

WEATHERIZATION PROGRAM NOTICE 93-8
EFFECTIVE DATE: MARCH 26, 1993

ATTACHMENT 1

WAIVER AUDIT APPROVAL CRITERIA AND SUBMITTAL REQUIREMENTS

The following approval criteria and submittal requirements provide the framework for the waiver audit approval process. While DOE has attempted to provide sufficient detail regarding audit requirements, there will likely be some questions regarding specific audits, approval criteria, and submittal requirements that require referral to Headquarters for determination. Additionally, States are invited to provide any further information which is important and which may assist the reviewer in fully and comprehensively understanding the operation of the energy audit.

Rule
Reference
(§440.21)

- 1) **Approval Criterion:** To warrant approval of a State's application to waive the 40 percent material cost requirement, the energy audit procedures must comply with §440.21(b), (d), (e), and (h) through (k). (a)

Submittal Requirement: In addition to the items listed below, the submittal package must include the energy audit procedures. This could include: a copy of the auditors' manual, a description of how energy audits are conducted and how different audit findings affect the auditor's actions and recommendations; and/or the detailed instructions for the data collection forms.

- 2) **Approval Criterion:** DOE-funded weatherization materials/measures considered by audit must be included in Appendix A. (b)

Submittal Requirement: The submittal package must include a list of all the weatherization materials/measures that the audit considers. Those weatherization materials/measures to be funded with DOE-WAP monies should be noted. The submittal package must also include a statement that the requirements of Appendix A will be followed.

Rule
Reference
(§440.21)

- 3) **Approval Criterion:** The energy savings calculations must take into account local heating or cooling degree days. Alternatively, the audit algorithms may use bin or hourly weather data in its energy savings calculations.

(d)

Submittal Requirement: The narrative portion of the submittal package should state the type of weather data used, the published source of the weather data, the geographic locations for which the weather data will be used, and how the energy savings calculations use the weather data.

- 4) **Approval Criterion:** The audit must use reasonable methods and assumptions.

(d)

Submittal Requirement: The narrative portion of the submittal package must describe the energy savings calculation algorithms (methods) and assumptions. Assumptions include a range of variables such as treatment of buffered envelope surfaces, treatment of solar insolation, wind, humidity, C_D factor, if applicable, etc. It does not include default values which can be changed by the auditor.

- 5) **Approval Criterion:** The audit must use reasonable methods and assumptions (approval criteria #4 is intentionally repeated here as #5 to specify an additional submittal requirement).

(d)

Submittal Requirement: In addition to the narrative description of the energy savings calculation methods and assumptions required by approval criterion #4, the submittal package should also include the input data, assumptions, and audit results (recommended measures) for two sample dwelling units typical of those weatherized by grantee's program.

- 6) **Approval Criterion:** The figures used for the lifetime of the materials and for the costs of materials and installation must be generally accepted in the relevant trade.

(e)

Submittal Requirement: Include the figures used for the lifetime of the materials and for the costs of materials and installation. State the sources of this information and how the values compare with current actual costs and lifetime values presently used.

- 7) **Approval Criterion:** The energy audit procedures must consider the rate of energy use. (h)(1)

Submittal Requirement: Describe how the energy audit procedures consider the rate of energy use. The energy audit procedures must consider energy efficiency as well as total energy savings. For example, replacing an existing space heater, currently heating one room, with a more energy efficient space heater, capable of heating several rooms, may not save any energy. However, the occupants would gain the use of more of their dwelling unit. If not handled as a health and safety measure, this measure would have to be cost justified by the audit. The only way to cost justify this measure would be to impute energy savings by calculating the amount of energy the inefficient space heater would have used to heat the several rooms now heated by the efficient space heater, and subtracting the estimated energy use of the new efficient space heater.

Other examples include instances where the occupant cannot afford to heat the dwelling to an adequate temperature or operate the furnace at all. Installing insulation and tuning up the furnace may now make the use of the furnace affordable. However, energy use is increased, not decreased. Again, if not handled as a health and safety measure, energy savings would have to be imputed to cost justify the insulation and/or the furnace tune-up through the audit. While not mandatory within the audit software, if used, the overall energy audit procedures must consider these types of circumstances.

- 8) **Approval Criterion:** Where cooling needs are significant, the energy audit must consider cooling measures. (h)(2)

Submittal Requirement: In States where cooling needs are significant, the list of weatherization materials/measures considered by the audit should include cooling measures. The narrative portion of the submittal package should describe how the energy audit considers cooling measures, including the algorithms and assumptions used. Internal gains, latent loads, and solar incidence must be considered.

DOE considers States with over 2,000 cooling degree days per year (65°F base) to have significant cooling needs and expect their audits to consider cooling measures. States with between 1,300 and 2,000 cooling degree days, whose audits do not consider cooling measures, must provide an adequate explanation why cooling measures are not considered.

**Rule
Reference
(§440.21)**

- 9) **Approval Criterion:** The energy audit procedures must make provision for use of advanced diagnostic and assessment techniques which DOE has determined are consistent with sound engineering practices.

(h)(3)

Submittal Requirement: Describe the advanced diagnostic and assessment techniques that can be used as part of the energy audit. Such techniques may include blower doors, infra-red cameras or detectors, various furnace testing procedures, health and safety testing, psychrometers, duct-leakage testing, bypass testing, etc. Describe how the results of this diagnostic work would be used and how the energy audit would consider the results of these techniques.

- 10) **Approval Criterion:** The energy audit procedures must determine energy use from actual energy bills or by generally accepted engineering calculations.

(h)(4)

Submittal Requirement: Describe how the energy audit determines energy use and how this value is verified.

