12	U	9.48E+01	U	1.79E+03	U	5	5.55E-03	2.27E-01

Chemical	H` and HLC Ref	Henry's Law Constant Used in Calcs (unitless)	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$\ (cal/mol)	$\Delta H_{v,b}$\ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Benzene	U	2.27E-01	353.15	U	5.62E+02	U	7340.00	U	1.20	U

*** Inputted values different from Resident defaults are highlighted.**
Output generated 21OCT2019:17:20:52

Variable	Resident Air Default Value	Form-input Value
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03	0.03
ED_{res} (exposure duration) years	26	26
ED_{0-2} (mutagenic exposure duration first phase) years	2	2
ED_{2-6} (mutagenic exposure duration second phase) years	4	4
ED_{6-16} (mutagenic exposure duration third phase) years	10	10
ED_{16-26} (mutagenic exposure duration fourth phase) years	10	10
EF_{res} (exposure frequency) days/year	350	350
EF_{0-2} (mutagenic exposure frequency first phase) days/year	350	350
EF_{2-6} (mutagenic exposure frequency second phase) days/year	350	350
EF_{6-16} (mutagenic exposure frequency third phase) days/year	350	350
EF_{16-26} (mutagenic exposure frequency fourth phase) days/year	350	350
ET_{res} (exposure time) hours/day	24	24
ET_{0-2} (mutagenic exposure time first phase) hours/day	24	24
ET_{2-6} (mutagenic exposure time second phase) hours/day	24	24
ET_{6-16} (mutagenic exposure time third phase) hours/day	24	24
ET_{16-26} (mutagenic exposure time fourth phase) hours/day	24	24
THQ (target hazard quotient) unitless	0.1	1
LT (lifetime) years	70	70
TR (target risk) unitless	1.0E-06	1.0E-06

Resident Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? (C_{vp} > $C_{i,a}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? (C_{hc} > $C_{i,a}$,Target?)	Target Indoor Air Concentration (TCR=1E-06 or THQ=1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m³)	Toxicity Basis
Benzene	71-43-2	Yes	Yes	Yes	Yes	9.68E-02	CA

Chemical	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=1) C_{sg},Target (µg/m³)	Target Groundwater Concentration (TCR=1E-06 or THQ=1) C_{gw},Target (µg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp}\ (25 °C)\ (µg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (µg/m³)	Temperature for Maximum Groundwater Vapor Concentration (°C)	Lower Explosive Limit LEL (% by volume)	LEL Ref
Benzene	3.23E+00	4.27E-01	Yes (5)	3.98E+08	4.06E+08	25	1.20	U

Chemical	IUR (ug/m³)$^{-1}$	IUR Ref	RfC (mg/m³)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (µg/m³)	Noncarcinogenic VISL THQ=1 $C_{ia,nc}$ (µg/m³)
Benzene	2.90E-05	U	3.00E-03	U	No	9.68E-02	3.13E+00

Chemical	CAS Number	Site Sub-Slab and Exterior Soil Gas Concentration C_{sg}\ ($\mu g/m^3$)	Site Indoor Air Concentration $C_{i,a}$\ ($\mu g/m^3$)	VI Carcinogenic Risk CDI ($\mu g/m^3$)	VI Carcinogenic Risk CR	VI Hazard CDI (mg/m^3)	VI Hazard HQ	IUR $(ug/m^3)^{-1}$
Benzene	71-43-2	20	6.00E-01	2.14E-01	6.20E-06	5.75E-04	1.92E-01	2.90E-05
**Sum*					*6.20E-06*		*1.92E-01*	

Chemical	IUR Ref	Chronic RfC (mg/m^3)	RfC Ref	Temperature (℃)\ for Groundwater Vapor Concentration	Mutagen?
Benzene	U	3.00E-03	U	25	No
**Sum*					

Chemical Properties
Output generated 21OCT2019:17:20:52

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref	MCL (ug/L)	HLC (atm-m^3/mole)	Henry's Law Constant (unitless)
Benzene	71-43-2	Yes	Yes	78.12	U	9.48E+01	U	1.79E+03	U	5	5.55E-03	2.27E-01

Chemical	H` and HLC Ref	Henry's Law Constant Used in Calcs (unitless)	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$\ (cal/mol)	$\Delta H_{v,b}$\ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Benzene	U	2.27E-01	353.15	U	5.62E+02	U	7340.00	U	1.20	U