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ENGINEERING & ENVIRONMENTAL SCIENCES

OIL SPILL
FORENSICS

FIRST DIMENSION ENGINEERING
A Division of Pario Engineering & Environmental Sciences

PARIO REPORT ISSUE 7

Defining the Problem

Oil spills continue to occur at an alarming rate despite improved regulations, standards, and Ontario laws. Environmental oil impact statistics are maintained by the Ontario Ministry of the Environment and the TSSA. In 2008, over 5,000 spills occurred in Ontario; and approximately 46% of these spills affected land, and spills to water numbered over 1,030.

The Ministry tracks the various materials which are spilled, 45% of the spills are attributed to oils.

Year	2008	2007	2006
Number of Oil Related Spills	2,300	2,219	2,516

Provincial law requires that all pollutants spilled into the Natural Environment must be immediately reported to the Ministry through the Spills Action Centre (SAC 1.800.268.6060). Environmental officers attend the Help Line 24 hours a day, 365 days a year.

Initial Response

Is the Spill On-Site or Off-Site?

If the spill is on-site and involves diesel, fuel oil, gasoline, propane and/or natural gas, the TSSA will be notified by the SAC office, and an onsite investigation by the Technical Standards & Safety Authority (TSSA) will be conducted. Reporting will be performed back through the TSSA. If the spill is off-site, the TSSA will attend, the Ministry of the Environment will attend; however, reporting may be back through the TSSA and/or the Ministry of the Environment. A determination will be made at the time of the response by the TSSA, and/or by the Ministry of the Environment.

TSSA (Technical Standards & Safety Authority)

The adoption of the TSSA Act occurred on June 27, 2001; prior to this date the 1990 Energy Act was in force. Under the TSSA Act, the TSSA regulates fuel suppliers, storage facilities, transport trucks, pipelines, contractors and equipment/appliances that use fuels. The TSSA also provides services to investigate fuel related disasters such as spills, fires, explosions, accidental release, carbon monoxide release, etc. (visit the TSSA web site **tssa.org** for more information). The TSSA has field experts strategically placed to cover all areas in Ontario; the TSSA representatives are highly trained and are experts in fuel safety.

In the event of a fuel oil spill, the Spills Action Centre (SAC) should be notified immediately. A follow up phone call to the local TSSA representative is also recommended as there can be a 1 – 3 business day delay prior to the TSSA representative being notified by SAC. Based upon my experience, notifying the TSSA representative directly immediately after calling SAC, and coordinating the site visit with the TSSA representative would be my recommendation.

What Laws, Acts and Regulations Protect the Industry?

Prior to July 2001 – The CAN/CSA B139-M91, 1990 Energy Act - Regulation 329, various UCL Standards, the National Building Code, the Ontario Fire Code, and the Environmental Protection Act were in effect in regards to fuel oil.

As of June 27, 2001 – the TSSA Act, the CAN/CSA B139-00 - Oil Heat Installation Code (currently the B139-06 is in effect), Ontario Fire Code, Ontario Building Code, various ULC Standards, Liquid Fuels Handling Code, TSSA – Fuel Oil Code and Adoption Document, Environmental Protection Act, and more recently the Environmental Management Protocol - May 2007 are in effect.

Preservation of Evidence

Please Note: TSSA Act Section 21 (2) No person shall interfere with or disturb any wreckage, article or things at the scene of an occurrence that is connected with it except in the interest of public safety (saving life, relieving human suffering, continuity of service or preservation of property. In summary, all evidence must remain in-situ in an undisturbed condition until the TSSA has attended and have completed their investigation. The TSSA has the right to remove and take evidence into their custody for further analysis, examination, and/or for other purposes.

Evidence must be preserved and a Chain of Custody must be maintained.

The TSSA will issue a report(s) pertaining to the spill, which may involve one or more parties. It is important to obtain copies of all of the TSSA reports which are issued to all parties. Reports can be applied for online through the TSSA website or contact the Freedom of Information Officer within the TSSA.

