1. Heating Improvement Program

- 1.1. Heating System Upgrades and Shell Weatherization
- 1.2. Heating System Repairs
- 1.3. Heater Replacement Eligibility Guidelines
- 1.4. Emergency Heating Replacements
- 1.5. Installing Heating Systems in Vacant Units
- 1.6. Installing Heating Systems Where None Exist
- 1.7. Home Energy Assistance Program Funds for Heating System Replacements
- 1.8. Central Air Conditioning

2. Hot Water Heaters

- 2.1 Repair and Replacement of Water Heaters

3. Assessment, Evaluation and Standards

- 3.1. Procedure for Approval of Heating System Improvement Services
- 3.2. Instructions for Testing Procedures that can be followed when certain conditions are found during an Oil Heating System Evaluation
- 3.3. Efficiency Standards
  - 3.3.1 Oil Burner Retrofit
  - 3.3.2 Replacement Oil-Fired Heating Systems
  - 3.3.3 Replacement Gas-Fired Heating Systems
- 3.4. Combustion Safety Testing of Heating Systems and Hot Water Tanks
  - 3.4.1. Procedures for Combustion Safety Testing
- 3.5. Efficiency Standard for Replacement Furnaces Installed in Mobile Homes
- 3.6. Oil Storage Tanks
  - 3.6.1 Above Ground Tanks
  - 3.6.2 Underground Tanks
- 3.7. Fuel Type Conversions

4. Leveraging Landlord Contribution

5. Client Documentation

- 5.1. Recommended Client Education Strategies for Recipients of Heating System Improvement Services

6. Consumer Product Safety Commission Product Warning

7. Walk Away Policy

1. Heating Improvement Program

The Heating Improvement Program (HIP) funded by LIHEAP funds provides low income families assistance in reducing their energy bills by upgrading, repairing and or replacing heating systems. The purpose of this chapter is to provide guidance on heating systems upgrades, repairs, or retrofits with HIP/LIHEAP WX or DOE funds.

1.1. Heating System Upgrades and Shell Weatherization

DOE funds can be used to complete shell work in a unit that receives a heating system upgrade with HIP/LIHEAP WX funds. The cost must be reported separately, and program averages must be maintained. **The cost of shell work or heater work cannot be split and charged to both grants.**

1.2. Heating System Repairs

The eligibility guidelines applicable to repairs are:

1. Client(s) must meet WAP income guidelines as found in Chapter 1, Eligibility and Documentation, Page 2.
2. Client(s) heat with oil or gas.
3. Client(s) have supply of oil or gas and unit is in working condition.
4. Heating system output is less than 300,000 BTU's.
5. Heating system has a life expectancy of at least five (5) years.
6. Electric baseboard

WAP Agency's field technicians should can make minor repairs, i.e., cement around flue going into chimney.

1.3. Heater Replacement Eligibility Guidelines

1. Client(s) must meet WAP income guidelines as found in Chapter 1, Eligibility and Documentation.
2. Client(s) heat with oil, gas or electric heat pump (*kerosene* and coal-fired units will be considered for conversion on a case by case basis).
3. Unit has one or more of the following conditions:
    a. Unit is inoperable.
    b. Unit is hazardous to operate, i.e., releasing toxic fumes into living area.
    c. Steady State Efficiency is under 72%.
    d. EA-QUIP/NEAT/MHEA Audits recommendation for replacement requires a savings to investment ratio of 1. or greater.
4. Heating System is rated at less than 300,000 BTU output (Residential Only).
5. Heating System has life expectancy of less than three (3) years.
6. Electric baseboard

Retrofitting multi-unit buildings that contain heating system(s) that do not exceed 300,000 BTU's are allowable.

All replacement heating systems must have as minimum efficiencies an AFUE of 82% for new oil or gas steam boilers, an AFUE of 83% for oil furnaces, an AFUE of 85% for oil or gas hot water boilers and an AFUE of 90% for new gas furnaces where not restricted by building design and where cost-effective. Heating contractors must ensure that they install the appropriate furnace type for horizontal applications.

