REFRIGERATION APPLIANCE REPLACEMENT OPERATIONS MANUAL

Iowa Weatherization Program

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1.00 INTRODUCTION

Electric baseload usage accounts for over 40 percent of a household's energy use. This includes lights, refrigerators and freezers, and other electrical appliances. The Iowa Weatherization Program allows for the straight removal of inefficient refrigerators and freezers and the replacement of inefficient refrigerators and freezers with high-efficiency units.

The program can achieve significant savings from removing or replacing inefficient refrigerators and freezers. Refrigerator and freezer replacements also have a very good savings to investment ratios.

The Department of Energy (DOE) allows for the replacement of inefficient refrigerators but not freezers. Therefore, DOE funds may be used to pay for the replacement of inefficient refrigerators but not freezers. The Iowa Weatherization Program allows for the use of HEAP funds to pay for freezer replacements. Certain utility funds may also be used to pay for freezer replacements as well as refrigerator replacements.

Developing a refrigerator/freezer replacement program involves both administrative and technical/field processes by agencies. The administrative activities include contracting with appliance vendors to provide and deliver the appliances to clients' homes and entering key information about the appliances in a software program that is used in the replacement assessment. The technical/field activities include metering the existing appliances, using a replacement protocol to determine whether it is cost-effective to replace them, and educating the clients about the benefits of removing and/or replacing the inefficient appliances.

2.00 POLICIES AND STANDARDS

2.10 Refrigerator Replacement

All refrigerators located in an intentionally or unintentionally conditioned area must be metered. Appliances in unconditioned areas may be metered and replaced if: (1) the new unit will be installed in an intentionally or unintentionally conditioned area, or (2) a 2-for-1 replacement will occur with the new unit being installed in an intentionally or unintentionally conditioned area. If a refrigerator cannot be metered because it cannot be moved, the estimated usage for that make and model may be found in the look-up table in the NEAT/MHEA Audit. Agencies must use the look up table to determine estimated usage based on make and model. All readings must be entered in WAMS.

Replacement model(s), including side-by-sides, must be Energy Star rated. The Baseload Appliance Rating Tool (BART) is used to determine whether replacing an appliance is cost-effective. Therefore, all models that are potential replacement appliances must be "run through" the BART program.

All replacement refrigerators must meet the UL-250 standard.

For situations where a straight one for one replacement is made, the replacement refrigerator must not be larger than the size of the old refrigerator. For situations where two (2) or more refrigerators will be replaced by one (1) new one or where a refrigerator and freezer will be replaced by one (1) refrigerator, the new refrigerator may be larger than the ones being replaced if needed in order to meet capacity needs.

The program will not pay extra for any additional features such as ice makers. The client is responsible for completing the hook-up of any ice maker included with a new appliance.

The color must be white or off-white, unless there is no difference in price for one of a different color. Note: Other colors are allowed if the client pays the additional cost.

2.20 Freezer Replacement

Freezer replacements are not allowed by DOE. Therefore, freezer replacements must be charged to the HEAP Contract or to a utility contract that covers the measure. Freezers may be installed when they are determined to be a cost effective replacement choice by the Baseload Rating Tool (BART) Program.

All freezers located in an intentionally or unintentionally conditioned area must be metered and those readings are to be entered into WAMS. Since there is not a look-up table available, freezers that cannot be metered are not eligible for replacement. If a freezer is not metered, the reason for not metering it should be recorded in WAMS.

Appliances in unconditioned areas may be metered and replaced if: (1) the new unit will be installed in an intentionally or unintentionally conditioned area, or (2) a 2-for-1 replacement will occur with the new unit being installed in an intentionally or unintentionally conditioned area.

Replacement freezers must be Energy Star rated only if charged to a utility contract.

2.30 General Replacement Policies

The number of appliances that may be installed is limited to what is allowed by the BART replacement protocol. For example, if a house contains two (2) refrigerators and one (1) freezer and the replacement protocol allows for the replacement of all three (3) appliances, then all three (3) may be replaced.

If a home has multiple appliances, all appliances in intentionally or unintentionally conditioned areas must be metered. If an appliance cannot be metered because it cannot be moved, the estimated usage for that make and model may be found in the look-up table in the NEAT/MHEA Audit.

Appliances in unconditioned areas may be metered and replaced if: (1) the new unit will be installed in an intentionally or unintentionally conditioned area, or (2) a 2-for-1 replacement will occur with the new unit being installed in an intentionally or unintentionally conditioned area.

If an appliance installed by the agency does not work well or fails within the first five (5) years, it may be replaced one time within the 5-year period with program funds.

Appliances located in an unheated porch or garage should still be metered and considered for replacement.

Costs for replacements are limited to what is allowed by the replacement protocol and other limitations described above.

Appliance replacement in rental units is allowed only when the renter owns the existing appliance.

Appliance repair is not allowed.

Removal and proper disposal of all replaced appliances is required.

The replacement policies and guidance cannot cover all possible situations. In some cases, common sense must be used to determine whether an appliance replacement is appropriate. For example, if a household has a second refrigerator that is seldom used or is used to store very

little, it would not make sense to replace it with a new appliance. Instead, efforts should be made to encourage the client to allow the straight removal of the appliance.

