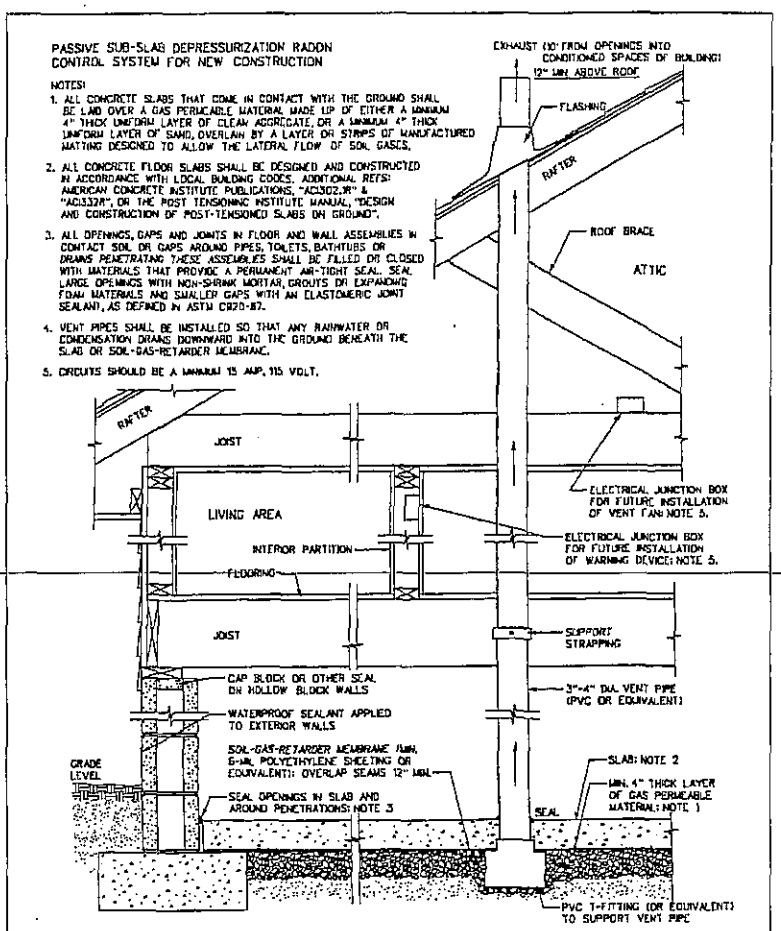
be very bad (often described as "old socks," "locker room," "rotten food," and "sewer gases"). Landfills contain a lot of buried organic matter that decomposes anaerobically, producing methane. Methane reaches explosive concentrations at 40,000 to 150,000 ppm, depending on the temperature and oxygen content. Such explosions have occurred at landfill sites. Buildings near landfills may end up with high methane levels—rarely at explosive concentrations but often at levels where the methane and associated gases can cause "nuisance odor" and health risks.

Water vapor is not itself a contaminant, but it creates an environment that can support populations of fungi, bacteria, mites, insects, or rodents. Potentially high levels of water vapor can enter a building from the ground. Whether this water vapor becomes a problem depends on the rate at which it is being added to and removed from the building by other means. Some studies have shown that strategies to keep soil gases out of buildings can significantly reduce indoor humidity levels.



This schematic illustrates the basic operation of a soil-gas control and mitigation system for a residence. Source: EPA 402-95012, May 1995

DEALING WITH SOIL GASES

A two-prong approach is recommended: prevent soil gas entry and provide dilution ventilation air as called for by codes or professional guidelines.

Preventing soil air entry is the primary control method. It solves soil gas problems that would be impractical to solve using ventilation alone. To prevent soil air entry:

- Provide a relatively airtight foundation;
- Avoid depressurization of the building through improperly balanced exhaust fans and air-handling equipment or through the stack effect (most pronounced in tall buildings);
- Provide a highly permeable layer of material beneath the building (e.g., crushed stone) that can be easily depressurized; and
- Install a passive stack that runs from the subslab layer through the heated part of the building to the outdoors.

The last two of these steps will create a low-air-pressure zone beneath the foundation that will intercept soil air and divert it through the passive stack. In the event that the passive stack is not powerful enough to keep problem gases out of the building, the stack can be powered with an in-line fan. Detailed correctly, a very small fan can treat a large footprint. In research conducted by the EPA, a single stack using a 90-watt fan has depressurized the drainage layer beneath a 100,000-square-foot (9,300 m^2) slab.

References

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