Fuel Oil Heating Installation Inspection Report #5 March 2010

Prepared for the:

Yukon Housing Corporation

Prepared by:

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Executive Summary

NRG Resources Inc. conducted 102 inspections of oil-burning appliances and supply tanks in Whitehorse and Haines Junction between March 13 and March 30, 2010 on behalf of Yukon Housing Corporation. The inspections were conducted to determine the level of compliance with the B139 *Installation Code for Oil-Burning Equipment* at two types of sites and for two separate purposes: 1/ sites that had been previously inspected to determine if corrective action had been taken; and 2/ sites where new appliances and/or tanks had been installed to determine the current state of compliance with the B139 Fuel Oil code.

The survey identified 529 infractions of the B139 Code of which 398 (75%) were considered to be significant concerns that either posed an imminent hazard (18 cases or 17%) or could reasonably be expected to develop into a problem in the future. The average number of code infractions per site was 5.2 and the average number of significant infractions was 3.9 per site.

Forty-two of the sites had been inspected as part of four previous surveys between January 2007 and July 2008. The re-inspection found 220 infractions of which 148 (67%) were considered significant (3 sites with imminent hazards). The average number of code infractions per re-inspected site was also 5.2 and the average number of significant infractions was 3.5 per site.

Seventy-seven of the sites had new appliances and/or tanks installed since 2008. A total of 338 infractions were found at these sites of which 296 (88%) were considered significant including 15 sites with imminent hazards. The average number of code infractions per re-inspected site was 5.0 and the average number of significant infractions was 3.8 per site.

The March 2010 inspection results are similar to four previous surveys conducted by NRG Resources for Yukon Housing in 2007 and 2008. The inspection of 203 sites in the four previous surveys found that the average number of code infractions per site was 5.8 and the average number of significant infractions was 3.0 per site (19 imminent hazard cases or 9%).

The re-inspection of previously inspected sites shows that owners and their contractors are not correcting problems or are creating more problems when corrective action is taken. The inspection of sites with new equipment shows that new installations are as poor as, or worse than, older installations.

All five surveys provide clear evidence that a large percentage of oil-burning equipment in the Yukon is not properly installed or maintained in accordance with the minimum standards established in the *B139 Installation Code for Oil-burning Equipment*.

The current survey confirms the recommendations made in the previously submitted reports. It is recommended that action is taken as soon as possible to prevent an incident causing harm to person or property.

Current Survey Procedure

The re-inspection sites were selected from the four previous survey site lists to re-visit serious problem sites. The new inspection sites were selected from a list of recently completed Building Permit Inspections from the City of Whitehorse as well as new installations conducted for the Champagne and Aishihik First Nation in Haines Junction and the Teslin Tlingit Council in Teslin.

All 102 inspections were conducted by Rod Corea from NRG Resources Inc. The inspections were conducted between March 13 and 30, 2010.

The inspection forms developed by NRG Resources and approved by Yukon Housing were employed to record the inspection results. Blank copies of these forms are found in Appendix A and the completed forms for each site are found in Appendix E.

Only a visual inspection of the oil-burning appliances, supply tanks, and supply lines was conducted at each site. No adjustments or changes to the equipment were made during the inspection. Combustion analyses were conducted on 91 of the 95 appliances inspected. The appliances that were not tested would have required significant changes to the appliances to conduct the tests.

The owner or occupant was in the house at the time of the inspection. A summary of the inspection findings was provided verbally to the owner/ occupant at the time of the inspection along with a copy of the combustion test print-out. Any safety or efficiency concerns were discussed with the owner/occupant. Where corrective action was warranted, the owner/occupant was advised to have a qualified heating contractor of their choice conduct the work.

Copies of the completed inspection checklists were mailed to each homeowner along with a cover letter identifying and discussing the major safety and efficiency issues. Copies of these documents are found in Appendix E.