All replacement heating systems shall be properly sized. The building should be evaluated to determine the correct BTUH output for the replacement furnace or boiler. See further guidance in the New Jersey Field Guide, Chapter 8 Heating and Cooling Systems.

All replacement heating systems shall be evaluated for proper heating distribution. See the New Jersey Field Guide, Chapter 8 Heating and Cooling Systems for further guidance on furnace system airflow, hydronic and steam distribution.

All replacement heating systems shall be evaluated for proper venting systems. See the New Jersey Field Guide, Chapter 8 Heating and Cooling Systems for further guidance on metal liners for masonry chimneys, manufactured chimneys and sidewall power *venting*.

Payment for approved and properly authorized heating system installations which pass all required inspections is to be made directly to the contractor who performed the installation as stated in Chapter 5, Prompt Payment to Contractors.

Reimbursement to client for replacement of a heating system is not permissible in this program.

Each potential candidate for a replacement heating system should be clearly informed that authorization to the contractor to proceed with the replacement can only be granted by the WAP Agency.

The OLIEC encourages that WAP Agencies clearly share this information with participating contactors as an additional step toward avoiding any possible misunderstanding of existing heating system replacement authorization policies.

1.4. Emergency Heating Replacements

Heating system replacement requests received from October 1st through May 1st are to be considered emergencies because of the correlation of these dates to the need for heat. WAP Agencies must solicit requests for proposals from three different heating contractors with a deadline for submission of 24 hours during the week and 48 hours during the weekends.

For a no heat and/or hot water situation, one bid is acceptable only if the WAP Agency has demonstrated that it requested bids from a minimum of three heating contractors.

Emergency bids can be submitted and or received via email or fax.

Heating system replacement requests received from May 2nd through September 30th will not be considered emergency situations. WAP Agencies are required to follow a bidding process as per Local Public Contractors Law, N.J.S.A. 40A:11-1 et. seq. during this time period.

If a heating unit also provides hot water, making year-round operation necessary, a separate hot water heater may be installed and handled as an emergency, irrespective of time period.

WAP Agencies are reminded that DOE does not allow heating systems to be replaced based solely on an emergency. The energy audit must recommend replacement with a Savings to Investment Ratio (SIR) of one (1) or greater, or it can be done as a health and safety measure if the cost is within the amount allowed for that purpose per the contract. Heaters charged to DOE must be within averages per program year *(may add HEA funds up to $2,500 when allowable)*. Heating systems can be repaired, retrofitted or replaced as an emergency with /HIP/LIHEAP WX) funds up to a maximum cost as reflected per program year below:

Program Year	Average
2013	$6,904
2014	$6,987
2015	$7,105
2016	$7,105
2017	$7,212
2018	$7,371
2019	$7,541*
2020	$7,669
2021	$7,776
2022	$8,009`
2023	$8,250

Any heating system replacement to be completed with HIP/LIHEAP WX funds that exceeds the maximum allowable must be approved by OLIEC. Replacement justification must be verifiable by visual inspection with photographs and test results, if applicable.

- U.S. Department of Energy revised the acpu for 2019 to $7,669 due to Covid-19 pandemic.

1.5. Installing Heating Systems in Vacant Units

If a unit requiring a single heating system is not occupied the unit must be deferred. If a single-family home (1-4 units) with one heating system, then the 66% or 50% rule must be met.

1.6 Installing Heating and Hot Water Systems Where None Exist

A heating or hot water unit cannot be installed where none exists if the unit is in a home that was originally for seasonal use (e.g. summer cottages,) and as such, had no heating or hot water system. WAP Agency must ensure that the unit is the permanent residence of the client.

If the heating or hot water unit is absent due to theft, vandalism, or removal by the owner, WAP agencies must request that the client submit an affidavit explaining the absence of the unit. WAP agency should determine what type of system the client had by examining the remaining distribution system, to ensure compliance with the same fuel source requirement.

1.7. Home Energy Assistance Program Funds for Heating and Hot Water Emergency

HEA funds must be used for heating system repairs first before WAP funds if the following limitations exists:

1. It must be during the Home Energy Assistance Program emergency period.
2. The recipient is a HEA recipient AND a homeowner.
3. The maximum amount allowable is $2,500 within a program year.

