SECO Safety and Environmental Compliance Office

Never turn your back on the ocean Hawaiian Proverb

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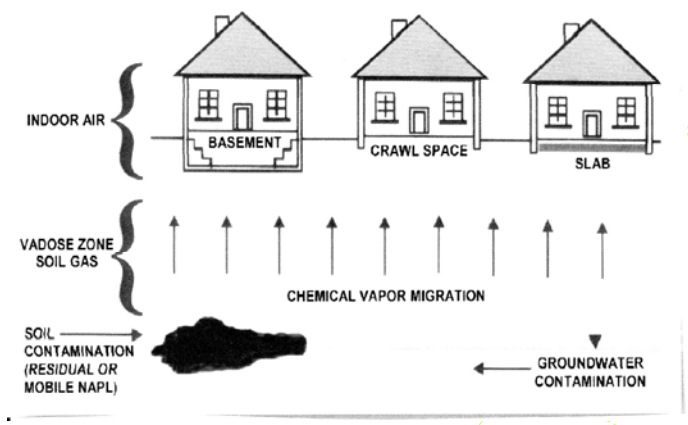
Consideration of Vapor Intrusion into Indoor Air at Contaminated Sites

In 2002, the EPA issued "*Office of Solid Waste and Emergency Response (OSWER) Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)*". This guidance provides technical and policy recommendations on determining if the vapor intrusion pathway poses an unacceptable risk to human health at cleanup sites. The vapor intrusion pathway is the means by which vapors from subsurface volatile chemicals migrate into building spaces thereby impacting indoor air quality.

Figure 1: General depiction of the vapor intrusion pathway in a residential setting (from EPA, 2002).



Volatile chemical vapors accumulating indoors can reach concentrations that create an explosive atmosphere or other acute health effects, or subtly cause chronic health problems. When evaluating indoor air quality, it can be difficult to differentiate between the contribution from vapors emanating from subsurface contaminants and the contribution of vapors from indoor sources such as cleaning solvents. The potential and degree of vapor migration from contaminated soil and/or groundwater to indoor air depends on many factors such as the chemical properties of the spill, intervening soil type, distance between foundation and groundwater, building design and building condition. Evaluation of soil gases and indoor air can be heavily influenced by the climatic conditions at the time of sampling. All these variables complicate the determination of whether there's a reasonable risk that a contaminated site will impact the health of nearby building occupants. Evaluation of the vapor intrusion pathway takes a multi-tiered, multi-step, site-specific approach that is described in the EPA guidance document at http://epa.gov/osw/hazard/correctiveaction/eis/vapor.htm. This guidance provides a process to follow to either eliminate or focus on contaminants that may be a concern at a particular site.

States are implementing their own vapor intrusion programs, some with a more conservative approach than the EPA guidance. For example, in July 2009 Alaska Department of Environmental Conservation (ADEC) issued "*Draft Vapor Intrusion Guidance for Contaminated Sites*". ADEC does not regulate indoor air quality directly, but can enforce soil and groundwater cleanup standards that are more restrictive when indoor air quality is in question. The EPA recommends use of its 2002 guidance document as a screening approach for the RCRA and CERCLA programs, but not for Subtitle I Underground Storage Tank (UST) sites. The EPA guidance also states that there is further study needed on the behavior of petroleum compounds relating to the vapor intrusion pathway, and does not include diesel fuel and gasoline in the document's table of contaminants to evaluate. However, ADEC's guidance does address UST-contaminated sites and does not exclude petroleum compounds from evaluation. Figure 1 indicates a residential setting; however, neither EPA nor ADEC restrict vapor pathway evaluation to just housing units. Finally, ADEC's document is "guidance", but its use is mandated regulation.

What are the implications for NOAA? Vapor intrusion is still a developing field of science and policy; however, as more states implement programs, environmental project managers and COTRs should be aware that evaluation of the vapor intrusion pathway and corresponding corrective actions will become a mandated component of site characterization and cleanup. Addressing this pathway under new regulations can also impact construction on old contaminated sites; be a factor in environmental due diligence for properties being acquired or leased; and potentially cause the reopening of conditionally closed sites where contaminants were left in place. Reopening of a conditionally closed site, for example a site where diesel fuel-contaminated soil was left under the foundation of a building, would likely occur only if a regulatory agency received information that the indoor air quality was possibly impacted by the contaminant left behind. Remedies for this situation could include further cleanup, sealing of vapor pathways, and/or the installation of building ventilation systems.