Inspection Criteria

The inspection criteria regarding code compliance was the B139 Code in effect at the time of the installation. This criteria required reference to four editions of the B139 Installation Code for Oil Burning Equipment, namely: B139-1976 (in effect from 1976 to 1991); B139-M91 (in effect from 1991 to 2000); B139-00 (in effect from 2000 to 2006); and the current B139-04 (in effect in the Yukon since April 2006). Installations dating from before 1976 have all been upgraded in some way and therefore were judged by the Code in effect at the approximate time of the upgrade.

Four exceptions were made to the above inspection criteria regarding reference to the Code in effect at the time of the installation. In all three cases (listed below) the current Code requirements were employed to identify the infraction since the condition poses a potential hazard that should be corrected even though it technically is in compliance with the Code at the time of installation. The four exceptions were:

1. The slope of the tank toward the outlet.
    - Although this requirement only appears in the B139-04 edition, it has been required by manufacturer's instructions in compliance with the S602 tank Standard since the early 1990's. Significant corrosion can occur inside the tank due to the collection of water and sludge when the tank is sloped away from the outlet.
2. The tank fill pipe height shall be at least one meter (3') above grade.
    - Again, this requirement only appears in the B139-04 edition. However, the corrosion problems posed by snow or water entering a tank warrant the identification of this poor installation practice as a code infraction.
3. Piping, valves, or filters shall not extend below the tank foundation.
    - Although this requirement only appears in the B139-04 edition, it has been required by manufacturer's instructions since the early 1990's. Since piping, valves, or filters that extend below the tank foundation could snap off as the tank settles, it is reasonable and responsible to identify this problem as a code infraction.
4. Piping or tubing shall not be buried in cement unless inside a duct.
    - This requirement was explicitly made in the B139-00 edition but previous code requirements to protect oil lines from corrosion could be interpreted as prohibiting this practice. The potential for corrosion and leakage warrants the identification of this poor installation practice as a code infraction.

The same four exemptions were included in the four previous surveys.

Combustion Efficiency Criteria

The criteria for judging whether the combustion efficiency of an appliance was "acceptable" was the guideline established in Canada's Energy Efficiency Act and Regulations which requires oil-fired furnaces with an input of ≤ 225,000 Btuh to have an efficiency of 78% or greater.

The combustion setup requirements established by the B139 Code and the appliance manufacturer's certified instructions were also factored into the assessment as to whether the efficiency of an appliance was "acceptable". Inefficient appliances (i.e. <78%) were not considered to be an infraction of the B139 Code unless they were in non-compliance with the combustion setup requirements of the B139 Code or the manufacturer's certified instructions.

Code Infraction Reporting Criteria

The criteria for identifying the code infractions found during the survey can be characterized as reasonable and practical. Not all code infractions found during the inspections are identified. Only those code infractions that could reasonably be considered as safety or efficiency issues are identified on the individual inspection reports found in Appendix E and summarized on the tables found in Appendices B, C and D.

Minor code infractions that could not affect the safety or efficiency of the installation are not identified in this report. For example, the B139-1996 Code and the B139-M91 Code both required that a tank vent pipe terminate at least seven feet above grade. The B139-00 and B139-04 editions of the Code only require the vent pipe to terminate 150mm (6") above the fill pipe.

The recent code requirements were employed to identify infractions related to vent pipe termination since the technical or legal requirement to comply with the code in effect at the time of installation would "clutter" the report with inconsequential infractions that might obscure the important safety and efficiency issues identified in the survey.

In regards to underground storage tank (UST) requirements, the 2004 edition of the B139 Code is the first fuel oil code that has no requirements regarding the installation, maintenance, or removal of underground tanks. Currently, USTs must only comply with the National Fire Code of Canada and the CCME Environmental Code. The same is true for aboveground tanks with a capacity greater than 2500L.

For the purpose of this report, the requirements for underground tank installations from previous editions of the B139 Code were employed since the 3 sites with USTs inspected during this survey pre-date the current B139 Code.