All heating repairs under $2,500 reflected on a HESWAP Invoice will be reviewed by State Monitor to confirm that costs cannot be charged to HEA. If the limitations listed above are not applicable, then the unit can be charged to HIP grant.

HEA funds used for heating system repair or hot water replacement cannot be reported on the DOE or HIP/LIHEAP WX report.

All sources of funds used must be documented in the client file and reported by funding source.

1.8 Central Air Conditioning

It is a permissible weatherization tactic to modify, repair, tune-up, and, in limited and specific circumstances, replace air conditioning systems. Replacement of air conditioning systems is permitted whenever replacement is required to facilitate the authorized replacement of (or other modification to) a heating system. Or the following – This replacement of air conditioning systems should also be supported by documentation which indicates that the air conditioning is medically necessary, if replaced under the Health and Safety category.

All work of any kind involving alterations or replacement of air conditioning systems must receive prior authorization from the assigned State Monitor.

Heat pumps systems, which include air conditioning, do not need prior authorization from OLIEC, unless the costs exceed the average cost per unit. Approval will be required as indicated in Chapter 7, 3.17. Exceeding Maximum Allowable Cost per Unit.

2. Hot Water Heaters

Hot water heaters can be replaced with DOE or LIHEAP funds. Shell work may be charged to DOE and the hot water heater to DHS and vice versa. Hot water heaters are allowable under Health and Safety category on either grant.

2.1. Repair and Replacement of Water Heaters

Installation of new water heaters is permissible under the LIHEAP WX, DOE Weatherization, Home Energy (HEA), and Heating Improvement Program (HIP).

Replacement of existing domestic water heating systems may be performed under the following circumstances:

1. The domestic water heating system is operating in a hazardous manner, which can only be corrected through complete unit replacement. "Operating in a Hazardous Manner" includes, but is not necessarily limited to:

   a. The producing of excessive Carbon Monoxide (See Section 3.4).
   b. Flue, venting or installation conditions which permit combustion by-products to enter the living space, present a fire hazard or which otherwise violate applicable codes.
   c. Inability of the unit to properly regulate temperature of hot water produced.
   d. Improper configuration or absence of pressure release mechanisms.
   e. The domestic hot water heater has a life expectancy of less than three years.

2. The domestic water heating system must be replaced to facilitate a properly authorized heating system repair retrofit or replacement.

3. A boiler is authorized to be replaced and the boiler supplies domestic hot water by means of an integral tankless coil (a separate boiler and standard tank-type domestic water heater can be installed).

4. Unavoidable damage is sustained by the domestic water heater during an authorized heater repair retrofit or replacement.

New storage tank water heaters must meet the minimum Uniform Energy Factors (UEF) as listed below:

a. .58 Gas
b. .63 Oil
c. .92 Electric

3. Assessment, Evaluation and Standards

3.1. Procedure for Approval of Heating System Improvement Services

The following policy and procedures will apply for approval of heating systems improvements services, to ensure that proper support documentation is on file for heating system replacements, and to facilitate testing of completed units:

I. Heater evaluations are mandatory for every unit weatherized. Each client file should contain a copy of the Heating System and Hot Water Heater Survey Report documenting the condition of the appliances. The Heating System Improvement Checklist must be completed in full and maintained on file whenever heating system improvement services are provided. Forms can be found in the Appendix.

II. Require the contractor who evaluates the heater to provide in writing why the unit must be replaced. The WAP Agency heater specialist must verify the contractors' findings unless the equipment in question (such as a heat pump) is not within his/her area of expertise. In those instances, it is advisable to get a second opinion from another contractor.

A cracked heat exchanger or boiler section is no longer a replacement justification unless the defective exchanger/section cannot be replaced. If the heater is in good condition, the repair option should be explored before replacement is considered. If the heater does not have at least a three-year life expectancy, then replacement is the only option.

III. All heaters must be tested before a determination is made to replace it. If the heater is not working due to defective controls, replacement should not be considered if the controls can be replaced. If the life expectancy of the unit does not warrant repairs (less than three years) then no money should be expended on defective parts. If the client does not have oil, and this prevents post-installation testing, the agency is authorized to expend up to 100 gallons for oil, to ensure that all post-installation testing can proceed in a timely manner.

