Health Opportunities During Energy Audits and Upgrades

Healthy Housing Solutions Inc.

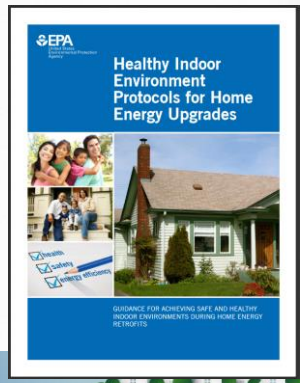
Learning Objectives for this Course

- Be able to identify the federal guidance documents that address health and safety during home energy upgrades.
- During an energy upgrade, be able to identify hazards and repairs related to:
  - moisture/ventilation
  - pest prevention,
  - contaminant control and
  - safety
- Be able to identify four local referral resources for repairs you cannot address.

Guidance, Guidance and More Guidance

Title	Healthy Indoor Environment Protocols for Home Energy Upgrades	Standard Work Specifications for Home Energy Upgrades	
Federal Agency	EPA	NREL / DOE	DOE
Purpose	Guidance for conducting home assessments and responding to indoor air quality and safety issues.	Defines the desired outcomes of a particular energy efficiency measure, and provides the minimum specs needed to meet those outcomes.	Describes the required content of health and safety plans developed by DOE Weatherization Assistance Program grantees. Details how WAP funds can be used.
Target audience	Weatherization, home performance	Weatherization, home performance	Weatherization

Voluntary Protocols for Home Retrofits



Priority Indoor Hazards

- Asbestos and vermiculite
- Below ground contaminants
- Building products / materials emissions
- Carbon monoxide and other combustion emissions
- Garage air pollutants
- Environmental tobacco smoke
- Lead
- Moisture (mold and other biologicals)
- Ozone
- Pests
- Polychlorinated biphenyls
- Radon
- Wood smoke emissions

The Protocols also cover:

- HVAC equipment
- Combustion safety (vented and unvented)
- Source ventilation
- Whole house ventilation
- Multi-family ventilation
- Home safety
- Jobsite safety and worker protections
- Client education

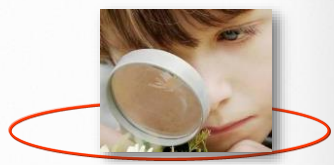
What to look for during the Home Energy Audit

PRIORITY ISSUES | ASSESSMENT PROTOCOL | HEALTHY INDOOR ENVIRONMENTS: Minimum Actions | Expanded Actions

Minimum Actions to ensure the Home Energy Retrofits "Don't Make it Worse"

PRIORITY ISSUES | ASSESSMENT PROTOCOL | HEALTHY INDOOR ENVIRONMENTS: Minimum Actions | Expanded Actions

Expanded Actions to further improve IAQ in Home Energy Retrofits (funds permitting)



PRIORITY ISSUES | ASSESSMENT PROTOCOL | HEALTHY INDOOR ENVIRONMENTS: Minimum Actions | Expanded Actions

Selected Minimum Actions

Asbestos	If suspected, good condition, don't disturb
Garage Pollutants	Seal walls/ceilings/door connecting to living areas
Lead	Follow EPA RRP – lead safe work practices
Moisture	Address before insulating/air sealing or installing combustion equipment that lowers infiltration rate
Ozone	Remove ozone producing air cleaning equipment
Below Grade Cont.	Fill dry drain traps; soil gas vapor suspected follow state regs
Radon	Test pre and post; mitigate to avoid increasing levels
Pests	If evidence, seal holes/cracks pest proof material
Vented Appliances	CAZ testing; repair/replace equipment; CO alarms
Local Ventilation	Meet ASHRAE 62.2 existing buildings (bath, dryer, kitchen)
House Ventilation	Install added ventilation to meet 62.2 existing buildings
Home Safety	Working CO & smoke alarms homes

Pests Protocol Highlights

Minimum Actions (Don't Make it Worse):

- If indication of current or past infestation, educate the clients about Integrated Pest Management (IPM) …

Expanded Actions (If Funds Available …):

- Patch holes > 1/4" x 3/8" using pest resistant materials (e.g. copper mesh, hardware cloth, sheet metal, concrete) before air sealing, and install screens over intakes & vents
- Apply boric acid/gels in holes for cockroach issues
- Provide sealable garbage cans

Pest Exclusion

Test-In/Test-Out Option

Conduct pre-work radon test
Take precautionary measures per Table 1: Radon Testing Options and Reduction Strategies (see next slide) during retrofit work
Conduct post-work radon test
Corrective action if necessary per Table 1
Educate clients (Consumers Guide)