Code Infraction Reporting Criteria (continued)

The Code infractions summarized in the tables found in Appendices B, C and D are separated into two categories as follows:

1. Significant Code Infractions: These are code infractions that were considered to be safety concerns that either posed an imminent hazard or could reasonably be expected to develop into a problem in the future.

   The sites that included imminent hazards are highlighted in yellow in the tables.

2. Potentially Significant Code Infractions: These are code infractions that were considered to be worth identifying since they should have been corrected during installation or maintenance of the appliances. However, they should not pose a problem under "normal" conditions.

Types of Sites and Equipment Inspected

All of the 102 sites inspected were single family dwellings.

The building year of construction ranged from the 1960s to 2010. Sixty-eight of the sites were in Whitehorse (or vicinity), twenty-six were in Haines Junction, and eight were in Teslin.

The types and age range of equipment inspected are listed below:

Appliance Type	Total	1960 to 1979	1980 to 1989	1990 to 1999	2000 to 2007	2008 to 2010
Forced air furnace	70	4	2	8	12	44
Boiler	16	1			2	13
Combo Water heater/Space heater	2				1	1
Water heater	2			2		
Space heater	5				2	3
Aboveground Indoor tank	12	4	2	1		5
Aboveground Outdoor tank	88	8	6	7	33	34
Underground tank	3	2		1		
Total Appliances	95	5	2	10	17	61
Total Tanks	103	14	8	9	33	39

General Overview of ALL Inspection Results

The inspection of 102 sites in Whitehorse, Haines Junction and Teslin with oil-burning equipment found a large number of code infractions and efficiency concerns as listed in the table in Appendix B and summarized below.

- Only three of the 102 sites (3%) completely complied with the B139 Installation Code for Oil-Burning Equipment.
- Code infractions related to the oil tank and supply lines were found at all but four of the sites (96%).
- Code infractions related to the appliances and venting systems were found at 70 of 90 sites that had appliances (78%).
- A total of 529 contraventions of the B139 Code were found at the 102 sites. This constitutes an average of 5.2 code infractions per site.
- 340 or 64% of the total number of code infractions were related to the tank and supply lines. As such, the average number of code infractions per site related to the tank and supply lines was 3.3. A focused discussion of these code infractions is provided in the next section of this report (pages 7 and 8).
- 189 or 36% of the total number of code infractions were related to the appliances and venting systems. This represents an average of 2.1 code infractions per site related to the appliance and venting system. More information regarding these code infractions is provided on pages 9 to 11 of this report.
- 18 of the 102 sites (17%) were considered imminent hazards posing a hazard to life or property if not addressed immediately. In all cases, the owners or occupants were advised about these problems. These sites are highlighted in yellow in Appendices B, C, and D.
- 96 of the 102 sites (94%) had at least one significant code infraction. A total of 398 significant code infractions were identified. A “significant” code infraction is defined on page 4 of this report.
- 17 of the 91 appliances (19%) tested for proper combustion were found to be inefficient and/or in non-compliance with the code requirements related to combustion set up.
- 16 of the 46 applicable sites (35%) were not being maintained annually as required by Section 14 of the B139 Code.
- Proof that the technician who recently installed or serviced the installation was a licenced Oil Burner Mechanic was found at only 27 of the 102 sites (26%). Most of the sites (74%) appear to have been installed or were serviced by uncertified workers.

Discussion of ALL Tank Inspection Results

As noted above, the inspection of 102 sites with 103 oil supply tanks identified 340 code infractions related to the oil tanks and supply lines. This represents an average of 3.3 code infractions per site related to the oil supply systems. All but four of the 102 sites inspected (i.e. 96%) had at least one code infraction related to the tanks and supply lines.

241 (71%) of these 340 code infractions were considered to be "significant" in that they either posed an imminent hazard (11 of the 18 such cases) or could reasonably be expected to develop into a problem in the future.

The following is a complete list of the types of infractions related to the oil tanks and supply lines as identified on the summary table in Appendix B and the individual inspection forms in Appendix E. Infractions are listed in order of importance with those considered "significant" identified in bold print.