2.40 Refrigerator/Freezer Removal

Program funds may be used to pay for the straight removal and disposal of refrigerators and freezers. This is the more cost-effective of the two refrigeration appliance measures since the only cost to the program is for the removal and disposal of the appliance. There is no replacement cost.

2.50 Disposal

All refrigeration appliances that are removed from homes must be disposed of according to the environmental standards in the Clean Air Act (1990), Section 608, as amended by Final Rule, 40 CFR 82, May 14, 1993. The entity recovering the refrigerant must possess an EPA-approved Section 608 Type II license or an approved universal certification.

3.00 REFRIGERATION APPLIANCE REPLACEMENT PROTOCOL

This section addresses the processes and procedures for replacing refrigerators and freezers.

The appliance replacement protocol involves both administrative and technical/field processes. These processes rely on several tools used by both office and field personnel. A discussion of the processes and tools follows. The processes are described in the same order as the flow of work. A flowchart illustrating the workflow is in the Appendix.

3.10 Administrative Processes

3.11 Selection of Potential Replacement Appliances

The first step in the process is getting appliance vendors to agree to participate in the appliance replacement program. Agency staff need to contact appliance vendors in their area to ask them if they will participate. Vendors agreeing to participate will need to do the following:

- Provide a price quote on various brands/models and styles of refrigeration appliances.
- Guarantee the price quoted for a specified period of time.
- Agree to deliver the appliance(s) chosen to the household.
- Remove all appliances designated for removal.
- Destroy all appliances that are removed, per applicable regulations.
- Provide normal covered service on the replacement appliances after the sale.

3.11.1 Refrigeration Appliance Data Sheet

Agencies will have participating vendors complete a Refrigeration Appliance Data Sheet (Appliance Data Sheet) or other form, such as a spreadsheet. The form will be completed for each brand/model of appliance for which the vendor is providing a price quote. The form specifies the style of the appliance, the features of the appliance, the size of the appliance, etc. This information will be input into the BART Program by the agency. Some of the information will be used to show the various choices of models that could be used as replacements. Some of the information is used in determining the cost-effectiveness of replacing an appliance. A copy of the Appliance Data Sheet is in the Forms section of the Weatherization *General Appendix*.

3.11.2 Vendor Agreement

Agencies will also have participating vendors agree to and sign a Vendor Agreement which certifies that the vendor agrees to the prices quoted and to the conditions listed above. A copy of a Vendor Agreement is in the Forms section of the Weatherization *General Appendix*.

3.12 Baseload Appliance Rating Tool (BART)

Agencies enter information from the Appliance Data Sheets or other form, and the Vendor Agreements into the Baseload Appliance Rating Tool (BART). BART is an ACCESS-based software program. Once the required information is entered, BART does the following:

- Determines which appliances meet DOE requirements and are therefore eligible as replacement units.
- Calculates a replacement rating for the "replacement" units.
- Generates the Replacement Ratings Report.

Refer to the *Baseload Appliance Rating Tool (BART) Operations Manual* for instructions on using the BART Program.

3.13 Replacement Ratings Report

The Replacement Ratings Report lists the candidate replacement appliances and the appliances' specifications. It also indicates whether the appliances meet DOE requirements ("DOE qualified") and lists the replacement ratings for the appliances. The Replacement Ratings Report is used by the energy auditors to determine which appliances qualify as replacement appliances. A copy of a Replacement Ratings Report is in the Appendix.

3.13.1 DOE Qualified Appliances

The "DOE Qualified" column is used a little differently for freezers. At this time, DOE doesn't allow states to use DOE funds for freezer replacements. Therefore, BART has been set up to show an "N" in the "DOE Qualified" column for all freezers. That was done to indicate that DOE funds cannot be used to cover the cost of freezer replacements. It does not mean the freezer is not energy efficient.

BART will still calculate a replacement rating for freezers. As long as the replacement rating number is less than the annual consumption of the existing freezer, a replacement can be made using HEAP funds or certain utility funds.

3.13.2 Replacement Rating

The replacement rating is a numerical rating that is applied to the replacement (new) appliances. The rating considers the energy consumption (kWh) of the appliance, the cost of the appliance, the cost of electricity, the lifetime of the appliance, and other factors. The rating is compared to the annual consumption of the existing (old) appliance to determine whether it is cost-effective to replace the existing appliance with the new appliance.

This is mathematically equivalent to traditional cost-effectiveness analysis which compares the life cycle costs of existing and replacement items. However, instead of expressing the cost of the replacement appliance in life cycle cost, it is expressed as an equivalent annual fuel consumption or Equivalent Annual Consumption (EAC). Replacement of an appliance is cost-effective if the annual energy consumption of the existing appliance exceeds the equivalent annual consumption of the replacement unit. The equivalent annual consumption of the replacement unit is called the replacement rating.

3.20 Technical/Field Processes

Energy auditors need to have the following items with them: several line loggers (meters), Replacement Ratings Report or agency-generated report, Annual Consumption Conversion Table or TI-89 calculator, and Client Agreement forms.

Energy auditors should tell the client the usage of their refrigerator (and freezer) will be metered to determine how energy efficient it is. The client must not be promised a new refrigerator or freezer. The determination as to whether it is cost-effective to replace an existing refrigerator or freezer is based on the results of metering the existing appliance.

