

SNOHOMISH COUNTY HUMAN SERVICES
3000 Rockefeller Avenue
Everett, WA 98201
(425) 388-7200

INVITATION TO BID

Date prepared November 18, 2008

Program Weatherization

F.O.B. Delivery Point Scattered Sites
throughout Snohomish
County

BID NUMBER WX 2008-01

Submit, sealed, with Bid Number on outer cover to Snohomish Human Services, 3000 Rockefeller, Admin Building East, Lower Level Reception Desk not later than 3:00 p.m. on:

December 11th, 2008

LATE BIDS WILL BE REJECTED

ARTICLES/SERVICES REQUIRED

GENERAL DESCRIPTION: **MECHANICAL INSPECTIONS AND SERVICE, ANNUAL CONTRACT**

PER SPECIFICATONS ATTACHED, PAGES _____ THROUGH _____ AND THE FOLLOWING ADMINISTRATIVE REQUIREMENTS.

Five percent (5%) Deposit **is not** required with sealed proposal. (If required, deposit must be either a surety bond, postal money order, cash, cashier's check, or certified check equal to 5% of the amount of the proposal. Deposits of unsuccessful companies will be returned after award. The successful company's deposit will be returned upon receipt and acceptance of contract documents.)

One hundred percent (100%) contractor's Performance Bond, including Washington State sales tax, **is not** required. (If required, the bond must be submitted to Snohomish County Purchasing within ten (10) days after notification of award. Bond must be approved by the appropriate County Officials before award is final.)

Public Works contract **is not** required. (If required, the contract must be executed and returned to Snohomish County Purchasing within ten (10) days after notification of award. Contract must be approved by the appropriate County Officials before award is final.)

Appropriate insurance coverage **is** required. (If required, proof of insurance must be Submitted to Snohomish County Risk Management within ten (10) days after notification of award. Bid award is not considered final until acceptable proof of insurance is received and approved by the appropriate County Officials.)

Payment of prevailing wages **is** required (see RCW 39.12). (If required, the contractor(s) must Submit a "Statement of Intent to Pay Prevailing Wages" to the Department of Labor & Industries prior to commencement of work. Each voucher claim submitted by the contractor(s) shall include the statement "Prevailing wages have been paid in accordance with the pre-filed Statement of Intent on file with the public agency.")

Show figures on the Continuation Sheet attached (written quotations).

**BIDS MUST BE SIGNED
TO BE ACCEPTED**

NOTE: The Minimum Acceptable Discount Period is 20 days or more. Prompt Payment Discount _____ % Discount Period _____

In compliance with this Invitation to Bid, and subject to the conditions and instructions on the reverse side hereof, the undersigned hereby submits the above bid quotation/quotations F.O.B. delivery point specified.

Bidder _____ By _____ Title _____
(Written Signature)

Address _____ Phone _____

CONDITIONS AND INSTRUCTIONS TO BIDDER

Snohomish County reserves the right to reject any and all bids, to waive any informality in bids and to accept any item in the bid.

If a Public Works contract is required, Bidder must agree to submit applicable certification to pay prevailing wages. No workman, laborer, or mechanic employed in the performance of any part of this contract shall be paid less than the "prevailing rate of wage" as determined by the industrial statistician of the Department of Labor and Industries. The schedule of the prevailing wage rates for the locality or localities where this contract will be performed is by reference made a part of this contract as though fully set forth herein.

Current prevailing wage data will be furnished by the Washington State Department of Labor and Industries after award.

Whenever a brand name is cited in the bid, the term "or approved equal" applies unless specifically exempted.

Whether or not a place of inspection is specified herein, all materials and workmanship shall be subject to inspection and test at all times and places, including inspection and test after arrival at destination,. In the event any articles are found to be defective in material or workmanship or otherwise not in conformity with the specification requirements, Snohomish County shall have the right to reject such articles or require their correction.

If the item bid upon has a trade name or brand, such trade name or brand must be stated in the bid.

Bids MUST BE submitted on this form using ink, indelible pencil or typewriter.

Unit prices must be stated in terms of the number of items included in that unit price (e.g.: each, per dozen, per hundred, etc.). Packing and shipping costs shall be included in the unit price.

Samples of items, when required, must be furnished at no cost to the County. Upon request, samples will be returned at the bidder's expense.

Snohomish County is required to pay State sales tax, but is exempt from Federal excise tax. Therefore, do not include State sales tax in you unit prices.