IV. The first priority for oil-fired systems is retrofitting. A unit should not be replaced instead of being retrofitted solely on the auditor's opinion that a unit will not last 3 years. That opinion must be supported by facts as called for on the Heating System and Hot Water Heater Survey Form and Heating System Improvement Checklist.

V. All replacement heaters must be certified as noted on the heater checklist. WAP Agencies must use the Air-Conditioning, Heating, Refrigeration Institute (AHRI) Certification website https://www.ahridirectory.org.

If the unit is not reflected in the AHRI Certification Directory, client file must contain the manufacturers' specifications with required AFUE rating (applicable for replacement heating systems) and/or UEF rating (when hot water tank is replaced).

VI. Any heater and shell treatments that exceed maximum program per unit costs must have justification in the form of an itemized listing of additional parts and labor. This includes distribution system repair or replacement, chimney lining and repair, oil tank treatments, etc. This data is called for on the Heating System Improvement Checklist and should be supported by cost itemization on the proposal.

VII. WAP Agencies must stress to contractors that estimates for heater replacements should include all additional parts needed to guarantee that the unit will operate at the minimum efficiency standards. In addition to this efficiency requirement, it is also required that clients

be left with heating systems which operate safely and effectively, as well as efficiently, at the conclusion of a repair, retrofit or replacement job.

Individual circumstances may dictate that to achieve this goal, improvements and/or corrections to the venting, distribution, water supply, or power supply systems (for example) may be required.

All heating systems proposed for improvement services (whether retrofit, repair or replacement) must be inspected by the WAP agency field technician prior to the agency soliciting any work proposals from contractors. This pre-installation inspection requirement applies to all heating system work, including the replacement of non-functional systems being serviced on an emergency basis.

The objective of this inspection procedure is to ascertain if there are circumstances present at the work site which the contractor should be aware of before he/she prepares the work proposal. The results of this WAP agency pre-inspection may indicate to the contractor that a site visit is necessary to gather additional information before the work proposal is prepared.

When contractors are solicited for proposals, they should be informed of any WAP Agency observations concerning circumstances at the premises which could either impact the ability of the contractor to complete the job, or the ability of the heater to function safely, effectively and efficiently following installation. The WAP Agency's observations of potential secondary problems need not necessarily be conclusive, if the circumstances observed are beyond the technical expertise of the WAP Agency field technician to diagnose. Contractors should include the correction of these secondary problems in their proposals, whenever correction is necessary.

Heating system contractors may rely on appropriate subcontractors for secondary problem correction. As an alternative, WAP Agencies may contract with appropriate tradespersons for the correction of secondary problems before authorizing contractors to proceed with heating improvement services. Contractors' proposals must include all costs, including any costs incurred through subcontractors, in their proposals. Contractors' proposals must be sufficiently comprehensive to provide the client with a safe, effective and efficient heating system which compiles with all applicable codes and regulations.

Contractors must provide clients with a 1-year warranty on parts and labor and manufacturers written material for the new appliance. WAP Agency must instruct or if necessary, assist the client to register the warranty on units being installed.

3.2. Instructions for Testing Procedures that can be followed when certain conditions are found during an Oil Heating System Evaluation.

CARBON DIOXIDE TOO LOW; OXYGEN TOO HIGH

This situation is usually a result of too much secondary air infiltrating into the combustion chamber (i.e., air that enters the system other than through the burner). If you suspect this is

the case, test to see if the carbon dioxide or oxygen readings change appreciably (more than 1 percent) when the blower comes on. Also, check for an appreciable difference when the barometric damper is open.

Make sure the draft in the breech is less than .03 inches of water. Remember that the new burner puts only 1/3 to 1/2 as much air into the unit, so that the draft loss across the unit is much less than before. Therefore, a low draft is sufficient.

If there is a difference in the carbon dioxide or oxygen reading, check for air leaks in the blast tube, doors, gaps between sections of the boiler, breech, fire box, etc. Seal whatever holes you find with the appropriate material. If the draft is excessive, reduce it.