In order to determine whether it is cost-effective to replace an existing refrigerator or freezer, the annual energy consumption of the existing appliance has to be estimated. This is done by metering the appliance.

3.21 Determining the Total Annual Consumption of Existing Appliances

3.21.1 Metering Procedures

Every refrigerator and freezer in the house needs to be metered. That is why the energy auditor needs to have several line loggers with him/her.

The energy auditor must ensure the meter has been reset before using it. The appliance to be metered needs to be unplugged and left unplugged for a minimum of five minutes to allow the compressor pressure to be relieved. After a minimum of five minutes the appliance should be plugged into the meter and the meter then plugged in the electrical socket.

The appliance(s) must be metered for a minimum of 120 minutes (2 hours). Therefore, the energy auditor needs to record the time the logger is plugged in.

When the metering is completed, the energy auditor needs to record the kWh usage from the meter and the number of minutes the appliance was metered on the home energy audit form and on the client agreement form. This information is needed because it will be entered later in the WAMS material database.

If it's not possible to move the appliance so a meter can be installed, annual consumption information can be obtained for most older appliances by using the look-up table in the NEAT/MHEA Audit. The appliance manufacturer and model of the appliance have to be known in order to use the table.

3.21.2 Calculating the Annual Energy Consumption of the Existing Appliance

The kWh usage and number of minutes the appliance was metered are used to calculate the annual energy consumption of the appliance. This can be done using one of two methods. (1) The TI-89 calculator can be used to determine the annual energy consumption. The energy auditor can enter the usage and meter time information into the TI-89 and a program in the TI-89 will calculate the annual energy consumption. (2) The Annual Energy Consumption Conversion Table (Consumption Conversion Table) may also be used to calculate an annual energy consumption amount.

The Consumption Conversion Table is used to convert short-term metering results to an annual energy consumption amount. The table lists short-term kWh readings down the left side and minutes that the appliance was metered on the top. The energy auditor can determine what the annual kWh consumption of the existing appliance is by finding the short-term kWh reading on the table that corresponds to the meter reading, and then

following a line over to the column that contains the time (in minutes) that the appliance was metered. The number at the intersection of the short-term consumption line and the time column is the annual consumption in kWh. The Consumption Conversion Table shows the kWh numbers as 2 decimal point numbers while the line loggers show kWh numbers as 3 decimal point numbers. The energy auditor will need to round the 3 decimal kWh reading (the line logger reading) to the closest 2 decimal kWh number on the Conversion Table.

Refer to the Consumption Conversion Table, in the Appendix, to follow this example: A refrigerator is metered for 120 minutes (2 hours) and the line logger showed it used .431 kWh. Looking at the column on the conversion table that says, "Reading", find the reading for .43 (the line logger reading rounded to two digits). Move across that line until reaching the column that says, "120" (the time, in minutes, the appliance was metered). The number at the intersection of the line and column is the annual consumption. The number is 1,900. Therefore, the annual consumption for the refrigerator is 1900 kWh.

3.22 Determining if an Appliance can be Replaced

Once the annual energy consumption of the existing appliance(s) has been determined using the TI-89 or the Consumption Conversion Table, the energy auditor can determine if it is cost-effective to replace the existing appliance. This is done by comparing the annual energy consumption of the existing appliance with the replacement ratings of the replacement appliances.

The replacement ratings of the replacement appliances are found on the Replacement Ratings Report. The energy auditor reviews the replacement ratings for the appliances listed on the Replacement Ratings Report to see which appliances have a lower rating than the annual energy consumption of the existing appliance. Any appliance (or combination of appliances) may be installed as long as the replacement rating for the appliance (or total replacement rating of any combination of appliances) is less than the total annual energy consumption of the existing unit (or combination of existing units).

Following are examples that describe how the energy auditor determines whether an appliance replacement should be made. Assume an agency has four different refrigerators listed on the Replacement Ratings Report. (In real life, the variations in brand, style, and size would result in more than four appliances to choose from.) The characteristics of the four appliances are shown below (all values are made up and do not represent actual data). When determining which new appliances can be installed, the energy auditor must ensure that the new appliance will fit into the space available.

Replacement Rating Report

ID	Rating	Brand	Style	Size
R1	1140	Whirlpool	TF	16.8
R2	1180	Amana	TF	18.2
R3	1250	Frigidaire	BF	18.8
R4	1425	Kenmore	TF	20.6

Example 1

A client's refrigerator was metered for 2 hours and showed a consumption of 0.282. This short-term reading is extrapolated to an annual energy consumption rate by using the TI-89 or the Conversion Table. The extrapolated annual energy consumption rate is 1,200.

By looking at the Replacement Rating Report, above, it can be seen that it would be cost-effective to replace the existing refrigerator with either Appliance R1, which has a replacement rating of 1,140, or Appliance R2, which has a replacement rating of 1,180. Both of these ratings are less than the annual energy consumption of the existing appliance (1,200). It would not be cost-effective to replace the existing refrigerator with either Appliance R3 or R4, since their replacement ratings are greater than the annual energy consumption of the existing refrigerator.

Example 2

The client has two appliances. The two units were metered for 2 hours, and showed consumption values of 0.252 and 0.180. These values are extrapolated to annual energy consumption rates using the TI-89 or the Conversion Table. The extrapolated rates are 1,104 kWh and 788 kWh, respectively. The total annual energy consumption of these two units is 1,892 (1,104 + 788).