Envelopes containing bids must be sealed and marked, as provided, in the upper and lower left-hand corners with name of bidder, bid number, title, date and hour of opening.

Proposals shall be submitted not later then the hour and date specified. Snohomish County shall assume no responsibility for delay in U.S. mail services, independent courier services, or any other circumstances resulting in late proposals. Late proposals will not be accepted.

Cash discounts for prompt payment will be considered in bid evaluations, providing the minimum discount period offered is 20 days or more. The computation period begins with date of completed delivery or receipt of a properly completed invoice, whichever is later.

If any item quoted cannot be delivered by the specific date, Snohomish County, at its option, may purchase the item on the open market and bill the company the difference between the proposal price and the open market cost or pursue any legal remedies.

All bidders contracting with the Human Services Department must have on file with the Department an executed Basic Terms and Conditions Agreement.

David G. Ott
Planner
Snohomish County, WA
425-388-7249
david.ott@co.snohomish.wa.us

Snohomish County is an Equal Opportunity Employer.
Participation by handicapped/disabled, minority, and
Women-owned businesses is encouraged.

Quantity	Item No.	2009 Project Bid Proposal Page 1 of 2	Unit Price	
			Dollars	Cents
SECTION 1		Liquid Fuel Combustion Appliances		
Approx. 75 Residences	1.	Safety Inspection and Service for Gas, Propane, or Oil Furnace or Heater.		
	2.	Safety Inspection and Service for Gas or Propane Water Heater.		
	3.	Safety Inspection and Service for Gas or Propane Range and Oven.		
	4.	Hourly rate for Repairs.		
	5.	Supply and replace Fan Belt.		
	6.	Supply and replace Thermocouple.		
	7.	Supply and install an Electronic Ignition on a gas furnace or heater.		
	8.	Flush Oil Lines.		
	9.	Supply and replace High Limit Control on an oil furnace.		
	10.	Size, supply and replace Nozzle on an oil furnace.		
	11.	Supply and install Flame Retention Burner on an oil furnace.		
	12.	Supply and replace existing 50 gallon gas or propane Water Heater. (must Meet State Energy Code)		
	13.	Supply and replace Dip Tube on water heater.		
SECTION 2		Electric Heating Systems		
Approx. 200 Residences	14.	Safety Inspect and Service Electric Furnace.		
	15.	Safety Inspect and Service Electric Water Heater.		
	16.	Hourly Rate for Repairs.		
	17.	Supply and replace Furnace Heating Element.		
	18.	Supply and replace 2 Switch Sequencer.		
	19.	Supply and replace 4 Switch Sequencer.		
	20.	Supply and replace transformer		
	21.	Supply and replace Existing Baseboard Heater, 30"		
	22.	Supply and replace Existing Baseboard Heater, 36"		
	23.	Supply and replace Existing Baseboard Heater, 48"		
	24.	Supply and replace Existing Baseboard Heater, 60"		
	25.	Supply and replace Existing Baseboard Heater, 72"		
	26.	Supply and replace Existing Baseboard Heater, 120"		
	27.	Supply and replace Existing Wall Heater 120 V 1500 W		
	28.	Supply and replace Existing Wall Heater 240 V 2500 W		
29.	Supply and replace Existing 50 Gallon Electric Water Heater (must Meet State Energy Code)			
30.	Supply and replace Water Heater Element.			
31.	Supply and replace Water Heater Thermostat.			
32.	Supply and replace Water Heater Dip Tube.			