Retain Your Own Expert

It is recommended when a spill event occurs that your expert be retained immediately. This will increase the probability that evidence necessary for your position will be fully documented, a Chain of Custody maintained, full documentation of the site completed, necessary record information obtained, and the arrangement at the site observed as per the in-situ conditions. There are occurrences when the TSSA will remove the evidence; however, once their investigation is complete the evidence may be returned to the owners and/or to the forensic expert who represents the owner of the article.

Critical to the defense of your position is your expert. Your expert should have a good working knowledge in all areas of oil spill forensics including the root causes which lead up to spill events. Your expert must understand fuel delivery, inspection services and maintenance procedures, acceptable versus unacceptable installations, B139 Code requirements, TSSA Act, home owners responsibilities, and be generally familiar with oil heating equipment.

Often the true cause of a spill is from an act or an omission that may have been performed years prior to the spill event, the hole in the bottom of the tank may just be the symptom or the effect of the problem and likely will not be the root cause or what created the failure condition.

Having investigated hundreds of fuel oil spills, and heating systems failures; the root-cause(s) is normally hidden in the conditions leading up to the oil escape long before the event actually occurs.

When the issue of responsibility arises with legal proceedings, the root causation facts are critical to the outcome of the action. Eventually, the legal experts must determine the ultimate responsibility (or responsibilities) for the failure.

The more experienced your expert is in examining and documenting the small details which led up to the spill event, the better the chances for a successful outcome in terms of cost recovery.

Regulations, laws, standards, annual service requirements, standards of practice, and manufacturing certified documents exist and, if properly and dutifully executed, should ensure that fuel safety exists.

Spills normally occur when homeowners, installers (OBTs), service technicians (OBTs), and/or a fuel supplier overlook and/or do not strictly carry out their duties and responsibilities.

Annual Inspection / Service is Required

A home owner is required to have their oil heat system maintained/serviced once per year, regardless how often the appliance is used. Homeowners on occasion use oil as a back up heat service only; however, are still required to have the system checked, serviced, cleaned, and inspected once per year as per the B139 code.

Mechanisms of Oil Tank Failures (Partial List)

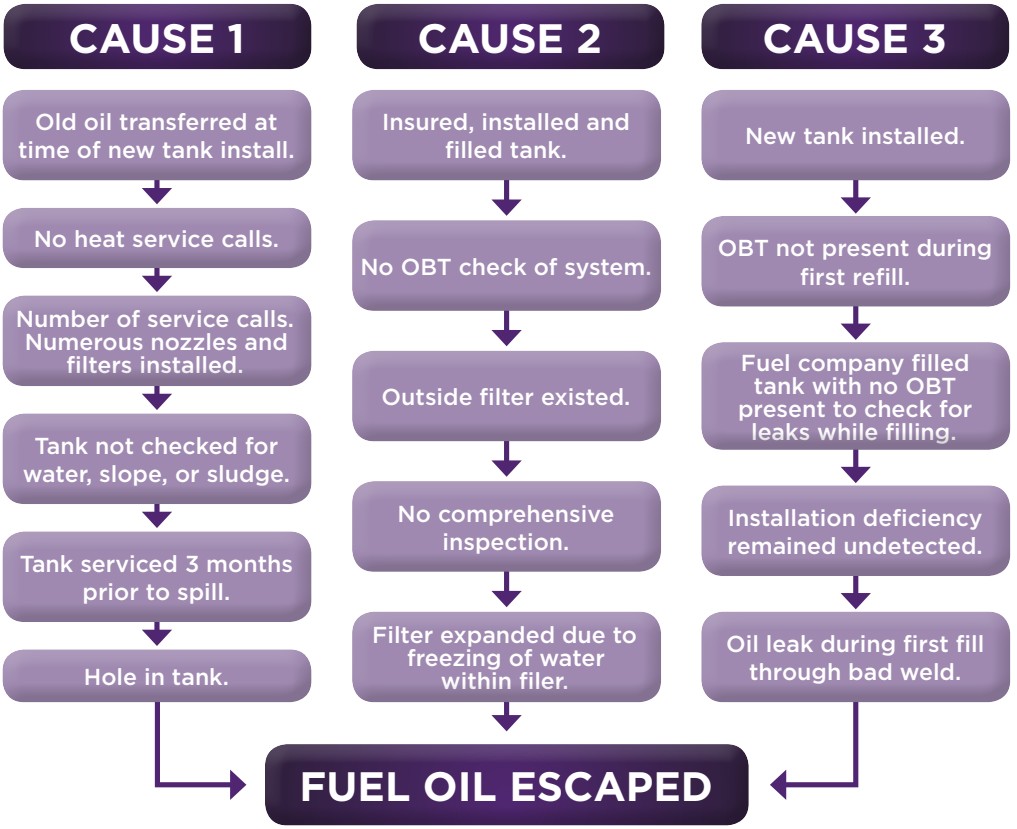
The following partial list details some common causes of oil spills.

