

# **Recommendations to Improve the Safety and Efficiency of Oil-burning Equipment Installation and Maintenance in the Yukon:**

## **A Response to Two Surveys of Oil-Burning Equipment Installations in the Yukon**

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Prepared for the:

**Yukon Government:**

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## Executive Summary

This report provides recommendations for the improvement of safety and efficiency at oil-burning equipment installations in response to the problems identified in two surveys (see Appendices A and B) conducted during the first part of 2007 in Whitehorse, Yukon.

The inspection of 124 sites with oil-burning equipment in the Yukon provided significant evidence that a large percentage of oil-burning equipment installations in the Yukon are not properly installed or maintained in accordance with the minimum standards established in the *B139 Installation Code for Oil-burning Equipment*. The average number of code infractions per site was 5.5 and the number of significant infractions that either posed an imminent hazard (12 cases) or could reasonably be expected to develop into a hazard in the future was 3 per site.

Eleven issues identified in both survey reports and summarized in this report require action to prevent the occurrence of serious safety problems at oil-burning equipment installations in the Yukon.

Six recommendations to improve the general safety and efficiency of oil burning equipment installations in the Yukon are discussed in detail in this report. In ascending order of importance the six recommending are:

1. A third survey should be conducted of oil-burning equipment installations located outside Whitehorse to determine whether the issues identified in the first two surveys are applicable to smaller and remote communities.
2. An advertising campaign should be conducted to inform owners about the health and safety, environmental, energy and cost saving benefits of annual maintenance of oil-burning equipment and the necessity of maintaining the proper clearances to combustibles around oil-burning equipment.
3. An information seminar or circular on the findings of the two survey reports should be provided to oil suppliers, heating contractors, and technicians to encourage discussion, debate, and corrective action by the oil heating industry.
4. Suitable enabling legislation and regulations for the latest version of the B139 Code should be promulgated to address installation and maintenance concerns identified in this report in both older and newer installations and to make the code directly applicable to the unique needs in the Yukon such as appliance venting and oil supply system requirements that are suitable for local conditions and equipment.
5. The development and implementation of a mandatory and effective method for training and certifying Oil Burner Mechanics in the Yukon is recommended. This action should be harmonized with the existing Yukon Apprenticeship Act.
6. An Oil Burning Devices Act, Regulations, and enforcement agency(ies) with appropriate powers should be created to encourage and ensure that the oil heating industry as well as users of oil burning equipment comply with the B139 Code by establishing duties and responsibilities for installers, contractors, oil suppliers, and owners of oil-burning equipment and an appropriate enforcement mechanism. These duties and responsibilities should include certification, licencing, and permits for new and replacement installations.

## **State of Oil-burning Equipment Installations in the Yukon**

Two separate surveys of 124 oil-burning equipment installations in Whitehorse were conducted between January and May 2007. The first survey of 55 installations was conducted by NRG Resources for the Yukon Government, Yukon Housing Corporation, and Energy Solutions Centre. The second survey of 69 installations employed the same format and procedure but was conducted by Yukon Housing Corporation and Energy Solutions Centre with the results reviewed and organized into a second report by NRG Resources.

The two survey reports are provided in Appendices A and B of this report. The types of sites, equipment, and infractions reported in both surveys were very similar. A comparison of the two surveys is included in the second report (see Appendix B).

The inspection survey of 124 sites in Whitehorse with oil-burning equipment identified 685 infractions of the B139 *Installation Code for Oil-Burning Equipment* of which 381 were considered to be significant concerns that either posed an imminent hazard (12 cases) or could reasonably be expected to develop into a problem in the future. The average number of code infractions per site was 5.5; the average number of significant infractions was 3 / site. None of the 124 sites completely complied with all of the installation and maintenance provisions of the B139 Code. Although the entire B139 Code is not in force in the Yukon, it is considered a reasonable standard for comparison that has withstood scrutiny in most, if not all, jurisdictions across Canada.

The B139 Code used for this survey was the edition of the code in force at the time of installation. In addition, four safety-related requirements which are in the latest version of the code were added. They are the requirements for 1/ the slope of the tank. 2/ the height of the tank fill pipe, 3/ the requirement that piping, valves and filters not extend below the tank foundation, and 4/ the requirement that piping and tubing not be buried in concrete. The addition of these items increased the number of infractions by 97, but did not change the general conclusions of the report.