Type of infraction (Significant = **bold text** Potentially significant = plain text)	Number of sites with this infraction	Code Reference	Comments
Signs of oil leakage	13	14.2.2	All 13 cases of weepage were on outdoor tanks. All were considered significant infractions.
Oil lines cemented in or under floor	6	8.3.5	See Note #4 on page 3
Tank not sloped toward outlet.	47	6.3.9.2 (c)	See Note #1 on page 3
Piping at tank is improper.	15	6.3.9.2	See Note #3 on page 3
Single wall underground lines used after 2000	12	8.3.2.1.2	2000 edition of B139 required the use of double-walled underground piping. These new installations did not comply.
Tank not protected from corrosion or physical damage	30	6.5.4 (a)	27 cases were considered significant
Oil line not protect-ed from corrosion or physical damage	35	8.3.1.5	33 cases were considered significant
Filter location improper.	8	3.10.2	Code requires filters to be indoors wherever feasible.
Tank improperly supported	22	6.3.8	Six cases used wooden blocks and seven were considered imminent hazards.
Unused tank open-ing not plugged	9	6.2.1.4	Shipping bungs were still installed in 7 tanks and two were open to the weather

Discussion of ALL Tank Inspection Results (continued)

Type of infraction (Significant = **bold text** Potentially significant = plain text)	Number of sites with this infraction	Code Reference	Comments
Fill and vent pipe terminate inside the building	1	6.8.5 and 6.9.1.5	Owner plans to move tank or vent it to the outdoors soon.
No valve at tank outlet	3	8.4.1	Tank could not be isolated in the event of a line leak
Oil line components not rated for 1000°F	5	8.1.1	Filters or valves were not rated for 1000°F and not equipped with a fusible link valve
No whistle in indoor tank	1	6.10.2	A tank may be overfilled if not equipped with a whistle
Unapproved tank	1	6.2.1.1	A tank approved for indoor use was used outdoors.
Tank vent does not terminate above fill	6	6.9.1.6	Code requires vent to terminate at least 6" above fill
No seismic restraint on aboveground tank	70	6.3.11	10 of these sites were considered significant infractions since the tanks were elevated or tipping
No Rating Plate on Tank	20	6.2.1.1	11 of these cases were on pre-1980 tanks. Lack of approval may indicate that tanks were not built to a Standard.
Fill and/or vent pipe too close to ground	2	6.8.6 (c) 6.9.1.7(b)	See Note #2 on page 3
Improper support of oil lines	4	8.3.1.5	Code requires minimum space between line supports.
UST not cathodically tested or maintained	3	Fire Code	Fire Code requires the maintenance and testing of USTs
No level gauge in tank	3	6.10.2	Gauge allows for troubleshooting
Tank within 5' of property line	3	6.5.4 (b)	In all cases the tanks were between 1 to 4 feet of the property line
Tank within 5' of point of egress	2	6.3.12	In all cases the tanks were between 1 to 4 feet of the point of egress
Improper clearances around tank	17	6.3.4 to 6.3.6	The 2004 edition of the Code requires specific clearances around oil tanks for inspection.
Fill and vent pipes too far apart	1	6.9.1.7e	Vents too far from the fill may result in overfilling the tank

Discussion of ALL Appliance Inspection Results

As noted on page 6, the inspection of 90 sites with 94 appliances identified 189 code infractions related to the appliances and venting systems. This represents an average of 2.1 code infractions per site related to the appliances and venting systems. All but three of the 90 sites inspected (i.e. 97%) had at least one code infraction related to the appliances and their venting systems.

157 (83%) of these 189 code infractions were considered to be "significant" in that they either posed an imminent hazard (3 of the 4 such cases) or could reasonably be expected to develop into a problem in the future.

The following is a complete list of the types of infractions related to the appliances and venting systems as identified on the summary table in Appendix B and the individual inspection forms in Appendix C. Infractions are listed in order of importance with those considered "significant" identified in bold print. The three cases that were considered as imminent hazards are identified in the summary tables in Appendix B.