Then check for infiltration of excess air (through the burner). Have you selected an appropriate head for the nozzle? The shutter and spinner should be set according to the manufacturer's instructions.

SMOKE LEVELS ABOVE "1"

High smoke levels could be caused by insufficient primary air. Check the air shutter. Consult the installation or manufacturer's literature for proper spinner setting, head, etc.

High smoke levels may also be caused by the flame touching the chamber wall. If this is the problem, consider using a smaller nozzle and higher pump pressure or a chamber liner that heats more rapidly.

This condition may also be caused by oil droplets that escape the circulating air pattern. Check the angle, pattern, and ratings of the nozzle to solve this problem.

STACK TEMPERATURES TOO HIGH

Stack temperatures that are too high often occur when the nozzle is too large. Check previous and present nozzle size to decide if the nozzle should be smaller. Check the heat exchanger to see if something is preventing heat exchange. Check for soot in hard to get at areas of the exchanger.

Check for any path that would allow hot gases to bypass the exchanger. Check for missing baffles or turbulators. It may be that the exchanger is poorly designed. If all else fails, note the manufacturer, design, mode number, etc. and report the problem. It may be possible to obtain a waiver.

If the furnace is the hot-air type, make sure hot air flow is unrestricted. Are any supplies or return ducts closed or obstructed? Are the filters dirty? Check the blower motor to see that it is running fast enough, and that the belt is not slipping.

If your efficiency testing equipment consistently reads higher or lower than the Inspector's, check the equipment for maintenance and calibration records. Review the Manufacturer's instructions and re-calibrate.

Make sure when you sample stack gases, you do so from a point near the breech and before the stack control or barometric damper. Steady-state efficiency is an objective test based on chemical principles. Results should be the same no matter what brand of test equipment is used or who performs the test. Some slight variation may occur from one piece of equipment to another, but all commonly used tests similar results if the equipment is functioning, calibrated, and used properly.

3.3. Efficiency Standards

The following standards are applicable to both the retrofit of oil-fired heating systems and the installation of new gas or oil-fired heating systems. Efficiency Standards are found in Section 1.3 Heater Replacement Eligibility Guidelines and 2.1 Repair/Replacement of Water Heaters.

3.3.1. Oil Burner Retrofit

Following the installation of an oil burner retrofit, the following standards shall be verified by the WAP agency heating system specialist:

1) A minimum carbon dioxide reading of 10.5%.
2) A maximum reading of 1 on the smoke scale.
3) A minimum Steady State Efficiency of 83%.
4) A maximum carbon monoxide level of 400 ppm air-free in the flue and 35 ppm measured in the ambient air.
5) A draft reading/test to ensure flue gases are venting properly.

All five of these standards must be achieved for the retrofitted unit to pass inspection. It will not be possible in all cases to achieve this result. Whenever all five standards are not achieved, the contractor should be informed of the WAP Agency test result and requested to return to the unit to make the needed adjustments.

Blanket waivers have been issued to cover all instances involving either horizontal furnaces or furnaces located in mobile homes. In these cases, the Steady State Efficiency requirement (as verified through the post-installation combustion testing procedure) has been reduced to 78%. The standards for smoke, carbon dioxide, and carbon monoxide are not changed for these installations.

3.3.2. Replacement Oil-Fired Heating Systems

The post-installation inspection procedures, standards, and waiver process are as described above for oil burner retrofits.

Replacement heating systems are also subject to standards based on their rated efficiencies. The WAP Agency must verify these ratings before heating systems are approved for installation. Ratings are verified by checking the proposed unit's efficiency at the following link for the Air-Conditioning, Heating, and Refrigeration Institute

(AHRI) at https://ahridirectory.org. The AHRI is the trade association represents manufacturers of HVACR and water heating equipment.

The pre-installation standard applicable to oil-fired replacement heating systems is based on Steady State Efficiency. If the Steady State Efficiency is not explicitly listed in the applicable trade reference, it may be calculated by dividing the BTU output by the BTU input.