The B139 Code is a Canadian Standards Association (CSA) standard that is referenced in the National Building Code (NBC) of Canada which, in turn, is adopted by the Yukon Building Standards Act only with respect to installation requirements. As such, only those parts of the B139 Code applicable to new building construction are enforceable in the Yukon. Legislation is needed to make the entire B139 Code a requirement in the Yukon with appropriate adjustments for northern conditions such that it can be applied and enforced for replacement and maintenance of oil-burning equipment.

The age of the installation was not a major factor in the number of deficiencies found; deficiencies were found in both new and older installations. It is worth highlighting that 64% of the 124 sites did not have annual maintenance performed and thus were not in compliance with the annual maintenance requirements in the B139 Code (which currently are not in force in the Yukon). Since many of the installation problems could have been corrected as a maintenance item, it is difficult to determine the degree to which maintenance or installation is the greater concern. Significant safety concerns about both installation and maintenance of oil-fired appliances were identified in the surveys.

The results and analysis of the surveys indicate that the general state of oil-burning equipment installations in the Yukon is poor. The potential for an incident causing harm to humans or property is high.

Both surveys identified eleven safety and efficiency issues. They are listed below in order of importance together with a brief explanation of the hazard(s) that they pose and their most probable cause(s).

**1. Lack of maintenance.** 79 of the 124 surveyed sites (64%) were not in compliance with the B139 Section 14 requirements regarding annual maintenance. Very few of the appliances inspected had been cleaned on a regular basis. In many cases, the appliances had never been cleaned or properly maintained.

Lack of maintenance is universally recognized as the primary cause of fires, leaks, and carbon monoxide poisonings for all fuel-fired appliances.

Three probable causes for this problem are:

- i) Owners' lack of knowledge about the practical requirements and benefits of having their oil-burning equipment maintained annually;
- ii) Lack of legislation and supporting enforcement agency(ies) with appropriate powers in the Yukon requiring compliance with the B139 Code especially in regards to annual maintenance.
- iii) Service technicians' lack of training and/or knowledge regarding proper annual maintenance requirements.

**2. A very low percentage of installers or service technicians are trained and certified as Oil Burner Mechanics.** Only 21 of the 124 sites inspected (17%) provided any indication that a certified Oil Burner Mechanic installed or serviced the installation. The number and nature of code infractions found during the surveys suggest that installers and service technicians either do not know about the minimum safety standards established in the fuel oil code or choose not to comply with these minimum standards.

The problems and hazards that are potentially created by unqualified technicians working on oil-burning equipment are numerous as shown by the high percentage of non-compliant and hazardous installations found in both surveys.

The Oil Burner Mechanic (OBM) trade is a voluntary certificate under Yukon's Apprentice Training Act. There is no enabling legislation that requires a person to hold an OBM certificate when conducting work on oil-burning equipment.

An informal survey of over 100 heating technicians who have attended five courses delivered by NRG Resources found that less than 5% of technicians working on oil-burning equipment indicated that they hold an OBM certificate. By comparison, 100% of technicians working on gas-burning equipment stated that they hold a Gasfitter licence which is a mandatory requirement under the Gas Burning Devices Act and Gas Regulations O.I.C. 1998/213.

The two most probable causes for the low percentage of training and certification among workers in the oil heat industry are:

- i) Lack of a regulatory requirement to ensure that technicians hold an Oil Burner Mechanic certificate before conducting unsupervised work on oil-burning equipment.
- ii) Lack of an enforcement agency(ies) having appropriate authority and a permit process that requires that technicians conducting work on oil-burning equipment are properly certified.

**3. Spillage of flue gases indoors due to improperly installed or improperly maintained appliances and their venting systems.** 14 cases of flue gases spilling indoors were found during the two surveys. This constitutes 11% of the 124 surveyed sites; all of the cases were significant and 6 were considered hazardous. Most of the cases involved positive vented appliances which require special venting material and are especially prone to failure if not strictly installed in accordance with the manufacturer's certified instructions and the B139 Code.

Spillage of carbon dioxide and carbon monoxide can cause severe health problems; heat spillage can cause fires.

The two most probable causes of this problem are:

- i) Lack of service technician training and/or knowledge regarding proper venting installation requirements.
- ii) Lack of inspections of oil-burning equipment installations since there is no fuel oil equivalent of the Gas Burning Devices Act and Regulations which require installation permits and inspections.