Test-In/Test-Out Option

Table 1: Radon Testing Options and Reduction Strategies

Pre-Work Test Result and Precautionary Measures	Post-Work Test Result	Minimum Actions	Expanded Actions
<2 pCi/L	<2 pCi/L	No action.	
Consider precautionary radon-reduction actions as part of energy upgrade work, especially covering exposed earth, air sealing open sumps, ensuring floor drains have traps and that traps are wet dry.	≥2 and <4 pCi/L	Complete foundation air sealing strategies.	For post-work radon levels between 2 and 4 pCi/L, refer client to EPA's Citizen's Guide to Radon and Consumer's Guide to Radon Reduction and/or mitigate in accordance with ASTM E2121.
	≥4 pCi/L	Mitigate in accordance with ASTM E2121.	
>2 and <4 pCi/L	<4 pCi/L and NOT higher than pre-work level.	No further minimum action.	For post-work radon levels between 2 and 4 pCi/L, refer client to EPA's Citizen's Guide to Radon and Consumer's Guide to Radon Reduction and/or mitigate in accordance with ASTM E2121.
Take precautionary radon-reduction actions: complete foundation air sealing strategies as part of energy upgrade work.	<4 pCi/L AND higher than pre-work level.	Verify that foundation air sealing strategies were completed appropriately and correct deficiencies.	For post-work radon levels between 2 and 4 pCi/L, refer client to EPA's Citizen's Guide to Radon and Consumer's Guide to Radon Reduction and/or mitigate in accordance with ASTM E2121.
	≥4 pCi/L	Mitigate in accordance with ASTM E2121.	
≥4 pCi/L	<4 pCi/L	No further minimum action.	For post-work radon levels between 2 and 4 pCi/L, refer client to EPA's Citizen's Guide to Radon and Consumer's Guide to Radon Reduction and/or mitigate in accordance with ASTM E2121.
Complete all foundation air sealing strategies as part of energy upgrade work.	≥4 pCi/L but NOT higher than pre-work level	Refer client to EPA's Citizen's Guide to Radon and recommend radon mitigation.	Mitigate in accordance with ASTM E2121.
	≥4 pCi/L AND higher than pre-work level.	Mitigate in accordance with ASTM E2121.	
No Pre-Work Test	<4 pCi/L	No further minimum action.	For post-work radon levels between 2 and 4 pCi/L, refer client to EPA's Citizen's Guide to Radon and Consumer's Guide to Radon Reduction and/or mitigate in accordance with ASTM E2121.
Consider precautionary radon-reduction actions as part of energy upgrade work, especially covering exposed earth, air sealing open sumps, ensuring floor drains have traps and that traps are wet dry.	≥4 pCi/L	Mitigate in accordance with ASTM E2121.	

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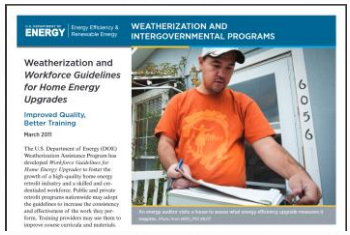
Precautionary Measures

Cover exposed earth floors
Air seal sumps
Install airtight drain fittings (e.g., trap or flange system) in foundation floor drains
Seal and caulk penetrations, openings or cracks in below grade walls & floors

Note: *These air sealing strategies are important elements of radon mitigation per ASTM E2121…*

Voluntary Standards for Home Retrofits



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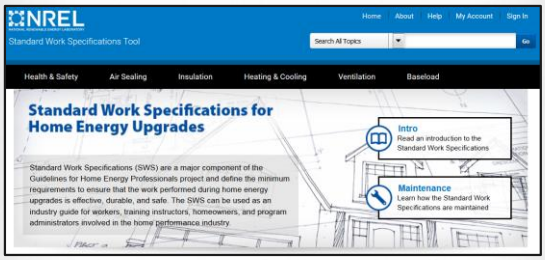
Standard Work Specifications



Health and Safety section https://sws.nrel.gov/spec/2

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National Renewable Energy Laboratory: Standard Work Specifications Tool – Section 2 Health and Safety

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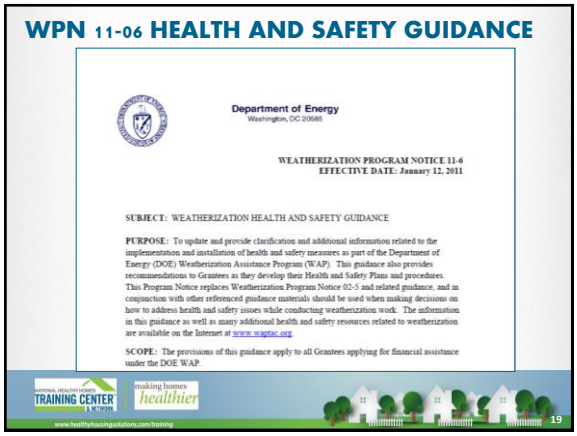
WPN 11-06 HEALTH AND SAFETY GUIDANCE