3.3.3. Replacement Gas-Fired Heating Systems

The pre-installation standard applicable to gas-fired replacement heating systems is based on Annual Fuel Utilization Efficiency (AFUE). The WAP Agency must verify these ratings before heaters are approved for installation. Ratings are verified by checking the proposed unit's efficiency at the following link for the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) (https://www.ahridirectory.org. The AHRI is the trade association represents manufactures of HVACR and water heating equipment.

Following the installation of a new gas-fired heating system, the WAP Agency's heating system specialist must perform a combustion efficiency test to verify that the unit complies with program standards. This test should verify that the oxygen level is no greater than 9%, and that the carbon monoxide level does not exceed 400 ppm air free in the flue and 35 ppm measured in the ambient air.

These standards are only applicable to the extent that they are consistent with manufacturers' recommendations. If a heating system has specifications which require an oxygen level higher than that specified by program standards, manufacturers' literature (or a letter on manufacturers' letterhead) evidencing this specification shall constitute sufficient grounds to establish the manufacturers' specification as an alternate program standard applicable to that installation.

Before contacting the contractor or the manufacturer, the WAP Agency should be certain that the test results are accurate. This can be accomplished by making certain that:

1. The test kit is properly calibrated, and the oxygen cell is in good condition.
2. The test probe is inserted in the proper place and the units are tested following the procedures described in the test kit's instruction manual.
3. The heater can be tested accurately, i.e., an air-free sampling of the flue gas is possible.

When the heater is equipped with a positive pressurized vent (i.e. condensing furnaces low-temperature plastic venting systems), these heating system types cannot be tested by disturbing the vent system. Ambient air testing is therefore acceptable to pass the combustion testing process, along with satisfactory local code and utility company inspections. For additional resources, go to the New Jersey Field Guide.

It is the responsibility of the installing contractor to either: 1) meet the general program standards or; 2) provide the necessary documentation to justify the application of an alternative standard to that installation or; 3) to provide the necessary documentation to establish that the unit cannot be reliably tested under field conditions.

3.4. Combustion Safety Testing of Heating Systems and Hot Water Tanks

The OLIEC requires that combustion safety testing be conducted in all heating systems, hot water heaters, and draft hood after the ambient air test is completed. Both pre- and post-work combustion safety tests must be conducted (see Section 3.4.1).

3.4.1. Procedures for Combustion Safety Testing

A preliminary and post-installation safety inspection of all combustion appliances must be completed as follows:

1. Check for fuel leaks.
2. Test Worst-Case Depressurization in the Combustion Appliance Zone (CAZ).
3. Test Combustion Spillage and CO.
4. Efficiency and Combustion Operating Parameters.

1. Check for Fuel Leaks:

Use a calibrated gas leak detector at joints, fittings, and along pipes to determine if fuel is leaking. Natural gas is lighter than air so test above joints, fittings, and pipes. Propane or LPG is heavier than air so test below the connections. Use soap bubbles to confirm a leak since some types of pipe dope (joint sealant) may set off the detector. *See testing procedures in the New Jersey Field Guide Chapter 8, section 8.2 Combustion-Safety Evaluation.* Should there exist a gas leak, the client will be so advised, and the WAP Agency will contact the local utility company for assistance.

2. Worst Case CAZ Depressurization Test:

CAZ depressurization is the leading cause of back drafting and flame roll-out in furnaces and water heaters that vent into naturally drafting chimneys. *Instructions to perform the worst-case testing procedures can be found in the New Jersey Field Guide Chapter 8, section 8.2 Combustion-Safety Evaluation.*

3. Spillage and CO Testing:

a) Spillage is the entry of combustion products into a building from a vented combustion appliance caused by back drafting, for example a leaky duct system and or lack of combustion air. Other issues may consist of vent blockage or leaks in the venting system. Spillage testing procedures and solutions for

spillage failure can be found in the New Jersey Field Guide, Chapter 8, section 8.2 Combustion-Safety Evaluation.

b) Testing for CO in the appliance vent is a part of combustion testing that happens under worst-case conditions. The ANSI/BPI 1200-S-2017 standard has two separate CO limits depending on the appliance type. If the following CO limits are exceeded in the undiluted combustion byproducts, the appliance fails the CO test under current BPI standards.