**4. Improper combustion set-up for safe, efficient combustion.** 46 of the 121 combustion tests (38%) conducted during both surveys indicated that the appliances were operating inefficiently (i.e. <78% efficiency) and/or were not in compliance with the safety requirements for combustion established in the manufacturer's certified instructions and the B139 Code.

Inefficient combustion set-up not only increases fuel costs and pollution of the environment but also causes damage to appliances and increases the risk of fires and carbon monoxide poisonings.

The three most probable causes of this problem are:

- i) Owners' lack of knowledge about the practical requirements and benefits of having their oil-burning equipment maintained annually.
- ii) Lack of legislation and a supporting enforcement agency(ies) with appropriate powers in the Yukon requiring compliance with the B139 Code especially in regards to annual maintenance.
- iii) Lack of service technician training and/or knowledge regarding proper combustion set-up requirements.

**5. Oversized, improperly installed, poorly maintained vent systems.** 71 of the 124 sites surveyed (57%) had infractions related to their venting systems. 58 of these 71 cases (82%) had significant code infractions and 11 of the 12 imminent hazard sites had venting infractions.

Oversized, improperly installed, or poorly maintained vent systems may cause venting problems resulting in flue gas spillage and damage to the appliances. These problems are especially prevalent in cold climates.

The two most probable causes for oversized and improperly installed vent systems are:

- i) Lack of service technician training and/or knowledge regarding proper venting requirements.
- ii) Lack of legislation and a supporting enforcement agency(ies) with appropriate powers in the Yukon requiring compliance with B139 Code requirements.

**6. Clearance to combustible material is not maintained.** 31 of the 124 sites inspected (25%) had infractions related to clearance between combustible materials and the appliance or vent. Approximately half of these problems were related to installation infractions and the other half were caused by the owners storing material too close to the appliance or vent.

Failure to comply with the clearance to combustible requirements established in the B139 Code and manufacturer's instructions may result in fires.

The most probable causes of this potentially dangerous infraction of the B139 Code and manufacturer's requirements are:

- i) Owners' lack of knowledge about the installation and maintenance requirements under the B139 Code and the practical requirement to maintain the proper clearance to combustibles.
- ii) Lack of legislation and supporting enforcement agency(ies) with appropriate powers in the Yukon requiring compliance with B139 Code requirements.
- iii) Lack of service technician training and/or knowledge regarding proper installation and maintenance requirements.

**7. Combustion air supply requirements are not met.** Infractions related to improper combustion air supply to appliances were found at 48 (36%) of the 124 sites inspected. 8 of the 48 cases were considered significant since they were in confined spaces and/or adversely affected the safe operation of the appliance(s).

Properly sized, installed and maintained combustion air openings have been required since the 1976 B139 Code. They ensure the safety and efficiency of appliances that use air from inside the building.

The high percentage of non-compliance regarding air supply requirements can be attributed to:

- i) Owners' lack of knowledge about the installation requirements under the B139 Code and the practical benefits of maintaining the air supply requirements for oil-burning equipment.
- ii) Lack of service technician training and/or knowledge regarding proper installation and maintenance of air supply requirements for oil-burning equipment.
- iii) Lack of legislation and supporting enforcement agency(ies) with appropriate powers in the Yukon requiring compliance with B139 Code requirements.

**8. Aboveground tanks not installed or maintained properly to prevent internal and external corrosion.** Two related problems are covered by this item: Firstly, 56 of the 106 aboveground tanks surveyed (53%) were not sloped toward the outlet as required by the current B139 Code; secondly, 15 of the 82 outdoor aboveground tanks surveyed (18%) showed signs of external corrosion.

Improper tank slope has been proven to cause internal corrosion resulting in leakage. Together these two corrosion related infractions of the fuel oil code may result in tank leakage and significant damage to the environment.

The four most probable causes for corroding aboveground tank systems are:

- i) Owners' lack of knowledge about the practical requirements related to maintenance of corrosion protection on aboveground tanks.
- ii) Lack of service technician training and/or knowledge regarding proper aboveground tank installation and maintenance requirements.
- iii) Lack of legislation and supporting enforcement agency(ies) with appropriate powers in the Yukon requiring compliance with B139 Code requirements.
- iv) Lack of regulatory responsibility placed on oil suppliers, through appropriate measures, to ensure that they deliver only to safe, compliant tank systems.