Type of infraction (Significant = **bold text** Potentially significant = plain text)	Number of sites	Code Reference	Comments
Flue gases leaking indoors	3	4.2.1 4.2.5.3	All three cases involved improperly joined vent connectors (2 positive pressure). One was an imminent hazard.
Combustion tests results do not meet requirements of the Code and/or manufacturer	18	5.1 5.2.2 5.2.3 5.2.5	Three cases were considered imminent hazards due to the VERY high CO &/or smoke levels Numerous problems including - Dirty heat exchanger - High CO or smoke readings - Insufficient or excessive draft readings - 6 appliances never had a flue gas analysis 18 out of 91 appliances tested constitute a 20% non-compliance rate.
Sidewall vent installation does not meet Code or manufacturer requirements	16	4.3	In two cases, improper vent material or joint compound was used which caused some flue gas leakage indoors. In 8 cases a side wall vent terminated too close to grade level. Six of these cases were considered imminent hazards.
Combustion air damper improper-ly installed	8	4.4.1.5	In all cases the newly installed device was not interlocked with the burner as required by the Code.
Common venting with unapproved wood appliance	2	4.1.4	In both cases, the owners stated that the wood appliances would only be fired in emergency situations.

Discussion of ALL Appliance Inspection Results (continued)

Type of infraction (Significant = **bold text** Potentially significant = plain text)	Number of sites	Code Reference	Comments
Appliance too close to combustibles	9	7.1.1	6 cases involved storage of material too close to the appliance. Seven were considered significant.
Vent and/or vent connector too close to combustibles	15	4.2.5.5 (f)	Eleven of these infractions were considered significant.
Installation of vent liner in chimney or factory vent does not meet Code &/ or manufacturer's requirements	18	4.2.2.5.1 4.2.2.9	Infractions included: - No base-tee on liner - No base-tee on L-Vent - No chimney cap - Improper vent material employed - Vent not properly supported
Vent connector improperly installed or maintained	12	4.2.5	Infractions included: - Vent sections not securely joined - Insufficient slope toward vent - Improper vent material employed One case was considered an imminent hazard due an open vent spilling gases.
Vent and/or vent connector too large	18	4.2.2.4	11 of these 18 infractions were considered significant.
Barometric damper improperly installed	13	4.2.7.1 4.2.7.3	Infractions included: - Damper not level and vertical - Damper stuck closed - Damper not installed (4 cases) All of these cases were considered significant infractions.
Return air opening too close to furnace or in garage	7	14.3.2	6 of these infractions were considered significant. This condition may starve the burner of air or cause flue gas spillage.
Electrical wiring does not meet Code requirements	1	3.7	Emergency disconnect switch in wrong location or missing
No air supply or improperly sized air supply to appliances	28	4.4.2.1	18 of these 28 infractions were considered significant since they were in confined spaces or in newer, more tightly constructed houses.

Discussion of ALL Appliance Inspection Results (continued)

Type of infraction (Significant = **bold text** Potentially significant = plain text)	Number of sites	Code Reference	Comments
Appliances not maintained annually	7	14.2.1	Annual maintenance was not conducted on 16 of the 46 sites that required annual maintenance (44 of the 90 sites had appliances that were recently installed). This represents a 35% non-compliance rate. 4 of these infractions were considered significant since the appliances had either never been maintained or showed obvious signs of problems due to lack of maintenance.
Safety controls not properly installed or not functioning	5	3.1.1	All of these infractions were considered significant.
Appliance significantly modified	2	3.1.1	Both cases were considered significant infractions.
Pressure relief on boiler improperly installed	4		All of these infractions were considered significant.
Appliance retrofitted with unapproved burner.	2	3.1.1	Both cases involved upgrades to older burners and controls. Although Codes prior to 1991 allowed this activity under strict guidelines, it is worth highlighting as a minor infraction since it affects the approval of an appliance as discussed in the next row.
No approval on appliance	1	3.1.1	This 1980's vintage boiler had a rating plate without a Canadian approval label. The lack of an approval label calls into question whether the appliance was tested and approved to a recognized safety standard.
Combustion Chamber damaged	4		Only one of these cases was considered significant.