In this example, neither of the existing refrigerators can be exchanged for any of the replacement units because the replacement rating for each of the replacement refrigerators exceeds the annual energy consumption for each of the existing units (1,104 and 788). However, a replacement refrigerator can be installed if both of the existing units are removed because the replacement rating of any of the refrigerators listed is less than the total annual energy consumption of the existing units (1,892). This could be a case where the client would agree to have the two refrigerators replaced by a larger more efficient unit.

3.23 Client Agreement

Once the energy auditor determines whether an appliance or a combination of appliances can cost-effectively be replaced by a new appliance(s), the energy auditor will discuss the possibility with the client. It may be possible to propose various combinations of appliances to be replaced. Greater energy savings are realized if multiple appliances can be replaced with one appliance.

If the client agrees to a replacement of an appliance or a combination of appliances, the energy auditor will complete the Client Agreement Form and have the client sign the form. The Client Agreement Form lists the existing appliances that will be replaced and the new appliances that will be installed. The Client Agreement Form is on 3-part NCR paper. One copy of the form is given to the client, one copy is given to the appliance vendor, and one copy is retained by the agency.

A copy of the Client Agreement Form is in the Forms section of the Weatherization *General Appendix*.

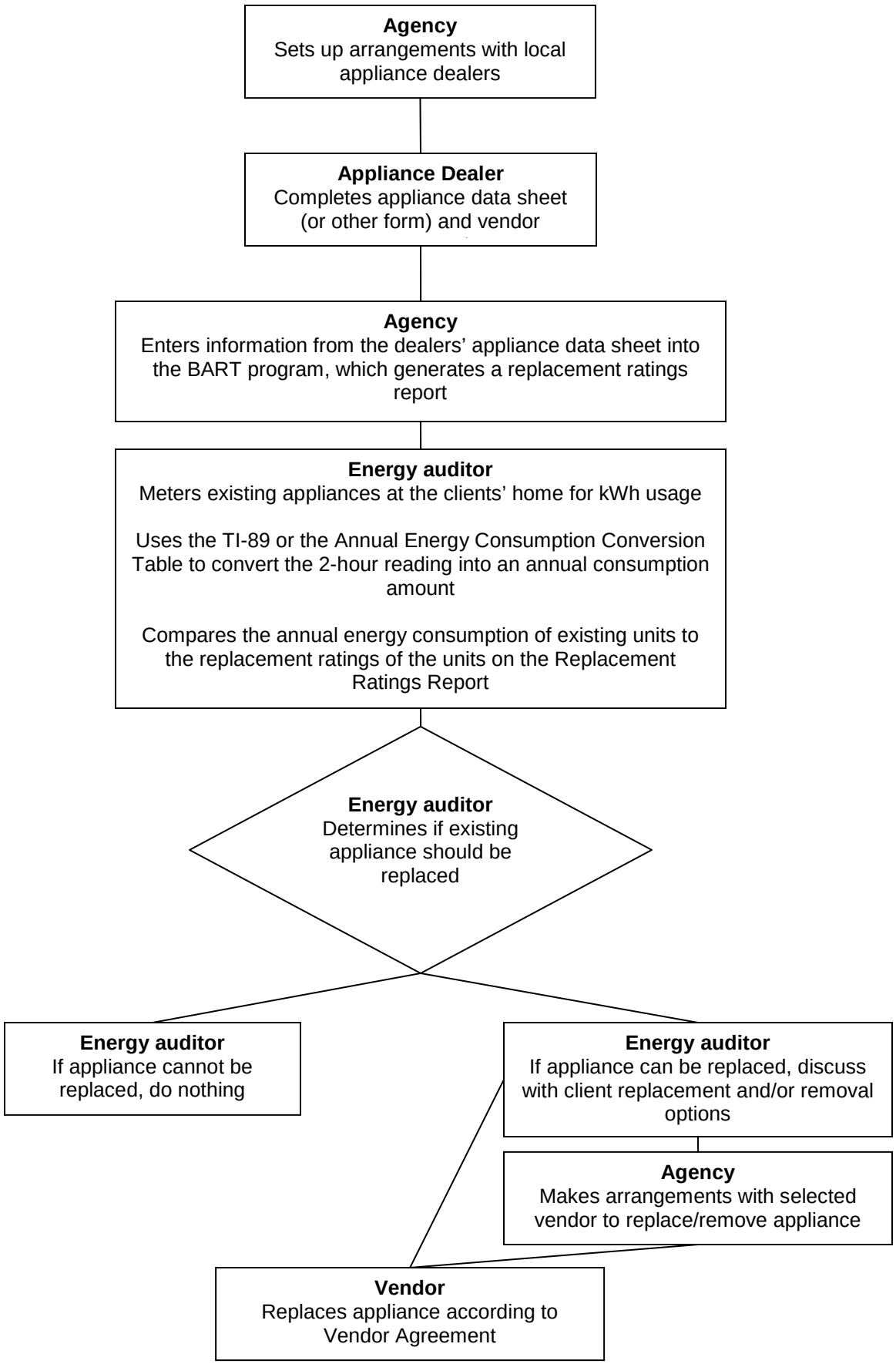
3.24 Order Appliance

The agency will make arrangements with the appropriate vendor to deliver the appliance that was specified as a replacement and to remove and destroy the “old” appliance. When making the arrangements with the vendor, the agency will ensure the vendor understands which existing appliances are to be removed and destroyed.