**9. Lack of monitoring of underground tanks for leakage and corrosion.** None of the 20 underground storage tanks (UST) surveyed were regularly monitored for water accumulation or for cathodic (rust) protection. Unfortunately, the current edition of the B139 Code is the first fuel oil code to not provide any requirements related to UST installation, maintenance, or removal. This is a significant problem since 20 of the 124 sites surveyed (16%) had USTs that would benefit from requirements given in previous codes.

Improperly installed and maintained underground tank systems may lead to underground leaks that can contaminate water wells and surface water systems.



The five most probable causes for the lack of monitoring of underground tank systems are:

- i) Owners' lack of knowledge about the practical requirements related to maintenance of corrosion protection for underground tanks.
- ii) Lack of service technician training and/or knowledge regarding proper underground tank installation and maintenance requirements.
- iii) Lack of regulatory responsibility placed on oil suppliers to ensure that they deliver only to safe, compliant tank systems.
- iv) Lack of legislation and supporting enforcement agency(ies) with appropriate powers in the Yukon requiring compliance with B139 Code requirements.
- v) The current lack of direction provided in the B139 Code regarding underground tank installation, maintenance, or removal.

**10. Aboveground tanks not properly supported or secured to prevent toppling or damage - especially if a seismic event occurs.** Significant code infractions related to improper tank support and improper piping at the tank were found at 27 of the 106 aboveground tanks surveyed (25%). None of the 106 aboveground tanks surveyed were equipped with seismic restraints (as required by the B139 Code since 1976) even though the Yukon is listed as an earthquake zone. However, the proposal now being developed to require seismic restraint in all installations should eliminate this concern.

Improper tank support and improper piping at the tank may result in tanks settling or falling over. If a significant earthquake occurs in the Yukon, a large number of aboveground tanks may topple resulting in significant contamination of soil, drinking water sources, and surface waterways.

The four most probable causes for improperly supported and secured aboveground tank systems are:

- i) Owners' lack of knowledge about the practical requirements related to the maintenance of aboveground tank supports.
- ii) Lack of legislation and supporting enforcement agency(ies) with appropriate powers in the Yukon requiring compliance with B139 Code requirements.
- iii) Lack of service technician training and/or knowledge regarding proper aboveground tank installation and maintenance requirements.
- iv) Lack of regulatory responsibility placed on oil suppliers to ensure that they deliver only to safe, compliant tank systems.

**11. Appliances and tanks without rating plates indicating that they have not been tested and approved to recognized standards.** 31 of the 106 above-ground tanks surveyed (29%) and 4 of the 134 appliances surveyed (3%) did not have a rating plate. The B139 Code requires that oil-burning equipment be certified to recognized standards.

The approval of equipment to recognized standards is a primary safety requirement that helps ensure that sub-standard and unsafe equipment is not employed at oil-burning installations. The use of uncertified tanks may lead to leaks resulting in contamination of the environment. The use of uncertified appliances and components may lead to fires and carbon monoxide poisonings.

Again, the three most probable causes for the high percentage of unapproved tanks and appliances found during the survey are:

- i) Lack of service technician training and/or knowledge regarding the use of approved tanks and appliances.
- ii) Lack of regulatory responsibility placed on oil suppliers to ensure that they deliver only to safe, compliant tank systems.
- iii) Lack of legislation and supporting enforcement agency(ies) with appropriate powers in the Yukon requiring compliance with B139 Code requirements.

Based on the writer's experience (see Appendix D for details), the number and nature of the infractions indicate that a significant portion of oil heat users are not aware of the installation requirements under the B139 Code or the practical need for annual maintenance and that the oil heating industry is not responding responsibly to self-regulation as required in the Yukon. Although there are good installations, technicians, and contractors, a large number of oil installations do not meet minimum safety and efficiency standards.

Based on discussions held with home owners, oil burner technicians, and heating contractors while conducting the inspections and during various courses in the Yukon, there is a general lack of knowledge of code requirements and practical issues related to the safety and efficiency of oil-burning equipment.

Those discussions have also indicated that the lack of incentives, consequences, and/or opportunity to be trained and qualified as an Oil Burner Mechanic are important factors regarding this general lack of knowledge. The lack of consequences for not complying with the code requirements has been identified by a number of technicians, contractors, and users as a major cause of the problems found at new and old installations.

This problem is compounded by the fact that although the current legislation does make obtaining a building permit compulsory, if a permit is not obtained by the building owner there are no penalties (fines) in legislation that can be imposed on the building owner or the contractor. If the building owner does not request an inspection there are also no sanctions that can be imposed. Suitable enabling legislation and regulations are needed.