General Overview of Inspection Results for Previously Inspected Sites Only

42 of the 102 sites (41%) had previously been inspected during one of the four surveys conducted by NRG Resources for Yukon Housing during 2007 and 2008. The purpose of the re-inspection was to determine if the owners had voluntarily corrected the infractions identified during the previous inspection. A large number of code infractions were found during the re-inspection as listed in the table in Appendix C and summarized below.

- Only one of the 42 sites (2%) completely complied with the B139 Installation Code for Oil-Burning Equipment.
- Code infractions related to the oil tank and supply lines were found at all but two of the sites (95%).
- Code infractions related to the appliances and venting systems were found at 35 of 41 sites that had appliances (85%).
- A total of 220 contraventions of the B139 Code were found at the 42 sites. This constitutes an average of 5.2 code infractions per site.
- 116 or 53% of the total number of code infractions were related to the tank and supply lines. As such, the average number of code infractions per site related to the tank and supply lines was 2.8. 67 of these 116 infractions were considered significant including one imminent hazard.
- 104 or 47% of the total number of code infractions were related to the appliances and venting systems. This represents an average of 2.5 code infractions per site related to the appliance and venting system. 81 of these 104 infractions were considered significant including three imminent hazards.
- 3 of the 42 sites (7%) were considered imminent hazards posing a hazard to life or property if not addressed immediately. These sites are highlighted in yellow in Appendix C.
- 39 of the 42 sites (93%) had at least one significant code infraction. A total of 148 significant code infractions were identified. This constitutes an average of 3.5 significant infractions per re-inspected site.
- 8 of the 43 appliances (19%) tested for proper combustion were found to be inefficient and/or in non-compliance with the code requirements related to combustion set up.
- 11 of the 33 applicable sites (33%) were not being maintained annually as required by Section 14 of the B139 Code.
- Proof that the technician who recently installed or serviced the installation was a licenced Oil Burner Mechanic was found at 9 of the 42 sites (21%). Most of the sites (79%) appear to have been installed or were serviced by uncertified workers.

The above results indicate that owners and their contractors are not correcting problems or are creating more problems when corrective action is taken.

General Overview of Inspection Results for Sites with NEW Equipment

77 of the 102 sites (75%) had new appliances and/or tanks installed since 2008. The purpose of the inspection of these sites was to determine if new installations were in compliance with Fuel Oil Code requirements. A large number of code infractions were found during these inspections as listed in the table in Appendix D and summarized below.

- Only two of the 77 sites (3%) completely complied with the B139 Installation Code for Oil-Burning Equipment.
- Code infractions related to the oil tank and supply lines were found at all but three of the sites (96%).
- Code infractions related to the appliances and venting systems were found at 50 of 67 sites that had appliances (75%).
- A total of 388 contraventions of the B139 Code were found at the 77 sites. This constitutes an average of 5.0 code infractions per site.
- 260 or 67% of the total number of code infractions were related to the tank and supply lines. As such, the average number of code infractions per site related to the tank and supply lines was 3.4. 184 of these 260 infractions (2.4/site) were considered significant including nine imminent hazards.
- 128 or 33% of the total number of code infractions were related to the appliances and venting systems. This represents an average of 1.7 code infractions per site related to the appliance and venting system. 112 of these 128 infractions were considered significant including seven imminent hazards.
- 16 of the 42 sites (38%) were considered imminent hazards posing a hazard to life or property if not addressed immediately. These sites are highlighted in yellow in Appendix D.
- 72 of the 77 sites (94%) had at least one significant code infraction. A total of 296 significant code infractions were identified. This constitutes an average of 3.8 significant infractions per re-inspected site.
- 11 of the 66 appliances (17%) tested for proper combustion were found to be inefficient and/or in non-compliance with the code requirements related to combustion set up.
- 7 of the 23 applicable sites (30%) were not being maintained annually as required by Section 14 of the B139 Code.
- Proof that the technician who recently installed or serviced the installation was a licenced Oil Burner Mechanic was found at 23 of the 77 sites (30%). Most of the sites (70%) appear to have been installed or were serviced by uncertified workers.