4.00 REFRIGERATION APPLIANCE REMOVAL PROTOCOL

The procedure for the straight removal of inefficient refrigeration appliances consists of explaining to the client the benefits of removing an appliance that is not used or is seldom used. By metering the appliance, the energy auditor can estimate how much the client can save each year by removing the appliance.

APPENDIX


Agency
Sets up arrangements with local appliance dealers
Appliance Dealer
Completes appliance data sheet (or other form) and vendor
Agency
Enters information from the dealers' appliance data sheet into the BART program, which generates a replacement ratings report
Energy auditor
Meters existing appliances at the clients' home for kWh usage
Uses the TI-89 or the Annual Energy Consumption Conversion Table to convert the 2-hour reading into an annual consumption amount
Compares the annual energy consumption of existing units to the replacement ratings of the units on the Replacement Ratings Report
Energy auditor
Determines if existing appliance should be replaced
Energy auditor
If appliance cannot be replaced, do nothing
Energy auditor
If appliance can be replaced, discuss with client replacement and/or removal options
Agency
Makes arrangements with selected vendor to replace/remove appliance
Vendor
Replaces appliance according to Vendor Agreement

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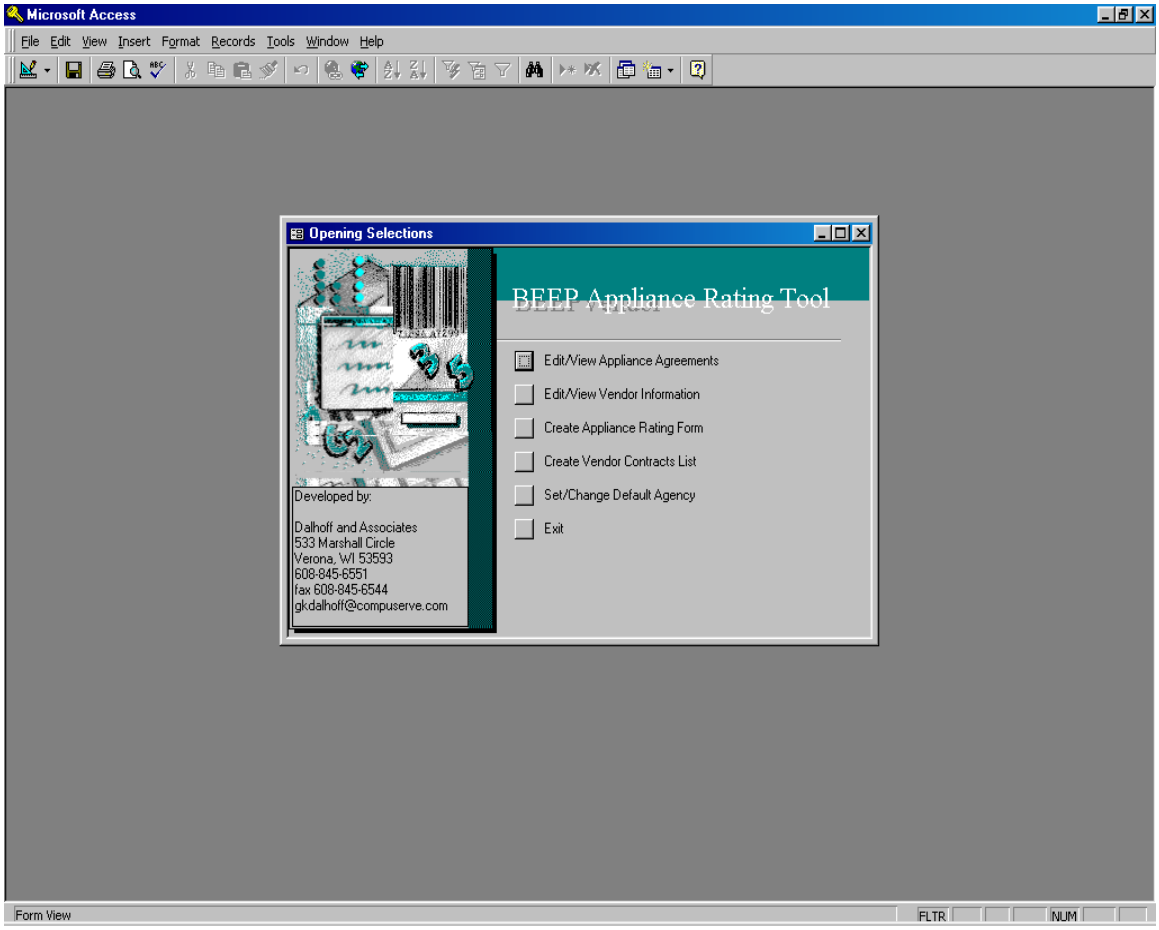
BEEP Appliance Rating Tool

We developed the BEEP Appliance Rating Tool (BART) to simplify calculating the BEEP rating and to allow the user to print the BEEP Ratings Report[1].