By James R. Malchow, PE

The Emergency Planning and Community Right-to-Know Act

By Jennifer J. Melton, PE

The Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) establishes requirements for Federal, State and local governments, Indian Tribes, and industry regarding emergency planning and reporting on hazardous and toxic chemicals. The Community Right-to-Know provisions help increase public knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. States and communities, working with facilities, can use the information to improve chemical safety and protect public health and the environment.

EPCRA has four major provisions:

- Emergency planning (Section 301-303),
- Emergency release notification (Section 304),
- Hazardous chemical storage reporting requirements (Sections 311-312),
- Toxic chemical release inventory (Section 313)

Information gleaned from these four requirements will help States and communities develop a broad perspective of chemical hazards for the entire community as well as for individual facilities. Regulations implementing EPCRA are codified in Title 40 of the Code of Federal Regulations, parts 350 to 372. The chemicals covered by each of the sections are different, as are the quantities that trigger reporting. Table 1 summarizes the chemicals and thresholds.

So, how does EPCRA affect NOAA facilities? Except for a few facilities, it mainly affects facilities that use or store more than 10,000 lbs (~ 1300 gallons) of diesel fuel. Most are required to comply with the Hazardous Chemical Storage reporting requirements. These requirements include:

- Section 311 – one time submission of a copy of the MSDS or a list of chemicals to the local emergency planning committee (e.g., local fire department); and
- Section 312 – annual submission of Tier II form due on March 1st.

For other chemicals, please go to the EPA web link at http://www.epa.gov/ceppo/pubs/title3.pdf to determine if these chemicals are subject to Sections 311 and 312 reporting requirements.

For more information, questions or assistance on this subject please contact SECO at 301-713-2870.

Table 1:	**EPCRA Chemicals and Reporting Thresholds**			
	Section 302	**Section 304**	**Sections 311/312**	**Section 313**
Chemicals Covered	356 extremely hazardous substances	>1,000 substances	500,000 products	650 toxic chemicals and categories
Thresholds	Threshold Planning Quantity (TPQ) 1-10,000 pounds on site at any one time	Reportable quantity, 1-5,000 pounds, released in a 24-hour period	TPQ or 500 pounds for Section 302 chemicals; 10,000 pounds on site at any one time for other chemicals	25,000 pounds per year manufactured or processed; 10,000 pounds a year used; certain persistent bio-accumulative toxics have lower thresholds

"What's the use of a fine house if you haven't got a tolerable planet to put it on?" *~ Henry David Thoreau*

Portable Heaters in the workplace:

There are two basic types of electric heaters: convection and radiant.

- Convection heaters provide warmth by blowing or pulling air over a heated surface. These heaters are designed to heat an entire room.
- Radiant heaters direct heat at objects and surfaces. They are not intended to heat a room.
- BMB need to be involved if there is a legitimate need for adding a personal heater. They have to make sure the circuit isn't overloaded.
- Portable heaters shall be plugged into a permanent wall receptacle (wall outlet), no extension cords and unplugged at night and when not in use.

Heaters can cause fires if not used properly

100 - 400 watt Radiant Heaters:

When necessary, a 400 watt radiant heater works well. They can be placed by one's legs and radiate enough heat to make a difference. Keep in mind, these heaters warm you and do not heat the space. They are required to be UL labeled and have a tip over safety switch.

1500 watt Radiant Heater:

A 1500 watt radiant heater (12.5 amps), in most cases is a fire waiting to happen. It cannot be safely plugged into a 15 amp receptacle (12 amps maximum) or an extension cord. It will easily overload (16 amp maximum on a 20 amp circuit) shared circuits (usually 4 to 6 offices on the same circuit). The code makes no exceptions for running such heaters at a reduced setting. This is not a not a choice for office areas.

Surge Protective Device (SPD) Power Strips

Surge protection devices (SPDs) are used to protect sensitive electronic equipment such as computers, monitors, scanners and printers, from transient over-voltages. SPDs can be manufactured as corded power strip or a wall mount outlet(s) and may have protected outputs for phone, network, and coaxial cable. Both types are considered as power strips and adding additional cords or power strips would be "daisy chaining".

All surge suppressors have a limited useful life. Metal oxide varistors (MOVs) inside the suppressor slowly degrade over time as they absorb excess energy from the power source.

Most surge suppressors will continue to function as a power strip, even though the MOV may have been destroyed by a power spike. This presents two possible dangers:

- If another power surge should occur, it can damage the equipment or appliances that are plugged into this surge protector.
- If sufficient voltage passes through the surge protector due to a second power spike, a resistant short may have been formed, allowing heating to occur and a fire to ignite.

Surge suppression devices with lights that indicate proper operation should be inspected on a regular basis. Devices without any visual or audible indication, as well as devices manufactured before 1998 should be removed from service and be disposed.