Quantity	Item No.	2009 Project Bid Proposal Page 2 of 2	Unit Price	
			Dollars	Cents
SECTION 3		Solid Fuel Combustion Appliances		
Approx. 100 Residences	33.	Safety Inspect and Sweep Wood Stove/Insert & Chimney.		
	34.	Safety Inspect and Sweep Fireplace & Chimney.		
	35.	Safety Inspect and Service Pellet Stove.		
	36.	Supply and Install Roof-Top Chimney Damper with Lyemance L 13x13 or approved equal.		
SECTION 4		Thermostats & Alarms		
Approx. 100 Residences	37.	Supply and replace existing 24 volt thermostat with Honeywell T87F or approved equal.		
	38.	Supply and replace existing 24 volt set-back thermostat with Honeywell T8600D2028 or approved equal.		
	39.	Supply and replace existing 24 volt heat pump thermostat with Honeywell T841A or approved equal.		
	40.	Supply and replace existing 24 volt heat pump set-back thermostat with Honeywell T8611G2002 or approved equal.		
	41.	Supply and replace existing line voltage thermostat with Honeywell T4800A or approved equal.		
	42.	Supply and replace existing line voltage set-back thermostat with Honeywell CT1950A or approved equal.		
	43.	Supply and install battery powered smoke alarm with Firex Model 4671 or approved equal.		
	44.	Supply and replace existing 120 V smoke alarm with Fyrnetics 1275EH or approved equal. (with 9V battery back-up)		
	45.	Supply and install 120 V smoke alarm with Fyrnetics 1275EH or approved equal. (with 9V battery back-up)		
	46.	Supply and install battery powered CO alarm with ProTech Model 7035-SL or approved equal.		
47.	Supply and install 120 V CO alarm with Fyrnetics 900-0099 or approved equal. (with 9V battery back-up)			
DISCOUNT		Discount		
	48.	Discount for two (2) appliances at the same address and within the same Section subtract...		
	49.	Discount for three (3) appliances at the same address and within the same Section subtract...		

STATEMENT OF BIDDER'S QUALIFICATIONS

Each bidder submitting a proposal on work included in these specifications must submit the data requested in the following schedule:

1. Name of Bidder: _____
2. Business Address: _____

3. Telephone Number: _____ Fax Number: _____
4. How many years has said bidder been engaged in the contracting business under the present firm name? _____
5. Contracts now in hand (gross amount): \$ _____
6. General character of work performed by said company:

7. List of more important projects constructed by said company, including approximate cost and dates. (Submit added sheet if necessary.)

8. List three recent customer references where similar work has been completed. Include organization name, address, telephone number and name of contact person:

9. Bank references: _____
10. Contractor's license number: _____
HVAC license number: _____
Electricians license number: _____

Company Name

By _____

Printed Name and Title

Date: _____

INSTRUCTIONS TO BIDDERS

SCOPE OF WORK

The successful bidder or bidders will be required to provide inspection and servicing of heating and cooking appliances at various residences throughout Snohomish County.

A one year written warranty on all work accomplished is required.

CONTRACT TERM:

The contract will be for a period beginning upon date of award until December 31, 2009.

At the sole option of the County Executive, or designee, subsequent contract may be extended for one or more additional years with concurrence of the contractor.

CONTRACT BID & AWARD:

The County wishes to contract with as few firms as possible, at the most cost effective price. The past several years one firm has provided all of the bid items.

The qualified bidder is encouraged but not required to bid all four Sections of the Project Bid Proposal. If a bidder does not wish to bid all four Sections of the Project; bidder may bid one or more of the first three Sections, but all bidders are required to bid on some or all of Section 4 as described below.

Bidders offering bids for Liquid Fuel Combustion Appliances (Section 1), must also bid Thermostats and Alarms (Section 4), Items No. 37, 38, 39, 40, 43, and 46.

Bidders offering bids for Electric Heating Systems (Section 2), must also bid all of Thermostats and Alarms (Section 4).

Bidders offering bids for Solid Fuel Combustion Appliances (Section 3), must also bid Thermostats and Alarms (Section 4), Items Nos. 43 and 46.

List in the Discount Section in Item 48 and 49 the amount to be subtracted from the total invoice for homes with two or three appliances being serviced at the same address. We usually service all the combustion appliances at each address.

QUALIFICATIONS OF BIDDING:

The County may take such investigations as deemed necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the County all such information for this purpose as the County may request. The County reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the County that such bidder is properly qualified to carry out the obligation of the contract and to complete the work contemplated therein. In addition, the Contractor certifies that bidder is registered and licensed as required by the laws of the State of Washington.

LAWS AND REGULATIONS:

The bidder's attention is directed to the fact that all applicable Federal, State and Municipal ordinances and regulations and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written in full.

PROTECTION OF WORK AND PROPERTY

The Contractor shall, at all times, guard the Owner's property from injury or loss in connection with this contract. The Contractor shall, at all times, safely guard and protect their own work. The Contractor shall replace or make good any such damage, loss, or injury unless such be caused directly by errors contained in the contract or by the Owner, or Owners duly authorized representative.

COMPLETION TIME

Each inspection must be completed within ten (10) working days after notice to proceed is issued by the County.