BART should be installed in c:\BART so that WAMS can find it easily.

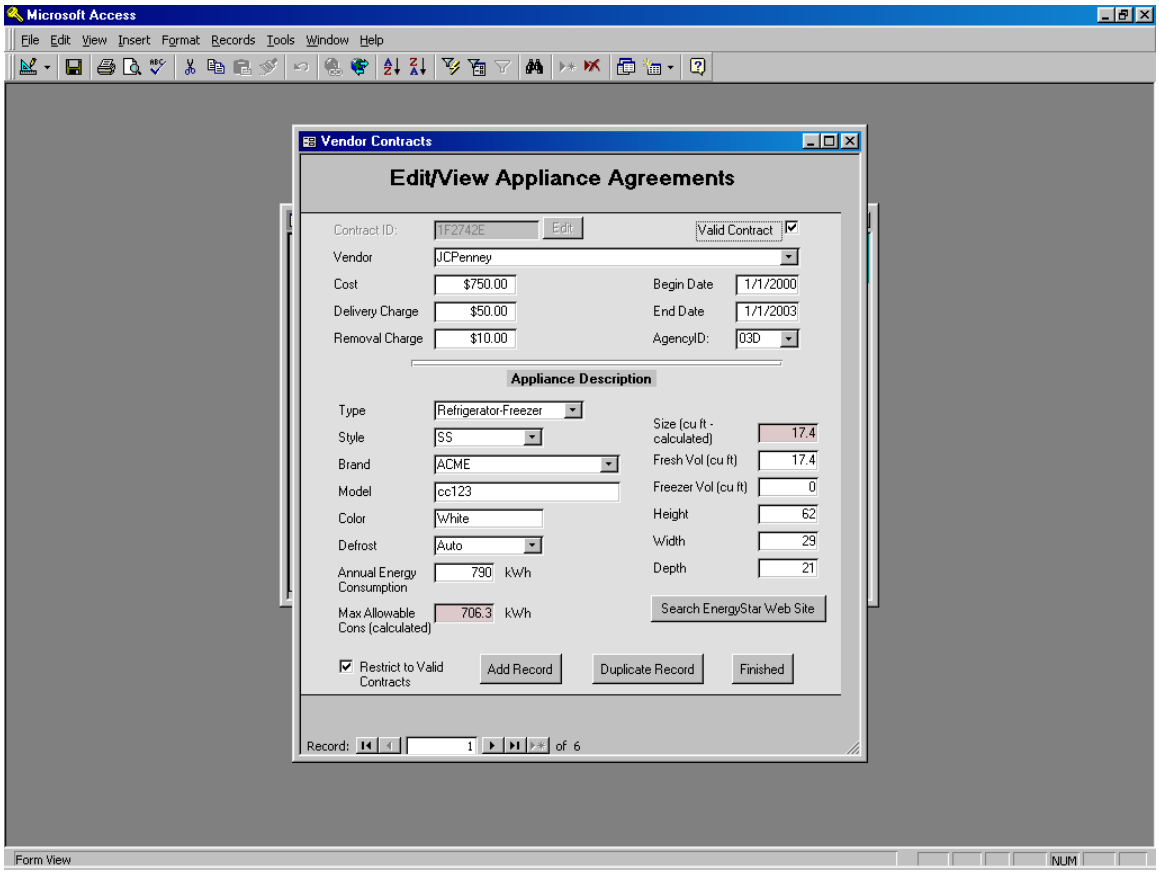
The opening screen has six choices:



[1] The BEEP Rating Tool is provided as an Access executable (.mde) file.

Edit/View Appliance Agreements Menu Item

The first selection, Edit/View Appliance Agreements, opens the screen below. Basic vendor agreement and appliance data is entered on this screen. This data is used for creating the BEEP Rating Report. All of the data is required, except for the beginning and end dates for the agreement, and the color of the appliance.



The Max Allowable Consumption is calculated for DOE qualified refrigerators (top and bottom mounted refrigerators, and side by side refrigerators, all without through-the-door ice service). It is set for 9,999 for all freezers and non-qualified refrigerators.