Additional requirements are:

- All surge protectors or power strips need to be UL approved. Be sure that the product is listed as a TRANSIENT VOLTAGE SURGE SUPPRESSOR.
- Use only devices that have an internal circuit breaker. These units will trip the breaker if the power strip is over loaded or shorted to prevent overheating and fire.
- If at any time the surge protector or power strip is hot to the touch remove and replace the unit. The electrical load for this strip should be evaluated for overloading.
- Do not locate a surge protector or power strip in any area where the unit would be covered with carpet, furniture, or any other item that will limit or prevent air circulation.
- Do not locate a surge protector in a moist environment.

Guidelines

Extension Cords:

Must be approved by an NRTL (National Rating Testing Laboratory):

- Underwriter Laboratories or SLAC Electrical Equipment Inspection Program (EEIP) and properly maintained with no exposed live parts, exposed ungrounded metal parts, damage, or splices.

Extension cords must be:

- Of sufficient current-carrying capacity to power the device. Current capacity of the cord must be matched to the load. An undersized cord is a fire hazard.
- Made of a heavy-duty or extra-heavy-duty rated cable and must be a continuous length without splices or repairs in the cable.
- Furnished with a ground prong, appropriately sized for the anticipated load, in good condition, free of splices, repairs, and signs of excessive wear. (Equipment grounding conductors that are part of flexible cords or used with fixture wires shall not be smaller than 18 AWG copper and not smaller than the circuit conductors.)

Must not:

- Pass through doors or windows.
- Be stapled or attached to a floor, wall, or ceiling.
- Be connected in series.
- Create a tripping or other safety hazard.
- Be unprotected where exposed to foot traffic, moving wheels, or falling debris to minimize tripping hazards and damage to the cords.
- Be in a cable tray that is not intended for power cables.

May be used to supply power to appliances under limited conditions. These include:

- Temporary situations such as laboratory experiments lasting no longer than --90 days or until the next downtime.
- Situations in which permanent rigid or flexible wiring is inappropriate because equipment is moved frequently.
- Power tools or other portable appliances used on a transient basis. They may be used around construction sites, in damp areas, or in an area where a person may be in direct contact with a solidly grounded conductive object such as working in a vacuum tank, extension cords must be protected by a ground fault circuit interrupter (GFCI) before the cord at a nearby power source. The GFCI can consist of a special circuit breaker, a GFCI outlet, or an extension cord with a built-in GFCI.

Some acceptable combinations are:

- Extension cord to device (electrical equipment)
- Power strip to device
- GFCI (with cord) to device
- Direct GFCI dongle to extension cord to device
- Direct GFCI dongle to power strip to device

Excerpt From a Typical NOAA Fire Prevention Plan:

Electrical Fire Hazards

Electrical system failures and the misuse of electrical equipment are leading causes of workplace fires. Fires can result from loose ground connections, wiring with frayed insulation, or overloaded fuses, circuits, motors, or outlets.

To prevent electrical fires, employees shall:

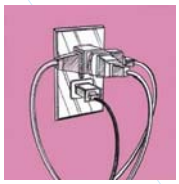
- Make sure that worn or old RPT's, extension cords, and wires are replaced.
- Use only appropriately rated fuses.
- Never use extension cords as substitutes for wiring improvements.
- Use only approved extension cords [i.e., those with the Underwriters Laboratory (UL) or Factory Mutual (FM) label].
- Check wiring in hazardous locations where the risk of fire is especially high.
- Check electrical equipment to ensure that it is either properly grounded or double insulated.

Portable Heaters

Portable electric heaters shall be plugged directly into a permanently installed receptacle. Portable electric heaters shall have tip-over protection that automatically shuts off the unit when it is tipped over. There shall be adequate clearance between the heater and combustible furnishings or other materials at all times.

Office Fire Hazards

Fire risks are not limited to industrial facilities. Fires in offices have become more likely because of the increased use of electrical equipment, such as computers and fax machines. To prevent office fires, employees shall:



- Avoid overloading circuits with office equipment.
- Turn off nonessential electrical equipment at the end of each workday.
- Keep storage areas clear of rubbish.
- Ensure that extension cords are not placed under carpets.
- Ensure that trash and paper set aside for recycling is not allowed to accumulate.

Total 1st Quarter Recordable Incident Rates

(Orange w/in 5% of goal, Red >5% above goal, Green = achieving goal)

Line Office	FY10 Goal	1st Qtr Actual
NWS	0.79	0.86
NMFS	2.00	0.53
OMAO	4.50	2.50
CORP	0.68	0.00
NOS	0.81	0.67
OAR	0.63	1.09
NESDIS	0.26	0.00
NOAA	1.38	0.82

- FY 2010 overall statistics for the first 3 months is 39% below the 1.14 incident rate experienced during the 1st Q of FY 2009.