Given the writer's knowledge and experience of the Ontario oil heat industry, a comparison of the state of the oil installations in that province to the surveyed installations may be of some value. In general, the number and type of infractions found in the Yukon would have been similar to those in Ontario before 2001.

Regulatory and enforcement changes in 2001 require oil distributors, oil heating contractors, and Oil Burner Technicians to take action whenever unsafe conditions are found. Oil distributors are required to inspect the installations before supplying oil to a site and to maintain a record of the inspection which must be updated at least every ten years. Technicians are given the power to shut down hazardous equipment and order repairs. Compliance with these new duties and responsibilities is now strictly monitored and enforced by the Technical Standards and Safety Authority which is a private, not-for-profit organization created out of a government department in 1997.

In comparison with the current state of oil-burning equipment installations in Ontario, the surveyed sites have a very high level of non-compliance. The non-compliance level in Ontario can be confidently estimated by the writer at less than 10% compared to the 100% infraction rate found in the two surveys.

Another equally worthwhile comparison can be made between the Yukon oil heating industry and the Yukon propane heating industry. The latter is tightly regulated by the Gas Burning Devices Act and Gas Regulations as well as closely monitored by the Gas Inspections Unit of the Building Safety Branch of Consumer and Safety Services.

Although the writer's knowledge of the state of propane installations in the Yukon is limited, the number of licenced Gasfitters attending any of the courses delivered by NRG Resources has consistently been greater than the number of certified Oil Burner Mechanics. It is expected that this higher proportion of qualified technicians, together with the requirement for permits and inspections, would result in a higher level of compliance with code requirements at propane installations compared to oil installations

## **Recommended Actions to Correct the Problems Identified in the Surveys**

The following six recommendations are offered in response to the eleven safety and efficiency issues identified in the two survey reports. A brief explanation of each recommendation is given first along with reference to the issue(s) (1 to 11) that it will help correct. A detailed discussion of each recommendation is provided after this list.

- A.** A third survey should be conducted of oil-burning equipment installations located outside Whitehorse to determine whether the trends identified in the first two surveys are applicable to smaller and remote communities.

This action will ensure that the issues and solutions that are applicable to communities outside of Whitehorse are addressed. Although it is anticipated that the same issues will be identified, the number of code infractions and therefore urgency of acting may be greater due to the challenges faced in getting qualified technicians and approved equipment.

- B.** An advertising campaign should be conducted to inform owners about the health and safety, environmental, energy and cost saving benefits of annual maintenance of oil-burning equipment and the necessity of maintaining the proper clearances to combustibles around oil-burning equipment.

This action will help correct the following issues identified in the previous section.

1. Lack of maintenance.
3. Improperly installed or maintained appliances and their venting systems.
6. Clearance to combustible requirements.
7. Combustion air supply requirements are not met or maintained.
8. Aboveground tanks not installed or maintained to prevent corrosion.
9. Lack of monitoring of underground tanks for leakage and corrosion.
10. Aboveground tanks not properly supported or secured.

- C.** An information course or circular on the findings of the two survey reports should be provided to oil suppliers, heating contractors and technicians to encourage discussion, debate, and corrective action by the oil heating industry.

This action will help correct all eleven issues identified in the previous section.

- D.** Suitable enabling legislation and regulations to accept and amend the B139 Code should be promulgated to address installation and maintenance concerns identified in this report in both older and newer installations and to make the code directly applicable to the unique needs in the Yukon. For example, the B139-04 Code employs venting tables designed for relatively warm winter climates and does not provide any requirements related to large aboveground tanks or any size of underground tank.

This action will help correct all eleven issues identified in the previous section.

- E. The development and implementation of a mandatory and effective method for training and certifying Oil Burner Mechanics in the Yukon is recommended. This action should be harmonized with the existing Yukon Apprenticeship Act.

This action will help correct all eleven issues identified in the previous section.

- F. An Oil Burning Devices Act, Regulations, and enforcement agency(ies) with appropriate powers should be created to encourage and ensure that the oil heating industry as well as users of oil burning equipment comply with the B139 Code by establishing duties and responsibilities for installers, contractors, oil suppliers, and owners of oil-burning equipment and providing an appropriate enforcement mechanism. These duties and responsibilities should include certification, licencing, and permits for new and replacement installations.

This action will help correct all eleven issues identified in the previous section.