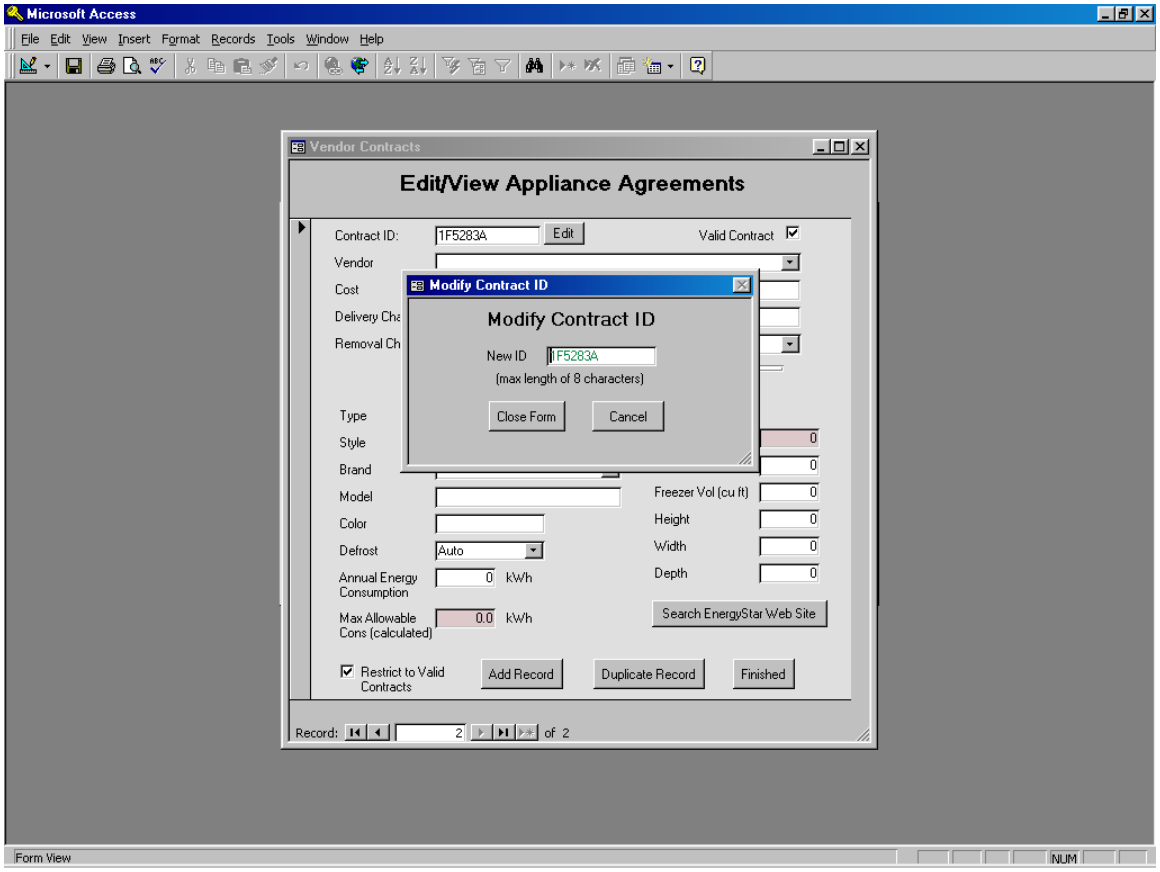
The user can add new Vendor/Appliance combinations by clicking the 'Add Record' or 'Duplicate Record' buttons. In each case, a unique Contract ID is assigned. A blank record is created if the 'Add Record' button is used, and all data (with the exception of the Contract ID) is copied if the 'Duplicate Record' button is clicked.

If a contract is no longer valid, uncheck the 'Valid Contract' checkbox. Unchecking this box will prevent this record from appearing in the BEEP Rating reports. It will continue to be shown in this screen however, unless the checkbox in the lower left corner 'Restrict to Valid Contracts' is checked.

The button "Search Energy Star Website" will launch the web browser and take you to Energy Star refrigerator search page.

Contract ID

The Contract ID is automatically created when a new record is added (either using the 'Add Record' or the 'Duplicate Record' buttons). A unique ID is used for each Vendor/Appliance combination. The user can edit the Contract ID by clicking the 'Edit' button next to the 'Contract ID'. Clicking the 'Edit' button opens the 'Modify Contract ID' dialog box (See next figure).



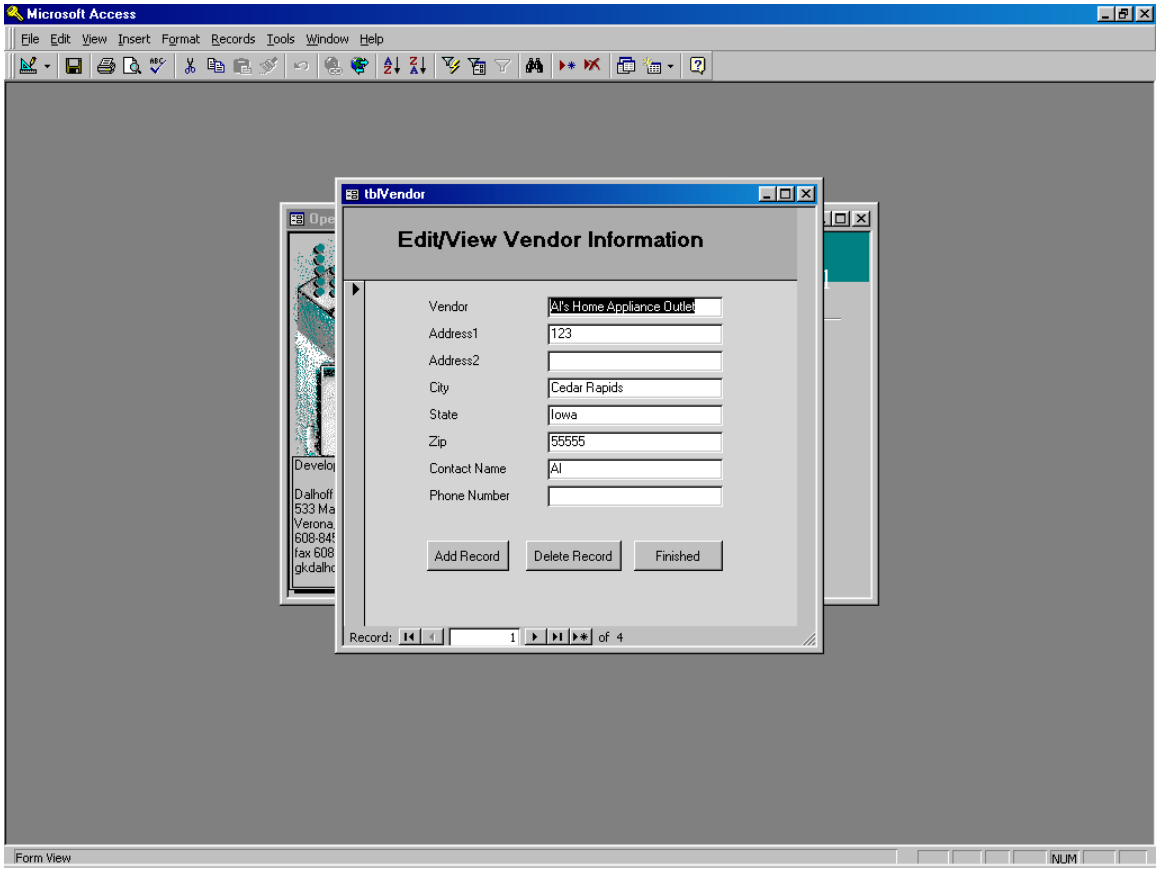
The color of the text in the 'New ID' box is green if the ID is unique, otherwise the text is red. The modified ID will not be saved unless the ID is unique: a warning appears if the user attempts to assign a duplicate Contract ID.

