Crawlspace Encapsulation and the Adverse Effects to the Health

of the Indoor Environment

ECO TRECK

C R A W L S P A C E E N C A P S U L A T I O N A N D T H E A D V E R S E E F F E C T S T O T H E H E A L T H O F T H E I N D O O R E N V I R O N M E N T

- Stack Effect
- Radon
- VOC (Volatile Organic Compound)
- MVOCs (Microbial Volatile Organic Compound)
- Moisture
- Drainage
- Insulation



STACK EFFECT

During the winter, warm air rises

This pressurizes the top of the building, pushing hot air out and sucking cold air in at the bottom.

This means: The air in the crawlspace gets forcefully pulled upward throughout your ENTIRE home before leaving through your attic...



STACK EFFECT

During the summer, in an air-conditioned building, the stack effect works in reverse because the warmer air is outside the home. Cool inside air tends to fall and get pushed out at the bottom of the building which draws hot air in at the top. *This Means:* The air in your attic gets forcefully pulled downward throughout your ENTIRE home before leaving through your crawlspace.



STACK EFFECT

Years ago, foundation vents were thought to be an important part of a crawlspace. The idea was to allow the crawlspace to breath and foundation vents were the best way to let that happen. Unfortunately, this theory ended up being false, instead it allows unconditioned, unfiltered air to enter from outside into the crawlspace. Prevailing issues, depending on the time of year can range from, Condensation, Humidity, Spores, Smells and Dust to then enter the building envelope through penetrations leading to Cross Contamination.



FOUNDATION VENTS





RADON

A radioactive, colorless, odorless, tasteless noble gas. Radon comes naturally from Uranium through a series of radioactive transformations. Radon is the second leading cause of lung cancer after smoking.





VOLATILE ORGANIC COMPOUNDS (VOCS)

- Are organic chemicals that have a high vapor pressure at room temperature. Gasses that are emitted from certain solids or liquids.
- VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects.
- According to the EPA's Office of Research and Development's (Total Exposure Assessment Methodology Study (Volumes I through IV, completed in 1985)
- Found that levels of about a dozen common organic pollutants to be 2 to 5 times higher inside homes than outside, regardless of home location.



VOLATILE ORGANIC COMPOUNDS HEALTH EFFECTS

- Health effects may include:
- Eye, nose and throat irritation
- Damage to liver, kidney and central nervous system
- Headaches, loss of coordination and nausea
- Some organics can cause cancer in animals, some are suspected or known to cause cancer in humans.

VOLATILE ORGANIC COMPOUNDS HEALTH EFFECTS

- Key signs or symptoms associated with exposure to VOCs include:
- Conjunctival irritation
- Headache
- Dyspnea
- Nausea
- Epistaxis
- Dizziness
- Nose and throat discomfort
- Allergic skin reaction
- Declines in serum cholinesterase levels
- Emesis
- Fatigue

MICROBIAL VOLATILE ORGANIC COMPOUNDS (MVOCS)

- Are compounds created by fungi and bacteria during their metabolic process.
- They give off a distinctly musty, moldy smell and can be dangerous and even toxic to humans. The musty odor smell is decay offgassing from biological growth which includes molds, bacteria and biofilm, signifying the presence of Microbial Volatile Organic Compounds that off gas while reproducing.
- Mycotoxins literally (Fungus Poison) in Latin are secondary metabolites that are produced by molds as they digest organic matter, because fungi digest externally before absorbing the nutrients mVOCs are formed as the food source breaks down.





MICROBIAL VOLATILE ORGANIC COMPOUNDS

- As information is limited for symptoms of MVOCs in studies some are:
- Headaches
- Nasal irritation
- Dizziness
- Fatigue
- Nausea

MICROBIAL VOLATILE ORGANIC Compounds

- Recommendations to Reduce mVOC Exposure:
- Professional HVAC System and air duct cleaning
- Disengage any built-in humidification devices within the HVAC system
- Control humidity below 45% all year round
- Replace carpeting with a more synthetic floor system
- Remove water damaged building materials
- Improve airflow in the home or building with an air recovery system (HRV/ERV)
- Use of an air purifier



MICROBIAL GROWTH

MOISTURE

- Working in the Rocky Mountain Region, it is widely believed that we are a dry climate.
- During the winter months we deal with snow and ice melt, and freezing temperatures contributing to busting pipes.
- During the summer months we deal with ground water, caused by again the snow and ice melt contributing to the underground lakes, rivers and aquafers.
- These factors along with condensation from the colder temperatures of crawlspaces and warmer temperatures of the living space cause Microbial issues within the sub-floor systems.



MOISTURE ISSUES

MOISTURE



• Snow and Ice melt lead to water intrusion at the foundation



MOISTURE INTRUSION

DRAINAGE

- OUTSIDE versus INSIDE:
- Outside forces such as rain, snow and ice would lead you to believe that an outside drainage system would be the only way to go (stop it from getting in), unfortunately it will not address the ground water issue inside the home.
- An Inside drainage system can handle both inside and outside but can be overwhelmed by large ice and snow melt, hence some situations will need both.
- The drainage system components can consist of but not limited to:
- A Sump pit, Sump pump, Ejection line, Sealed sump pit lid, Drainage tile or French drain working together to gather water into a low pressure point and eject the water away from the home.
- Soil types are a determining factor when designing the drainage system for a properly functioning water removal system.



DRAINAGE SYSTEM

DRAINAGE SYSTEM



ion

INSULATION

- Fiberglass insulation installed in a crawlspace is completed for several reasons and in multiple ways
- · Way: Installed in the floor joist system, fiberglass batt with or without paper
- Reason: To help keep floor warmer in the winter and cooler in the summer.
- Way: Install on exterior walls, Fiberglass with or without paper and or vinyl
- Reason: To help condition the space with the result being warmer floor in the winter and cooler in the summer.
- Although with good intentions fiberglass can result in damaging issues ranging from:
- Moisture retention Dust Harboring dust mites Dust mite feces Mold
- Bacteria Fungus Mice Mice feces and urine

All of which can cause the insulation to fall from the floor joist system to the crawlspace floor which without an encapsulation will allow the mold, bacteria, fungus to feed off the dust and moisture. Insulation in the rim bays will suffer as well due to ice and snow melt during the winter months.



INSULATION

INSULATION

INSULATION BEFORE AND AFTER

HVAC IN CRAWLSPACE

YE

R E F E R E N C E S

- Cassen.ca
- Ionscience.com
- Exactrecon.com
- Branchenvironmental.com
- Indoordoctor.com
- EPA.gov

WWW.ECOTRECK.COM