Department of Energy
Washington, DC 20585

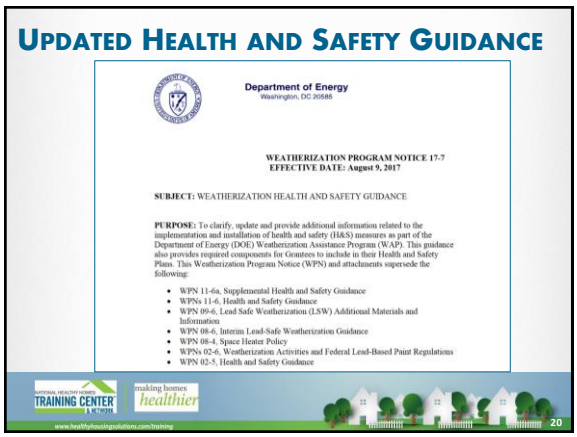
WEATHERIZATION PROGRAM NOTICE 11-6
EFFECTIVE DATE: January 12, 2011

SUBJECT: WEATHERIZATION HEALTH AND SAFETY GUIDANCE

PURPOSE: To update and provide clarification and additional information related to the implementation and installation of health and safety measures as part of the Department of Energy (DOE) Weatherization Assistance Program (WAP). This guidance also provides recommendations to Grantees as they develop their Health and Safety Plans and procedures. This Program Notice replaces Weatherization Program Notice 02-5 and related guidance, and in conjunction with other referenced guidance materials should be used when making decisions on how to address health and safety issues while conducting weatherization work. The information in this guidance as well as many additional health and safety resources related to weatherization are available on the Internet at www.wgtac.org.

SCOPE: The provisions of this guidance apply to all Grantees applying for financial assistance under the DOE WAP.

UPDATED HEALTH AND SAFETY GUIDANCE



Department of Energy
Washington, DC 20585

WEATHERIZATION PROGRAM NOTICE 17-7
EFFECTIVE DATE: August 9, 2017

SUBJECT: WEATHERIZATION HEALTH AND SAFETY GUIDANCE

PURPOSE: To clarify, update and provide additional information related to the implementation and installation of health and safety (H&S) measures as part of the Department of Energy (DOE) Weatherization Assistance Program (WAP). This guidance also provides required components for Grantees to include in their Health and Safety Plans. This Weatherization Program Notice (WPN) and attachments supersede the following:

- WPN 11-6a, Supplemental Health and Safety Guidance
- WPNs 11-6, Health and Safety Guidance
- WPN 09-6, Lead Safe Weatherization (LSW) Additional Materials and Information
- WPN 08-6, Interim Lead-Safe Weatherization Guidance
- WPN 08-4, Space Heater Policy
- WPNs 02-6, Weatherization Activities and Federal Lead-Based Paint Regulations
- WPN 02-5, Health and Safety Guidance

Health and Safety Issue	Action/Allowability	Testing	Client Education	Training
Lead Based Paint	Follow EPA's Lead; Renovation, Repair and Painting Program (RRP). In addition to RRP, Weatherization requires all weatherization crews working in pre-1978 housing to be trained in Lead Safe Weatherization (LSW). Deferral is required when the extent and condition of lead-based paint in the house would potentially create further health and safety hazards.	Testing is allowed. Job site set up and cleaning verification is required by a Certified Renovator.	Follow RRP requirements.	All weatherization crews working on pre-1978 homes must receive LSW training and be accompanied by an EPA Certified Renovator. Grantee Monitors/Inspectors must be Certified Renovators and receive LSW training.
Mold and Moisture	Limited water damage repairs that can be addressed by weatherization workers and correction of moisture and mold creating conditions are allowed when necessary in order to weatherize the home and to ensure the long term stability and durability of the measures. Where severe Mold and Moisture issues cannot be addressed, deferral is required.	Visual assessment is required and diagnostics such as moisture meters are recommended pre and prior to final inspection. Mold testing is not an allowable cost.	Provide client notification and disclaimer on mold and moisture awareness.	National curriculum on mold and moisture or equivalent.
Occupant Preexisting or Potential Health Conditions	When a person's health may be at risk and/or the work activities could constitute a health or safety hazard, the occupant at risk will be required to take appropriate action based on severity of risk. Temporary relocation of at-risk occupants may be allowed on a case by case basis. Failure or the inability to take appropriate actions must result in deferral.	Require occupant to reveal known or suspected health concerns as part of initial application for weatherization. Screen occupants again during audit.	Provide client information of any known risks. Provide worker contact information so client can inform of any issues.	How to assess occupant preexisting conditions and determining what action to take if the home is not deferred. Awareness of potential hazards.
Occupational Safety and Health Administration (OSHA) and Crew Safety	Workers must follow OSHA standards and Material Safety Data Sheets (MSDS) and take precautions to ensure the health and safety of themselves and other workers. MSDS must be posted wherever workers may be exposed to hazardous materials.	Grantees must perform assessments to determine if crews are utilizing safe work practices.	Not applicable.	Use and importance of personal protection equipment. OSHA 10 hour training is required for all workers. OSHA 30 hour training is required for crew leaders.