The first three recommendations are direct and relatively easily achieved responses to the survey results.

The last three recommendations require legislative or regulatory changes by the Yukon government.

A more detailed discussion of each of the six recommendations is provided below to assist in both the understanding and implementation of these recommendations.

**A. Survey oil-burning equipment installations located outside Whitehorse.**

Only one of the installations inspected during the two surveys was located outside Whitehorse. Although this recommendation does not directly provide a solution to the problems identified in the two Whitehorse surveys, it does ensure that the problems identified by the surveys are applicable to smaller and remote communities.

By including smaller and remote communities in the survey sample other measures, priorities, and impediments to improving the safety and efficiency may be identified. Since these communities do not have many of the advantages available in Whitehorse (e.g. number of heating contractors and equipment suppliers), the survey should investigate the applicability for these communities of the five other recommendations given in this report.

A survey of oil-burning equipment installations outside Whitehorse would engage owners and industry stakeholders in smaller and remote communities. It would also ensure that improvements to the safety and efficiency would have an effect across the Yukon rather than just in Whitehorse.

**B. Inform owners about maintenance issues.**

Although the owners and/or occupants of the 124 inspection sites were informed about the inspection findings at their location, the findings and implications of the surveys should be advertised to the general public so they can make informed decisions about their oil-burning equipment installations.

The advertisement should highlight the requirement established in Section 14 of the B139 Code for owners to maintain their oil-burning equipment annually. The list of tests and maintenance actions that are required under the B139 Code during annual maintenance should be included to show the practical value and importance of the code requirements.

The practical value of having annual maintenance conducted by a qualified technician should be highlighted by using the statistical evidence of problems found during the surveys. Obvious correlations between maintenance and reduced heating costs as well as extended equipment life can be drawn.

Although an informed public is a good first step in addressing the problems related to maintenance and clearance to combustible issues, the other recommendations will have longer-term and more comprehensive effects on safety and efficiency of oil-burning equipment installations.

**C. Inform oil suppliers, heating contractors/technicians about the survey results**

The intention of this third recommendation is to encourage discussion, debate, and corrective action by the oil heating industry. The vast majority of companies and workers involved with oil-burning equipment installations want to improve the safety and efficiency of the installations. They are aware that it is in their self-interest to effectively respond to all the problems identified in the surveys.

An information seminar about the survey results should be offered to interested oil suppliers, heating contractors and front-line technicians. An open forum presentation should encourage discussion and debate to ensure that these industry partners understand and take ownership for their respective roles in improving safety and efficiency at new and existing installations.

Two seminars are recommended with one occurring before the advertisement delivered to the public and one after the advertisement. The first would ensure that the concerns of the oil heat industry are included in the advertisement campaign; it would also ensure that they feel included and are ready to respond to public concerns about the problems identified in the surveys. The second seminar would allow those industry partners who were either not able or willing to attend the first seminar to participate after the public discussion is engaged by the advertising campaign.

Although an informed and engaged oil heat industry is crucial for the improvement of safety and efficiency at oil-burning equipment installations, the remaining three recommendations would help ensure that the entire oil heat industry becomes involved in the improvements to safety and efficiency.

#### **D. Amend the B139 Code to address tank requirement deficiencies**

One of the major impediments to improving the safety of oil supply tank installations is the lack of code requirements in the current B139-04 *Installation Code for Oil-burning Equipment*. This is the first fuel oil code since 1957 that does not provide direction on how to install, maintain, or remove aboveground tanks with a capacity exceeding 5,000 L or any size of underground tank.

The lack of code requirements related to underground tank systems is especially troubling since recent surveys conducted across North America have indicated that a significant percentage of underground tank systems are leaking. The previous B139-00 Code recognized and responded to these environmental concerns by retroactively requiring the removal of any single-wall steel underground tank by 2009. Unfortunately, with the acceptance of the current code, these retroactive tank removal requirements were canceled.

It is worth noting that Ontario has not accepted the B139-04 Code due in large part to its perceived deficiencies concerning larger aboveground tanks and all underground tanks. Instead, Ontario created its own Code which CSA publishes as the *B139ON-06 Ontario Installation Code for Oil Burning Equipment*.

The concept of customizing the B139 Code to meet local requirements through creation of a local version of the code, or through enabling legislation and regulations, is recommended for the Yukon. It would not only address the obvious deficiencies in code requirements for oil supply tanks but would also allow for the fine tuning of the requirements to make the entire code directly applicable to the unique needs in the Yukon.