EMERGENCY RESPONSE

The Contractor must be on site to begin service or repair within eighteen (18) hours after notification in an emergency situation.

An emergency is defined as life or health threatening situation as determined by Snohomish County. (Over the past two years, during the heating season, we have averaged 3 or 4 emergencies per month, either no heat or excessive carbon monoxide.)

TECHNICAL SPECIFICATIONS

The Snohomish County Human Services Department Low-Income Weatherization and Repair Program provides weatherization and minor home repair services to approximately 400 housing units each year. Typical services include installing attic, wall and floor insulation, air-sealing (including sealing ducts), insulating ducts and pipes, and repairing roofs, dry wall, plumbing and electrical wiring. Approximately half of the housing units worked on are single-family frame construction and the other half are mobile homes or manufactured housing.

The County requires a contractor to provide **Electric Furnace Safety Inspection and Servicing** to approximately 200 housing units located throughout Snohomish County and to provide **Gas and Oil-fired Furnace Safety Inspection and Servicing** in approximately 75 housing units located throughout the county. The gas furnaces may include units fueled by propane. The contractor is expected to inspect the entire heating system: in the case of combustion appliances availability of sufficient combustion and make-up air, appropriate size and type of fuel supply lines and properly functioning vent connectors and chimneys, as well as the heating appliance are to be inspected.

The contract will be for a period beginning at the date of the award until December 31, 2009. At the sole option of the County Executive, or his or her designee, the contract may be extended for one or more additional years with the concurrence of the Contractor.

Inspection of any combustion appliances requires completion of the "Combustion Safety Test Report", (attached) as appropriate for the system(s) being inspected. The County is aware that many bidders are not familiar with this form; instruction in completion of the form will be provided, upon request, to the successful bidder(s). Bidders should be aware that completion of the "Combustion Safety Test Report" requires the use of a manometer or magnehelic that reads to 1 Pascal (Pa), such as the DG-500 Pressure Gauge available from The Energy Conservatory, and a carbon monoxide meter, reading to 1 ppm, such as the Bacharach Monoxor II.

During the furnace inspections, items may be identified as defective, inoperable or requiring repair. The items identified shall be reported to the County. Additional work may be authorized at the discretion of the County to repair defective items found during the inspection.

Reasonable travel time for the pick-up of repair parts for additional repair work or for a second trip to return to do additional work not defined in the original bid specifications may be authorized at the discretion of the County and will be reimbursed at the hourly rate indicated in this bid. Travel time for an additional trip for repairs shall be from the Contractor's place of business to the job site and return.

Emergency situations involving a life or health threatening crisis may be identified by the County. The Contractors agrees to respond to a customer faced with a life or health threatening energy crisis, as determined by the County, within eighteen hours of the order being received from the County.

A one year written warrantee on all work accomplished is required.

All prices are for furnace service work and parts installed according to industry standards and include labor, material, permits, job site cleanup, overhead and all other costs, **excluding sales tax.**

The price for the Electric Furnace Safety Inspection and Servicing shall include the following:

Electric Furnaces

Inspect the elements.

Inspect the sequences and control system.

Inspect the thermostat for correct operation. Clean or adjust if necessary.

Inspect and clean the blower motor and fan blades. Lubricate all motors and bearings.

Inspect all belts for tension, wear and condition.

Replace all filters. Inspect to insure the availability of return air and provide one extra filter for occupant to replace.

Inspect the cold air return for the furnace.

Measure and report heat rise.

The price for the Gas and Oil-fired Furnace Safety Inspection and Service shall include the following measures:

Oil Furnaces

Inspect furnace for burner operation, unusual noises and vibrations, flame color, flame shape and flame impingement as the furnace begins to operate. Inspect the length of time between shutting off the burner and when the flame is extinguished.

Inspect the chimney and base, and/or flue pipe. Inspect the barometric damper, if present. Vacuum and clean the combustion chamber (including secondary chamber), heat exchanger, and flue, as necessary.

Inspect the brickwork and/or combustion chamber and heat exchanger for cracks.

Inspect the oil pump screen and oil filter. Clean or replace, if necessary.

Inspect for oil leaks.

Clean and adjust the firing assembly, as required.

Inspect the cad cell or stack relay. Clean if necessary.

Test the burner transformer.

Inspect the relay safety timing.

Replace the air filter. Inspect to ensure the availability of combustion air and provide one extra filter for occupant to replace.