The threshold limit values for carbon monoxide testing at 5 minutes of burner operation are as follows:

- Space heaters and water heaters: 200 ppm air-free.
- Furnaces or boilers: 400 ppm air-free.
- Ambient Air Monitoring for CO
  The DOE SWS requires personal monitoring for ambient CO during the entire inspection process. This is imperative especially during combustion testing to ensure that ambient CO in the combustion appliance zone (CAZ) doesn't exceed 35 ppm as measured. If ambient CO levels in the combustion zone exceed 35 ppm, stop testing for your own safety. Ventilate the CAZ thoroughly before resuming combustion testing. If ambient CO levels range from 36 ppm – 69 ppm the source of CO shall be turned off immediately. If ambient CO levels reach 70 ppm or greater, the inspection shall be immediately terminated, and the building occupants evacuated from the residence. The appropriate emergency services shall be notified from *outside*. Investigate indoor CO levels of greater than 9 ppm to find their cause.

c) Should there exist a carbon monoxide concentration (ppm) that is above the afore-mentioned threshold limit values, the client will be so advised, and the agency will contact the local utility and request a "carbon monoxide investigation" and if determined necessary, request an "appliance adjustment for emissions". If a safety violation is issued and or CO levels remain above threshold limits the combustion appliance shall be repaired or replaced with HIP/LIHEAP WX funding.

4. Efficiency and Combustion Operating Parameters:

Perform combustion analysis at Steady-State Efficiency (SSE) to verify heating system's correct operation. Procedures found in the New Jersey Field Guide.

a. If the heating system and or hot water heater does not meet required standards and has been retrofitted, repaired or replaced with *HIP/ LIHEAP WX or DOE funds*, the contractor will be contacted by the WAP Agency and required to return to the site to make adjustments to the unit.

b. If the heating system and or hot water heater has been retrofitted, repaired, or replaced with HIP/LIHEAP WX or DOE funds the following Post Installation Report is required to be completed and signed by the heater specialist. Verifying the unit passed WAP Agency final inspection. Post Installation Report can be found in the Appendix:

3.5. Efficiency Standard for Replacement Furnaces Installed in Mobile Homes

The efficiency standard for new oil-fired furnaces installed in mobile homes is revised. The new standard is a minimum 78% Steady-State Efficiency, a minimum of 10.5% Carbon Dioxide, zero to trace smoke, and a maximum Carbon Monoxide reading of 400 *ppm air-free* in the flue and a maximum Carbon Monoxide of 35 ppm as measured. All four standards must be achieved and verified for the unit to pass inspection.

Many mobile homes in New Jersey are equipped with oil-fired furnaces.
These furnaces are designed specifically for limited-space installation and use exterior air for combustion. The replacement units often fail to achieve the 80% Steady-State Efficiency requirement by one or two percentage points, due to an elevated stack temperature.

It has been suggested by the Institute for Human Development (IHD) that contractors de-rate the unit to a 0.65gph nozzle (or less) whenever possible to minimize the stack temperature and maximize the efficiency (provided that this strategy does not affect the manufacturer's warranty).

A blanket waiver of the 80% Steady-State Efficiency requirement for replacement of oil-fired furnaces installed in mobile homes is provided. However, the unit must achieve the revised standard listed above unless the manufacturer indicates testing of replacement furnace will void warranty.

Mobile Homes Gas-Fired Furnaces.

Mobile home furnaces must be replaced by furnaces designed and listed for use in mobile homes. If feasible, consider replacing the existing gas furnaces with a sealed-combustion, down flow, condensing furnace.

Be advised that mobile homes seldom have floor drains in which to discharge the condensation from the combustion process. Follow the guidelines found in the New Jersey Field Guide.

Mobile Homes Hot Water Heaters

Hot water heaters replacements must have a HUD Safety Approval to be installed in manufactured homes. For additional guidance refer to the New Jersey Field Guide, Section 11.8 Mobile Home Water Heaters.

3.6. Oil Storage Tanks

The Department of Community Affairs (DCA) has issued Bulletin Nos. 95-1B to address removal/abandonment of Residential Heating-Oil Tanks and Other Heating-Oil Tanks Under 2,001 Gallons. See Resources Section of Policy Manual for a copy of the bulletin.