A Yukon Fuel Oil Code could provide focused direction on vent sizing and air supply sizing to address the effects of the cold temperatures experienced in the Yukon. Specific direction could be provided regarding seismic restraint methods.

By involving industry stakeholders (oil suppliers, contractors, technicians and consumers) in the code amendment process, the customized Yukon Fuel Oil Code would garner the approval and acceptance that a safety code requires to be effective.

The Ontario Code could be employed as a starting point to minimize the work and liability involved in customizing a safety code. The legislative changes recommended in the final recommendation could easily establish the framework for the customization and approval process.

**E. Create a mandatory and effective method for training and certifying Oil Burner Mechanics in the Yukon**

The significant percentage of uncertified workers installing and servicing oil – burning equipment installations in the Yukon is considered a major cause of all eleven safety and efficiency issues identified in the surveys.

A Certificate of Qualification constitutes standardized proof that a technician has achieved a minimum level of knowledge and skills considered necessary to work in the industry. Without the proof of a certificate all the actions of a technician are suspect as sub-standard. The high percentage of code infractions found in the surveys confirms that a high percentage of installation and service work being conducted in the Yukon is sub-standard.

The Oil Burner Mechanic (OBM) trade is recognized in the Yukon by the Apprentice Training Act and Regulations. However, there is no legal requirement or enforcement procedure to ensure that workers are certified.

Although contractors and technicians have informed NRG Resources that they consider the OBM apprenticeship requirements to be both onerous and costly, John Gryba, Acting Director of Training Programs in the Yukon Department of Education, has clarified the requirements for NRG Resources and indicated that the apprenticeship requirements are neither onerous nor costly.

In fact, there is no mandatory requirement for in-school training to gain an OBM certificate; on-the-job training and successful completion of an exam are sufficient. Given these minimal requirements, it appears that the primary reason that technicians are not certified is simply that they can legally work without training and certification.

It is recommended that OBM training and certification be made mandatory for any person conducting work on oil-burning equipment. It is further recommended that a more intense, more “hands-on” training course and/or testing system be implemented to ensure that OBM certificates are only issued to qualified technicians.

Currently, the optional apprenticeship in-school training is conducted in Nova Scotia. It is recommended that a training program be made available in the Yukon that addresses concerns specific to the Yukon oil heat situation.

Certification alone cannot fully resolve the safety and efficiency issues raised by the surveys. Without incentives or consequences for contractors and technicians to justify becoming certified, there is a competitive disadvantage to meeting the apprenticeship requirements since competing contractors or technicians do not spend the time or money to become certified. The final recommendation addresses this concern.



## **F. Create an Oil Burning Devices Act, Regulations, and enforcement agency**

The survey results show that the self-regulation model employed to date in the Yukon has failed to meet the minimum safety and efficiency standards established in the fuel oil code and manufacturer's instructions.

Currently, inspections of oil-burning equipment installations by government authorities are only required for new construction sites. Inspections of retrofit installations may be conducted at the request of the owner or installing contractor but are not mandatory. These inspections are conducted by Building Inspectors who are not required to be trained or certified as Oil Burner Mechanics.

Currently, there is no procedure in place for identifying and resolving problems at existing installations. Oil suppliers, contractors, and technicians are not empowered or required to resolve problems that they find. Although civil litigation is a motivating force, there is, in fact, a competitive disadvantage for businesses to refuse to supply oil to or work on non-compliant installations since competitors can gain market share without any consequences.

Without legislated inspection requirements and consequences, work conducted on oil-fired equipment installations will continue to be sub-standard since the market incentive to "cut-corners" to reduce prices inevitably forces even knowledgeable and responsible suppliers, contractors, and technicians to reduce their standards to the lowest common denominator set by those willing to put public safety at risk for short-term personal gain.

As previously discussed (page 8), the propane industry in the Yukon, which is subject to the Gas Burning Devices Act and Gas Regulations, as well as the fuel oil industry in Ontario, which is subject to the Technical Standards and Safety Act and Fuel Oil Regulation (see Appendix C), are two models of regulated fuel industries that work to the benefit of all parties. It is worth noting that NRG Resources investigated how all jurisdictions in Canada deal with oil-burning equipment installations and concluded that no other models are available for comparison.

It is recommended that the regulatory review process that creates an Oil Burning Devices Act and Oil Regulations draws the best features from both of the recommended models to create a system that addresses the following points.