- All Line Offices except NWS and OAR are significantly below the 2010 goal at this point in time.

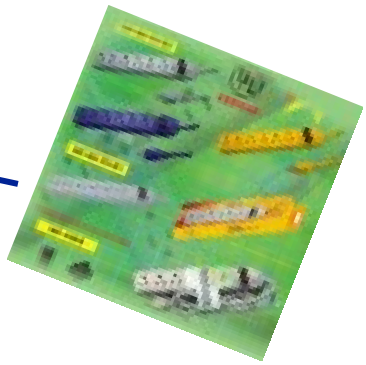
WORKPLACE ELECTRICAL SAFETY

EXTENSION CORDS AND & RELOCATEABLE POWER TAPS (RPTs)

Relocatable Power Tap (RPT's)

NOT TO BE USED FOR SPACE HEATERS OR HIGH POWER LOADS

- RPT's are not extension cords and their flexible cords tend to be short, usually well under 15 feet.
- RPT's cannot be permanently mounted.
- RPT's with built-in circuit interrupters are not equivalent to circuit breakers and shouldn't be relied upon to prevent a hazardous overload or other electrical problems.
- RPT's are not designed for high power loads like portable heaters, microwave ovens, coffee makers, toasters, hair dryers or refrigerators and should not be used for such devices.
- Flexible power cords shall not be routed through walls, windows, ceilings, floors, or similar openings.
- The UL Directory contains instructions that require UL-listed RPTs to be directly connected to a permanently installed branch circuit receptacle (wall outlet); they are not to be series-connected (daisy chained) to other RPTs or connected to extension cords.
- UL also specifies that RPTs are not intended for use at construction sites and similar locations.
- They are limited to indoors, dry locations and light loads only.
- RPT's shall be directly connected to a permanently installed receptacle.



Relocatable Power Tap (RPT) or Power Strip

A Relocatable Power Tap (RPT) or power strip is a variation of an extension cord, where the cord terminates in a row or grouping of receptacles. Power strips are commonly used in offices to provide multiple receptacles to office equipment. In general, the policies pertaining to extension cords also apply to power strips. Most are rated for 15 amps and should not be overloaded.

Good practice and an OSHA interpretation letter suggests that major appliances such as microwaves, refrigerators, space heaters, coffee makers, toaster ovens and other high power loads must be plugged into the wall outlet directly. Power strips are not designed for high power loads such as space heaters, refrigerators and microwave ovens, which can easily exceed the recommended ampere ratings on many power strips.

Additional requirements are:

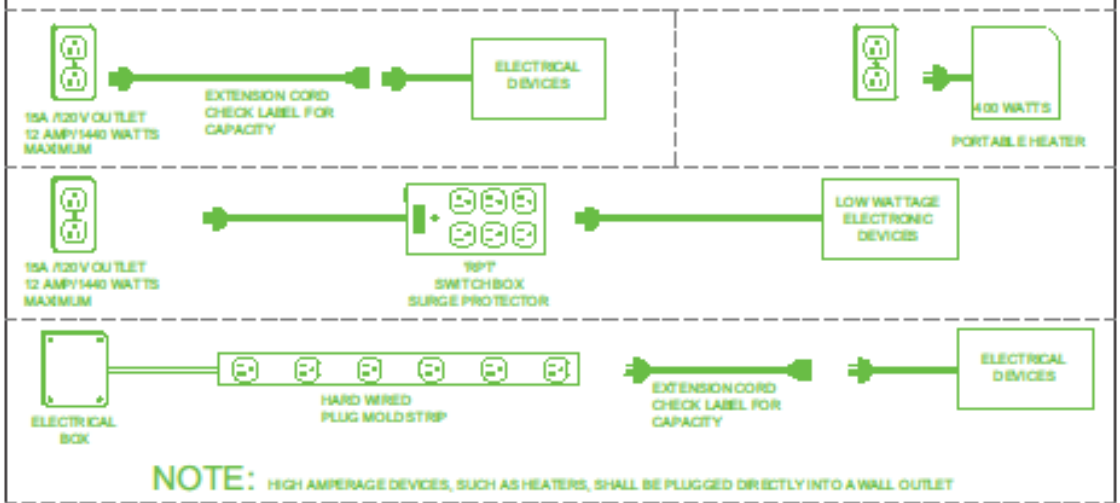
- Only UL (or other NRTL) approved device can be used.
- A RPT cannot be permanently mounted to any facility surface, except as allowed in 3 below. It may hang from screws or hooks if manufactured with for that purpose with slots or keyholes.
- In equipment racks, the preferred method of supplying 120/208-volt utility power to rack-mounted instruments is via a special power strip specifically designed to be rack-installed.