- Tank deterioration – Exterior surface rust and/or internal corrosion.
- Filter installed outside – failure of the filter during a freeze/up within filter due to water presence, and subsequent release of fuel oil when a warm thaw period occurs.
- Improper or poor grade of steel, the steel is not required – ASTM and/or CSA G40 specifications.
- Steel too thin did not meet the minimum 1.8 mm minimum specification.
- Oil product and sludge transferred over at time of new tank and the tank failed within the early life cycle of tank.
- Tank installed improperly – improper foundation, too close to grade, vegetation in contact with underside of tank, tank has a backward slope, a vertical loop exists in the line, etc.
- Tank weeps or wicks water from above, tank located directly below an eave. No thread compound used to protect water entry through threads at fill, vent, and sight gauge openings.
- Tank fill/vent pipes too short, splashing on top of tank allows water to enter tank (fill/vent lids don't fit tightly).
- Broken site gauge – oil weeps through float hole.
- Tank on wrong slope.
- Loop in fuel line creates a trap for water, and a line failure occurs.
- Compression fittings in lines.
- Lines buried in concrete or in dirt (lines are susceptible to potential rapid corrosion process in this case).
- Furnace relay – 30 to 45 second trial to ignition relay fails in the run mode (empties tank into furnace, ignition transformer weak).
- Tank not properly situated on a proper foundation, tank is unstable, tank overturns, or concentrated loading damages shell of tank.

- Act of vandalism.
- Failure of underground tanks due to combination of water and sulfur in fuel creates an internal corrosion failure.
- Hole in tank (End Wall Tank) due to manufacturing design/build problem. Tank cannot discharge all potential water from the bottom of tank due to the lip created by the end wall outlet.
- Microbial Assisted Bacterial Corrosion attacks the tank shell and causes internal pitting, and ultimately an interior corrosion hole in tank, caused by the presence of water/sludge along bottom of tank.
- Fuel supplier allows snow or rain water to enter tank at time of filling.
- Condensation within tanks due to temperature/humidity fluctuations and partially filled tanks. (Tanks are best kept filled over spring, summer, and fall months).
- Bad oil delivery, high presence of water in fuel.
- Mishandling and physical abuse of tanks during installation.
- Improper installation, connections not properly performed, non-certified components.
- Improper servicing and maintenance of tanks, fuel lines, filters, valves, etc.
- Installing non-certified tanks.
- Improper placement of tank, tank placed directly under eave without protection.
- Falling ice and snow – severs fuel line (valve assembly). Valve and line not protected.
- Improperly installed oil lines, oil lines not properly supported.
- Nozzle failure, ignition transformer failure and/or burner motor failure.
- Over filling of tank by fuel supplier.
- Improper connections, loose connections.
- Failed O Rings or improperly installed filters.
- Corrosion failure with filter systems.
- Poor welding of tank and/or other manufacturing defects.

Cause and Effect Diagram

The following cause and effect diagram displays how spill events typically are related to cause and effect.



Have Your Team In Place

Immediate responses reduce overall clean up costs, and successful subrogation potential.

Seminars and presentations can be arranged for your claims representatives for purposes of developing a response protocol, and for further in-depth discussions regarding forensic investigations.

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