3.6.1 Above Ground Tanks

The following are steps for above ground oil tanks:

1. Remove oil from tank.
2. Cut oil tank in half by removing top.
3. Remove sludge after squeegeeing.
4. Hand wipe inside of tank clean.
5. Remove tank (and fill and vent pipes, if separate) and dispose at proper facility. (Most scrap-metal yards will accept cleaned storage tanks.)
6. Dispose of all sludge, water, etc. at a licensed facility.
7. Have oil reclaimed or dispose of it at a licensed facility.

3.6.2 Underground Tanks

If the underground oil tank is leaking it must be deferred. The leaking underground tank must be reported to the New Jersey Department of Environmental Protection (NJDEP). Tank removal and clean-up will be required. The homeowner should be referred to the following loan/grant programs administered by the NJDEP and the NJ Economic Development Authority (NJEDA). Detailed information can be obtained from the NJDEP website at http://www.nj.gov/dep/srp/finance/ustfund/ and the NJEDA website at http://www.njeda.com.

3.7. Fuel Type Conversions

Replacement heating systems installed under all weatherization programs must operate with the same type of fuel as the units which they replace.

An exception to this rule applies when the system to be replaced operates on propane, coal or other solid fuels. Solid fuel burning heating systems may be replaced with systems which operate on either oil or gas. The decision whether to install an oil or gas system will be based on an analysis of the full installation cost for each system type. The full installation cost includes such items as oil tanks, gas lines and meters, and venting in accordance with code.

Fuel conversions are approved on a limited, case by case basis utilizing HIP funds. These approvals will only be granted when all related costs demonstrate the effectiveness of the fuel conversion over the life of the measure (SIR). WAP Agency must provide a justification demonstrating that a thorough evaluation was conducted.

For fuel conversions utilizing DOE funds, request must be submitted to OLIEC for forwarding to DOE. An energy audit must be conducted on units being submitted to DOE for fuel conversions.

- The audit must demonstrate the cost effectiveness of the fuel switch over the life of the measure (SIR).
- The audit libraries must contain all utility cost information to provide accurate data for the fuel conversion.
- All other related charges associated with fuel conversion must be provided.

4. Leveraging and Landlord Contribution

Heating system and hot water tank replacement in rental properties must have a landlord contribution of at least 50%. This does not apply to landlords that are income eligible.

5. Client Documentation

5.1 Recommended Client Education Strategies for Recipients of Heating System Improvement Services

To ensure that the clients have a basic understanding of the maintenance required to keep their heating systems operating at optimal efficiency, the OLIEC recommends the incorporation of a client education component into all weatherization programs (when applicable).

The WAP Agency field technician should provide the client with the following information at a "post-installation" orientation session:

1. Show the client when and how to change the air filter.

2. Explain to the client what heating system efficiency is and how to request an efficiency test in writing.

3. Explain the detrimental effects of running out of oil, (i.e., voiding the service warranty by clogging the system with sediment and sludge).

4. Review the periodic maintenance procedures which are the responsibility of the dwelling occupant, with emphasis on the operations of steam systems.

5. Ascertain that the contractor has left the Manufacturer's instruction booklet and warranty (replacement units) with the client.

6. Review with the client the proper procedure for requesting service from the contractor and/or the manufacturer.

7. Leave a completed and signed copy of the Appliance Heating System Evaluation form once all work is done. A copy of the form can be found in the Appendix.

6. Consumer Product Safety Commission Product Warning

WAP agencies should refer to the Consumer Product Safety Commission Website for all product warnings and recalls.

7. Walk Away Policy

If the cost of a heating system replacement exceeds average cost per unit and additional funds are not available through leveraging and landlord contribution, the replacement cannot be done. A WAP agency cannot charge clients or endorse clients entering into a payment agreement with a contractor for the amount in excess of what is allowable by program guidelines. As stated in Deferral Policy, Chapter 7, Section 3.9, if total cost exceeds ACPU + H&S (not to exceed) $3,500, then unit should be deferred.