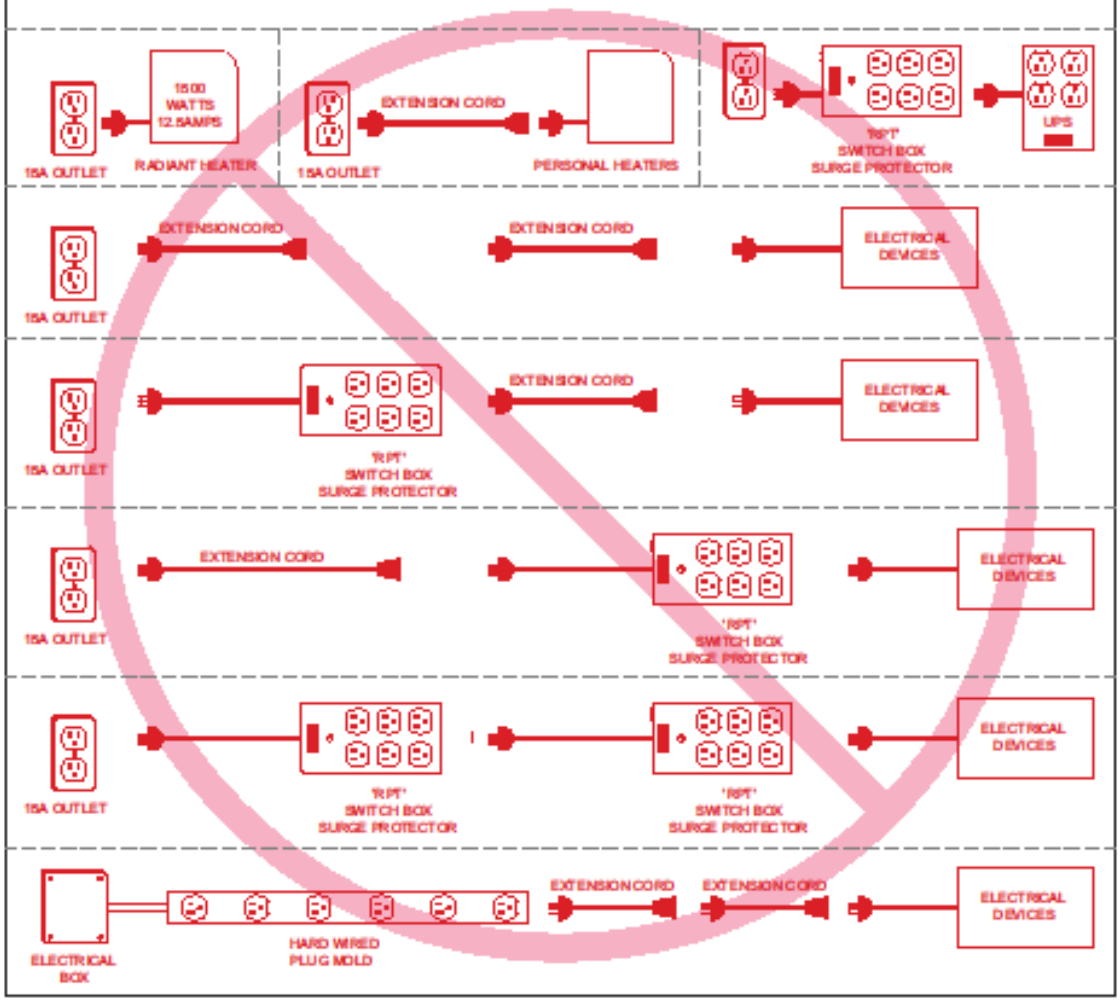
About this Newsletter

This newsletter is brought to you by the staff of the Safety and Environmental Compliance Office (SECO). The issues will be produced on a quarterly basis and posted on http://www.seco.noaa.gov/ to help increase awareness of the environmental, safety and health programs. If you have any questions or comments, please contact SECO at (301)713-2870.

ELECTRICAL SAFETY

ACCEPTABLE
COMBINATIONS OF EXTENSION CORDS & RPTS



NOTE: HIGH AMPERAGE DEVICES, SUCH AS HEATERS, SHALL BE PLUGGED DIRECTLY INTO A WALL OUTLET

UNACCEPTABLE
(DAISY CHAIN) COMBINATIONS OF EXTENSION CORDS & RPTS