Asbestos in Vermiculite

Allowed	**• Encapsulation by a certified asbestos control professional is allowed.** **• Where blower door tests are performed, it is a best practice to perform pressurization instead of depressurization.** **• Asbestos Hazard Emergency Response Act of 1986 (AHERA) certified prescriptive sampling is allowed by a certified tester.**
Required	• Assess whether vermiculite is present. • When vermiculite is present, unless testing determines otherwise, take precautionary measures as if it contains asbestos, such as not using blower door tests and using personal air monitoring in attics. • Instruct clients not to disturb suspected asbestos containing material. • Provide asbestos safety information to the client. • Formally notify client if test results are positive for asbestos and require client's signature.
Restricted	• Removal is not allowed.

Mold & Moisture

Allowed	• Correction of moisture and mold creating conditions are allowed when necessary in order to weatherize the home and to ensure the long term stability and durability of the measures. • Diagnostics such as moisture meters are recommended pre-weatherization and at final inspection.
Required	• Where severe mold and moisture issues cannot be addressed, deferral is required. • Visual assessment is required. • Provide client notification and disclaimer on mold and moisture awareness. • Staff trained on national mold and moisture curriculum or equivalent.
Restricted	• Mold remediation is not allowed. • Repairs are limited to areas with water damage that can be corrected by weatherization workers. • Mold testing is not an allowable cost.

Radon

Allowed	**• Testing is allowed in locations with high radon potential.**
Required	• Whenever site conditions permit, exposed dirt must be covered with a vapor barrier, except for mobile homes. • In homes where radon may be present, precautions should be taken to reduce the likeliness of making radon issues worse. • Provide client with EPA consumer's guide to radon.
Restricted	• Radon remediation is not allowed, accept for in cases where weatherization work is known to have worsened radon levels AND when those levels are above the EPA action level of 4 pCi/L.

Ventilation

Allowed	• **When doing the ASHRAE 62.2 calculations, an infiltration credit based on the anticipated final blower door reading may be applied, reducing the total amount of fan CFM needed for the home.**
Required	• 2010 (or most current) ASHRAE 62.2 is required to be met to the fullest extent possible when performing weatherization activity. • Existing fans and blower systems must be updated if not adequate. • ASHRAE 62.2 evaluation, fan flow metering, and follow up testing are required to ensure compliance. • Provide client with information on function, use, and maintenance of ventilation system and components. • Include disclaimer that ASHRAE 62.2 does not account for high polluting sources or guarantee indoor air quality. • ASHRAE 62.2 training for weatherization staff.
Restricted	• Installation and repair of ventilation that is a component of an ECM is not allowed as a health and safety cost.

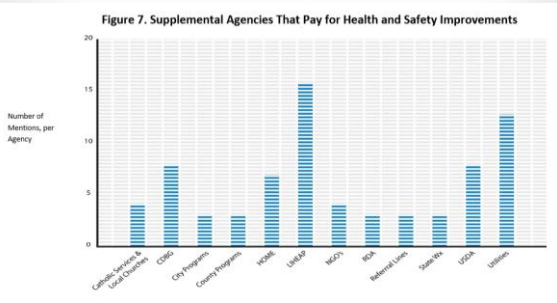
Pests

Allowed	• **Pest removal is allowed only where infestation would prevent weatherization.** • **Screening of windows and points of access to prevent intrusion is allowed.**
Required	• Infestation of pests may be cause for deferral where they cannot be reasonably removed or the infestation poses a health and safety concern for workers. • Assessment of presence and degree of infestation and risk to worker. • Inform client of observed condition and associated risks.
Restricted	• Removing pests that would not otherwise prevent the workers ability to weatherize the home or protect weatherization measures.

Injury Prevention

Allowed	• **Minor repairs and installation may be conducted only when necessary to effectively weatherize the home.**
Required	• Workers must take all reasonable precautions against performing work on homes that will subject workers or occupants to health and safety risks. In other words, work safe. • Observe if dangers are present that would prevent weatherization. • Inform client of observed hazards and associated risks.
Restricted	• Minor repairs and installation of items such as stairs, porches, safety lighting, hand rails, etc. are not allowed unless their absence would prevent the effective weatherization of the home.

REFERRALS



Source: "Healthy Housing Opportunities During Weatherization Work" NREL, NCHH, Tohn Environmental Strategies, March 2011