- 11) **Approval Criterion:** The energy audit procedures must determine that each weatherization material is cost effective by ensuring that the discounted savings-to-investment ratio (SIR) is greater than or equal to one. The denominator in the SIR equation must include the costs of material, labor, and on-site supervisory personnel (§440.18(c)(1),(2), and (7)).

(h)(5)

Submittal Requirement: Show the SIR equation used by the audit and describe how future fuel cost savings are discounted to present value. If the State elects not to use the discount rate provided by DOE, show the discount rate to be used and its published source. Describe how fuel cost escalation is treated and show these factors, or refer to their source. (The discount and fuel cost escalation rates may be given here or under #16.) Show the costs included in the denominator of the SIR equation.

**Rule
Reference
(§440.21)**

- 12) **Approval Criterion:** The energy audit procedures must assign priorities among weatherization materials in descending order of SIR and must account for interaction between architectural and mechanical measures. After adjusting the estimated fuel cost savings for interaction between measures, the energy audit procedures must eliminate any measure whose interaction-adjusted SIR is less than one. (h)(6)

Submittal Requirement: Describe how the energy audit accounts for the interaction between architectural and mechanical measures. Describe how, when moving from an architectural to a mechanical measure (or vice versa), the energy audit procedures adjust the estimated fuel cost savings of measures with lower non-interacted SIRs. Show that the energy audit procedures eliminate any measure whose interaction-adjusted SIR is less than one.

- 13) **Approval Criterion:** The energy audit procedures must ensure that the overall SIR for the entire package of measures is greater than or equal to one. In calculating the overall SIR, the energy audit procedures must add the cost of incidental repairs (§440.18(c)(9)) to the costs of materials, labor, and on-site supervisory personnel in the denominator. (h)(7)

Submittal Requirement: Show the equation for the overall SIR used by the audit and describe how the energy audit ensures that the overall SIR is greater than or equal to one. List the costs included in the denominator of the overall SIR equation.

- 14) **Approval Criterion:** The energy audit procedures must identify health and safety hazards to be abated with DOE funds in compliance with the State's DOE-approved health and safety procedures under §440.16(h). (h)(8)

Submittal Requirement: Describe how the energy audit procedures identify health and safety hazards to be abated with DOE funds and how the material and labor costs of health and safety abatement are determined on each home.

- 15) **Approval Criterion:** The energy audit procedures must treat the dwelling unit as a whole system by: (h)(9)
- A) Examining its heating and cooling system;
 - B) Examining its air exchange system;
 - C) Examining its occupants' living habits and needs; and
 - D) Making necessary adjustments to the priority of weatherization materials in response to these examinations.

Submittal Requirement: Describe how the energy audit procedures treat the dwelling unit as a whole system. Specifically, describe how the energy audit procedures examine the heating and cooling system, the air exchange system, and occupants' living habits and needs. Explain how the audit procedures make necessary adjustments to the priority of weatherization materials in response to these examinations and how these adjustments are documented.

- 16) **Approval Criterion:** The energy audit must provide for use of an annually adjusted discount rate. (i)

Submittal Requirement: If not specified under #11, state the discount and fuel cost escalation rates to be used and their published source (if the DOE-provided discount rate is not used).

- 17) **Approval Criterion:** Priority lists, if used, must be developed by conducting site-specific energy audits (that comply with the requirements in §440.21(h)) of a representative sample of typical dwelling units for each major dwelling type covered by the State's weatherization program. Priority lists must be revalidated by conducting a representative sample of site-specific energy audits every 5 years. (j)

Submittal Requirement: Provide any priority lists to be used and explain how the priority lists were developed. State the energy audit on which the priority lists are based and how it complies with §440.21(h), if different than the audit being submitted. Describe the circumstances that will require a site-specific audit rather than the use of the priority list and the audit to be used in such circumstances (in compliance with §44.21(h)).

- 18) **Approval Criterion:** Priority lists (and lists of general heat waste measures), if used, must be developed by conducting site-specific energy audits (that comply with the requirements in §440.21(h)) of a representative sample of typical dwelling units for each major dwelling type covered by the State's weatherization program (approval criteria #17 is intentionally repeated here as #18 to specify an additional submittal requirement). (j)

Submittal Requirement: Describe how the representative sample of typical dwelling units for each major dwelling type was determined. Some States have indicated that fuel type and construction factors (assemblies) predict energy use (and weatherization energy savings) better than dwelling type. DOE will accept a representative sample determined on this basis, provided an adequate explanation is given to substantiate this method. Assuming the same representative sample was used for the priority lists and the GHW lists addressed in #19, only one discussion under #18 is required. If the samples for priority lists and GHW lists are different, a separate discussion of each is required, plus an explanation of why different samples were used.

- 19) **Approval Criterion:** Lists of presumptively cost-effective general heat waste (GHW) reduction weatherization materials are subject to DOE approval and must state the circumstance under which such materials may be presumed cost effective. The list of GHW materials must be shown to be cost effective in typical dwelling units for major dwelling unit types in the State based on documentation of a representative number of site-specific energy audits (in compliance with §440.21(h)). (k)

Submittal Requirement: Provide any lists of general heat waste reduction weatherization materials to be used and state the circumstance under which such materials are presumed to be cost effective. Describe how the lists were developed including the energy audit on which the lists are based. If different than the audit being submitted, describe how the audit on which the GHW list is based complies with §440.21(h). Provide documentation of a representative number of site-specific energy audits showing how these materials, in the circumstances and the amounts prescribed, was determined.

Under #18 above, describe how the representative sample of typical dwelling units was determined for the GHW list. See #18 for the discussion of representative samples.