- Designate an *authority having jurisdiction* over oil-burning equipment installations
- Provide the administrative structure, powers, and check and balance system for the designated authority to work effectively and efficiently. This provision should include:
  - the appointment process for a director and inspector(s)
  - powers given to the director to accept and amend National Codes and Standards
  - powers given to the inspector to effectively carry out his/her duties

- powers given to the director and/or inspector to refuse or revoke the licence of an oil supplier, contractor or technician for significant failures to comply with minimum safety standards
  - an appeal procedure for challenging the orders or actions of a director or inspector - first by means of an internal procedure with ultimate authority given to the court system.
- Require that appliances and components employed at oil-burning equipment installations are approved to standards recognized by the Canadian General Standards Council
  - Require that any installation, service, repair, or removal of oil-burning equipment be conducted by certified Oil Burner Mechanics
  - Require oil suppliers to be licenced to deliver oil and require heating contractors to be registered to conduct the business of installing, servicing, and removing oil-burning equipment. Like the technician certification requirement, this licencing of oil suppliers and registration of contractors can be employed to track and control compliance with the duties and responsibilities established for these key groups.
  - Require owners to maintain their oil-burning equipment and to comply with safety orders issued by inspectors, oil suppliers, contractors, or certificate holders.
  - Establish a permit and inspection requirement and process for new and retrofit appliance or tank installations.
  - Require the reporting of fuel-oil related fires, explosions, leaks, spills, or carbon monoxide poisoning to the designated authority and establish an investigation procedure that will effectively address any problems identified by the investigation.
  - Either require the reporting of unsafe conditions and non-compliant installations (that can not be immediately corrected) to the designated authority so they can ensure the problems are corrected **OR** empower and require oil suppliers, contractors, and technicians to act decisively when hazardous conditions are identified and to issue work orders to correct deficiencies. The first option is the method employed to correct deficiencies under the Gas Burning Devices Act and Regulations while the second option is employed in the Ontario regulatory system. A combination of the two methods may be the most effective.
  - Require oil suppliers to only supply oil to installations for which they have reliable evidence indicating that the installation meets the minimum safety standards established in the fuel oil code and manufacturer's instructions
  - Set the maximum penalties that can be issued by the authority having jurisdiction and or the court system for failure to comply with the rules governing the oil heat industry.

The creation of an Oil Burning Devices Act, Fuel Oil Regulation, and enforcement agency is the most important and effective step toward the improvement of safety and efficiency at oil-burning equipment installations in the Yukon.

## **Conclusion**

The inspection of 124 sites with oil-burning equipment in the Yukon provided significant evidence that a large percentage of oil-burning equipment installations in the Yukon are not properly installed or maintained in accordance with the minimum safety standards established in the *B139 Installation Code for Oil-burning Equipment*.

The problems identified in the two surveys can be categorized into eleven issues or areas of concern as follows:

1. Lack of maintenance.
2. Lack of installers/ service technicians trained and qualified as Oil Burner Mechanics.
3. Improperly installed or maintained appliances and their venting systems.
4. Improper combustion set-up.
5. Oversized, improperly installed, poorly maintained vent systems.
6. Clearance to combustible material is not maintained.
7. Combustion air supply requirements are not met or maintained.
8. Aboveground tanks not installed or maintained to prevent corrosion.
9. Lack of monitoring of underground tanks for leakage and corrosion.
10. Aboveground tanks not properly supported or secured.
11. Appliances and tanks not approved to recognized standards.

To address these 11 issues and improve safety and efficiency of oil-burning equipment installations in the Yukon, six recommendations are offered for consideration.

- A. Survey oil-burning equipment installations located outside Whitehorse.
- B. Inform owners about maintenance issues.
- C. Inform oil suppliers, heating contractors/technicians about the survey results.
- D. Amend the latest version of the B139 Code through creation of a local version of the code, or through enabling legislation and regulations, to address tank requirement deficiencies and other safety issues unique to the Yukon.
- E. Create a mandatory and effective method for training and certifying Oil Burner Mechanics in the Yukon.
- F. Create an Oil Burning Devices Act, Regulations, and enforcement agency.

Implementation of the six recommendations will significantly improve the safety and efficiency of oil-burning equipment installations across the Yukon.

I trust that this report meets with your approval. Please do not hesitate to contact me to discuss any of the issues raised in this report.

Yours Sincerely,



Rod Corea