Inspect the cold air return to the furnace.

Inspect for confined space conditions.

Inspect and clean the blower motor and fan blades. Lubricate all motors and bearings.

Inspect and adjust as necessary the fan belt tension, wear, and condition.

Test the high limit control and measure the temperature rise through the unit.

Inspect the thermostat for correct operation. Clean or adjust if necessary.

Inspect the chimney for cleaning and safety.

Conduct a post-inspection efficiency test and complete certification report.

Conduct combustion safety tests and complete an information checklist. The combustion safety checks shall include a worst case fan depressurization test, a combustion back draft test, a forced air system heat exchanger test, a spillage test, and a carbon monoxide (CO) test.

Gas Furnaces

As the furnace begins operation, check for burner operation, unusual noises and vibrations, flame color, flame roll out, and light off.

Inspect and clean the furnace fan and blower. Lubricate all motors and bearings.

Inspect and adjust as necessary the fan belt tension, wear, and condition.

Inspect the heat exchanger and combustion chamber for cracks.

Replace air filter. Inspect to ensure the availability of combustion air and provide one extra filter for occupant to replace.

Inspect the cold air return to the furnace.

Inspect for confined space conditions.

Inspect the draft control for proper operation. Draft reading should be, at a minimum, .02.

Inspect the bottom of the draft diverter for pitting.

Inspect the chimney and base, and/or flue pipe. Inspect the vent damper, if present.

Adjust the pilot and perform any burner or firing adjustments necessary.

Test the safety lockout.

Test the fan limit switch.

Inspect the thermostat for correct operation. Clean or adjust if necessary.

Test the high limit control and measure the temperature rise through the unit. (Should be within 60-100 degrees Fahrenheit.)

Inspect the chimney for cleaning and safety.

Conduct a post-inspection efficiency test and complete certification report.

Conduct combustion safety tests and complete an information checklist. The combustion safety checks shall include a worst case fan depressurization test, a combustion back draft test, a forced air system heat exchanger test, a spillage test, and a carbon monoxide (CO) test.

Solid Fuel Combustion Appliances

Inspect the chimney for appropriate height and size, spark arrestor and/or chimney cap. As appropriate inspect the condition of the masonry, crown, mortar, stove pipe, vent liner and flashing. Visually examine the interior of the chimney for nests or other obstructions, failed mortar or brickwork.

Inspect the condition of the firebox, doors, screens, damper and ash dump as appropriate.

Inspect the condition of the heating appliance, fire bricks, heat exchanger, and vent connectors as appropriate. Inspect for heat shields and adequate clearance from combustible surfaces.

In mobile homes, verify that the appliance is approved for mobile homes and is properly installed including functioning independent combustion air.

Conduct combustion safety tests and complete an information checklist. The combustion safety checks shall include a worst case fan depressurization test, a combustion back draft test, a forced air system heat exchanger test, a spillage test, and a carbon monoxide (CO) test.

Other

Charges for additional parts or other costs not specified in these documents shall be determined by the bidders invoice price plus 15 percent. Labor for installation of the part(s) shall be at the rate specified in this bid.

Only water based mastic or foil faced butyl tape (installed to manufacturer's recommendation) is allowed for sealing joints in duct work and plenums.

The Contractor shall:

1. Keep customer records confidential,
2. not treat adversely any customer because of participation in the energy assistance or weatherization programs, and
3. not discriminate in the services provided to any customer because of participation in the energy assistance or weatherization programs.

The Contractor shall maintain records, for audit purposes, which identify the service(s) provided by the name and address of the customer. These records shall be maintained for four years from the date of service, or, if the Contractor is notified that a review or audit is being performed, until the final resolution of the review or audit. The Contractor shall make the records available for review or audit by authorization representatives of Snohomish County, the State of Washington, the United States Department of Energy, or the United States Department of Health and Human Services.

SNOHOMISH COUNTY INSURANCE REQUIREMENTS

All contracts, licenses, permits, or other written agreements wherein Snohomish County is being insured by the other contracting party or where there is a "Hold Harmless" provision shall contain the following insurance provisions.