The above results indicate that the sites with recently installed appliances and/or tanks were as poor as or worse than installations with only older oil-burning equipment.

Conclusions and Comparisons

The March 2010 inspection survey of 102 oil heating equipment installations in the Yukon identified 529 infractions of the B139 Code of which 398 (75%) were considered to be significant concerns that either posed an imminent hazard (18 cases) or could reasonably be expected to develop into a problem in the future. The average number of code infractions per site was 5.2 and the average number of significant infractions was 3.9 per site.

Forty-two of the sites had been inspected as part of four previous surveys between January 2007 and July 2008. The re-inspection found 220 infractions of which 148 (67%) were considered significant (3 sites with imminent hazards). The average number of code infractions per re-inspected site was also 5.2 and the average number of significant infractions was 3.5 per site.

Seventy-seven of the sites had new appliances and/or tanks installed since 2008. A total of 338 infractions were found at these sites of which 296 (88%) were considered significant including 15 sites with imminent hazards. The average number of code infractions per re-inspected site was 5.0 and the average number of significant infractions was 3.8 per site.

The March 2010 inspection results are similar to four previous surveys conducted by NRG Resources for Yukon Housing in 2007 and 2008. The inspection of 203 sites in the four previous surveys found that the average number of code infractions per site was 5.8 and the average number of significant infractions was 3.0 per site (19 imminent hazard cases or 9%).

The re-inspection of previously inspected sites shows that owners and their contractors are not correcting problems or are creating more problems when corrective action is taken. The inspection of sites with new equipment shows that new installations are as poor as, or worse than, older installations.

All five surveys provide clear evidence that a large percentage of oil-burning equipment in the Yukon is not properly installed or maintained in accordance with the minimum standards established in the *B139 Installation Code for Oil-burning Equipment*. The key statistics from all five surveys are as follows:

- 305 sites inspected
- 1706 code infractions or 5.6 per site
- 998 significant code infractions or 3.3 per site
- 37 sites with imminent hazards or 12% of the sites

The present survey of re-inspected sites shows that voluntary compliance with reports identifying significant problems does not improve the safety of the installation. This survey also proves that the problems identified to the heating industry in previous surveys are not resulting in improved safety and compliance at new installations.

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 incentive, consequences, and/or opportunity to become licenced as Oil Burner Mechanics are important factors in regards to 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.

The major safety and efficiency issues identified by this survey and listed in order of importance are:

1. Lack of maintenance.
2. A majority of installers / service technicians are not trained and qualified as licenced Oil Burner Mechanics.
3. The installations of sidewall positive vented appliances are especially poor and in many cases dangerous.
4. Oversized and improperly installed vents.
5. Clearance to combustible material is not maintained.
6. Aboveground tanks not installed properly to prevent internal corrosion or damage to outlet piping.
7. Aboveground tanks not secured to prevent toppling or damage due to a seismic event even though the Yukon is listed as an earthquake zone.
8. A significant percentage of appliances are improperly set up for safe, efficient combustion
9. Appliances and tanks without rating plates indicating that they have not been tested and approved to recognized standards.
10. Lack of monitoring of underground tanks for leakage and corrosion.

As stated in all four previous reports, self-regulation has failed to provide the level of safety and environmental protection that is the aim of the B139 Fuel Oil Code. The evidence – especially from the current survey regarding problems at re-inspected sites and new installations – strongly indicates that action must be taken as soon as possible to prevent an incident causing harm to person or property.

I trust that this report meets with your approval. Please contact me to discuss any of the issues raised in this report.

NRG Resources Inc. is committed to assisting the Yukon in its goal to achieve safer, more efficient oil-burning equipment installations.

Yours Sincerely,

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