INSURANCE

1. Such contracting party shall obtain and maintain continuously liability insurance appropriate to the activity and/or other insurance necessary to protect the public within limits of liability not less than:

\$1,000,000.00 Combined Single Limit/Bodily Injury & Property Damage

with coverage endorsements to include Broad Form Contractual, Broad Form Property Damage, Owner's Contractor's Protective, XCU, Auto and Non-owned Auto, unless such additional coverage endorsements are not applicable. Liability insurance must cover Pollution Occurrence. Many liability policies exclude this coverage, requiring separate Pollution Occurrence insurance.

2. Such insurance shall name as additional insured Snohomish County, its officers, elected officials, agents, and employees and shall not be reduced or cancelled without thirty (30) days written prior notice to the County.

3. Such insurance, in its provision for additional insured, shall include a "Cross Liability Endorsement", "Severability of Interests", or "Separation of Insureds" provision indicating:

"The inclusion of more than one insured under this policy shall not affect the rights of any insured as respects any claim, suit, or judgment made or brought by or for any other insured or by or for any employee of any other insured. The policy shall protect each insured in the same manner as though a separate policy had been issued to each except that nothing herein shall operate to increase the company's liability beyond the amount or amounts for which the insurer would have been liable had only one insured been named."

4. If coverage is on a claims-made basis, the retroactive date shall be prior to or coincide with the date of this contract, and the policy shall state that coverage is claims made, and state the retroactive date. The Contractor shall maintain coverage for the duration of this contract. It is further agreed that either the Contractor or County may invoke the tail option on behalf of the other party and that the Extended Reporting Period premium shall be paid by the Contractor.
5. Where there are specialized contracts, such as franchises, exhibitions, carnivals, livestock shows, rodeos, or other conditions which are extraordinary, then additional insurance requirements may be imposed in each individual case.

PROOF OF INSURANCE

The successful bidder will be required to provide satisfactory written evidence of proper insurance coverage within ten (10) days after bid award.

Proof of insurance must be in the following form:

Declaration pages of your commercial general liability which pertain to the project scope of work, and required coverage, along with a copy of the additional insured endorsement (ISOCG2010) that adds "Snohomish County, its officers, elected officials, agents, and employees" as an additional insured. The County may request that the successful bidder provide a copy of the entire policy, if questions arise about particular coverage.

NOTE
THE STANDARD ACCORD FORM (CERTIFICATE OF INSURANCE)
IS NOT ACCEPTABLE AS PROOF OF INSURANCE.

THE BID AWARD IS NOT CONSIDERED FINAL UNTIL THE APPROPRIATE INSURANCE DOCUMENTS ARE RECEIVED AND APPROVED BY THE COUNTY.

Please make it clear to your firm's insurance representative that the insurance industry's standard Accord Form or other similar insurance certificates are **NOT** acceptable as proof of appropriate insurance coverage. Also, submittal of proper insurance documents in a timely manner is extremely important.

Please provide a copy of these guidelines to your insurance representative.

COMBUSTION SAFETY TEST REPORT

Customer Name		Job#	
		Date	Date
Technician Name		PRE	POST
1	Measure existing house pressure (stack, wind etc.), house WRT outside		
2	Outdoor wind speed		
3	Outdoor temperature		
4	Combustion appliance zone, designate appliance _____		
5	Is there a hazardous or unsafe condition	Y/N	Y/N
6	Are there visible signs of vent pipe leaks or damage	Y/N	Y/N
7	Is there the smell of gas or indication of fuel leak	Y/N	Y/N
	Combustion appliance zone (CAZ) worst case set-up test/ and carbon monoxide (CO) test. Combustion appliance (CA)	NA	NA
8	Is the door of the CAZ open or closed (circle one)		
9	Was there flame roll-out of combustion equipment	Y/N	Y/N
10	Did the equipment spill gases for more than one minute	Y/N	Y/N
11	Did the flame change in the furnace when the air handler turned on	Y/N	Y/N
12	After 5 min. measure the CO in the ambient air in the living space		
13	Measure the draft pressure in the vent of the combustion appliance Test the combustion appliance vent WRT CAZ		
	Minimum acceptable draft pressures, below 20°F -5pa, 20°to40° -4pa, 40°to60° -3pa, 60°to80° -2pa, 80°+ -1pa	NA	NA
14	Measure the CO in the exhaust gases of the vented appliance		
15	If the door of CAZ is closed - open it. If the door is open - close it. Open/closed. Combustion appliance vent WRT CAZ.		
16	Heat Rises: measure temperature across heat exchanger: supply plenum temp - return plenum temp		
17	Fireplace/wood stove zone worst case test: FPWSZ zone WRT outdoors Also document any vent pipe, chimney or clearance problems		
18	Measure the CO in exhaust gases of kitchen stove: Range top burner 1		
	burner 2 (after 5 min.)		
	burner 3 (after 5 min.)		
	burner 4 (after 5 min.)		
	oven (after 5 min.)		
	ambient CO after 15 minutes		
	ambient CO after 45 minutes if CO is over 5 ppm after 15 min.		
19	Return house to pretest conditions, Circle DONE when complete	DONE	DONE

1. WORST-CASE FAN DEPRESSURIZATION - Is there danger of backdrafting?

Prepare house:

- Close all interior and exterior doors and windows. Make sure the furnace and water heater are off.
- Turn on all exhaust fans (for example, bathroom and kitchen fans) and clothes dryers. Clean out lint filter in dryer before turning it on.
- Perform a smoke test on each interior door to determine whether to leave it open or closed. Position yourself in or toward the main body of the house.
- If the smoke goes in, open the door. If smoke comes back into the body of the house, close the door.
- Last, test the door to the Combustion Appliance Zone (CAZ). If smoke comes into main body of house, open the door. If smoke goes into the CAZ, close the CAZ door.

Take the measurements:

- With the manometer, measure and record the depressurization of the CAZ with respect to the outside. The negative pressure reading should not exceed the House Depressurization Limits (HDL) as listed in the following table.
- Decide whether it passes or fails.

HDL CHART - HOUSE DEPRESSURIZATION LIMIT			
Appliance	Chimney height (feet)	Unlined chimney On outside wall	Metal lined, insulated Or interior chimneys
Gas furnace, boiler or water heater	13 or less	5 Pa	5 Pa
	14 - 20	5 Pa	6 Pa
	21 +	5 Pa	7 Pa
Oil furnace, boiler or water heater	13 or less	4 Pa	4 Pa
	14 - 20	4 Pa	5 Pa
	21 +	4 Pa	6 Pa
Fireplace	N/A.	3 Pa	4 Pa
Wood stove or air-tight fireplace	N/A.	10 Pa	10 Pa
Induced Draft Appliance	N/A.	15 Pa	15 Pa

2. SPILLAGE TESTS - Do combustion by-products enter the living space?

- Keep house in worst case depressurization mode (see #1 above).
- Test each combustion appliance separately. Fire up each combustion appliance. Check for flame roll-out or explosive start. For forced-air systems, check for a change in the flame when air handler turns on. After five minutes of operation, check for spillage at the draft diverter with smoke.
- If appliances have a common vent (for example, the water heater and furnace are vented into same chimney), conduct test on smallest input appliance first. Then test with both appliances running.
- If spillage continues beyond five minutes, remove negative pressure in combustion room by opening a window or exterior door.
- Recheck for spillage. If spillage stops from opening window or door, there is a pressure-induced problem. If spillage continues, check vent and chimney for obstructions, and check whether the BTU input of the appliance fits with the chimney size.
- Decide whether it passes or fails.

3. DRAFT TESTS - Is there enough pressure to move flue gasses out?

- Keep house in worst case depressurization mode (see #1 above).
- Drill a small hole in the vent pipe about two feet from the draft diverter or barometric damper.
- After appliance has been running for five minutes measure draft pressure of vent WRT the CAZ. Use your digital monometer and a static pressure probe. Compare your reading with those in the Minimum Draft Pressure Chart.
- Decide whether it passes or fails.

4. CARBON MONOXIDE TESTS

Turn off all exhaust fans. Close all outside doors and windows.

CO in appliances:

- Test combustion appliances after they have been firing for at least five minutes.
- Gas furnace: Measure CO before the draft diverter in each port.
- Gas water heater: Measure CO at top of heater before draft hood in each port.
- Oil furnace: Measure CO in the breech section before the barometric damper.
- Gas range: Turn on all burners. Measure CO three feet above cooking surface.

Ambient CO levels in house:

- House interior: Measure and record CO level in living areas of house.
- Combustion Appliance Zone: Measure and record CO level in the CAZ.

Action levels:

- 100 ppm for furnace, boilers and water heaters**
- 35 ppm for gas ranges and ovens**
- 9 ppm for ambient**

5. RETURN HOUSE TO ORIGINAL CONDITION AND MAKE SURE PILOT LIGHTS ARE LIT.