Pressing the 'Cancel' button will revert to the original ID.

The BEEP Rating Tool is provided with a blank record with the ID 'PlacHldr'. The user will probably wish to uncheck the 'Valid Contract' checkbox for this record, *but this should not be done until the user has added a new record to the database with either the 'Add Record' or 'Duplicate Record' buttons.*

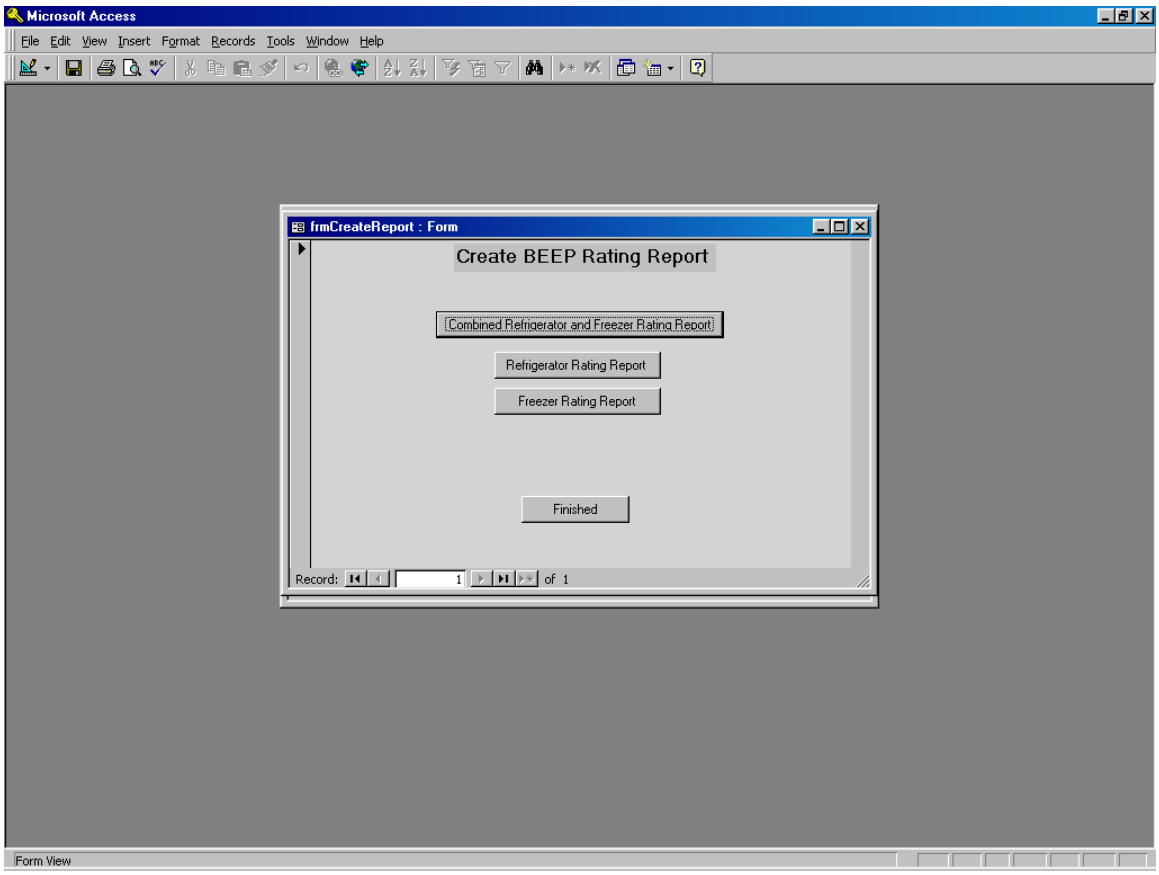
Edit/View Vendor Information Menu Item

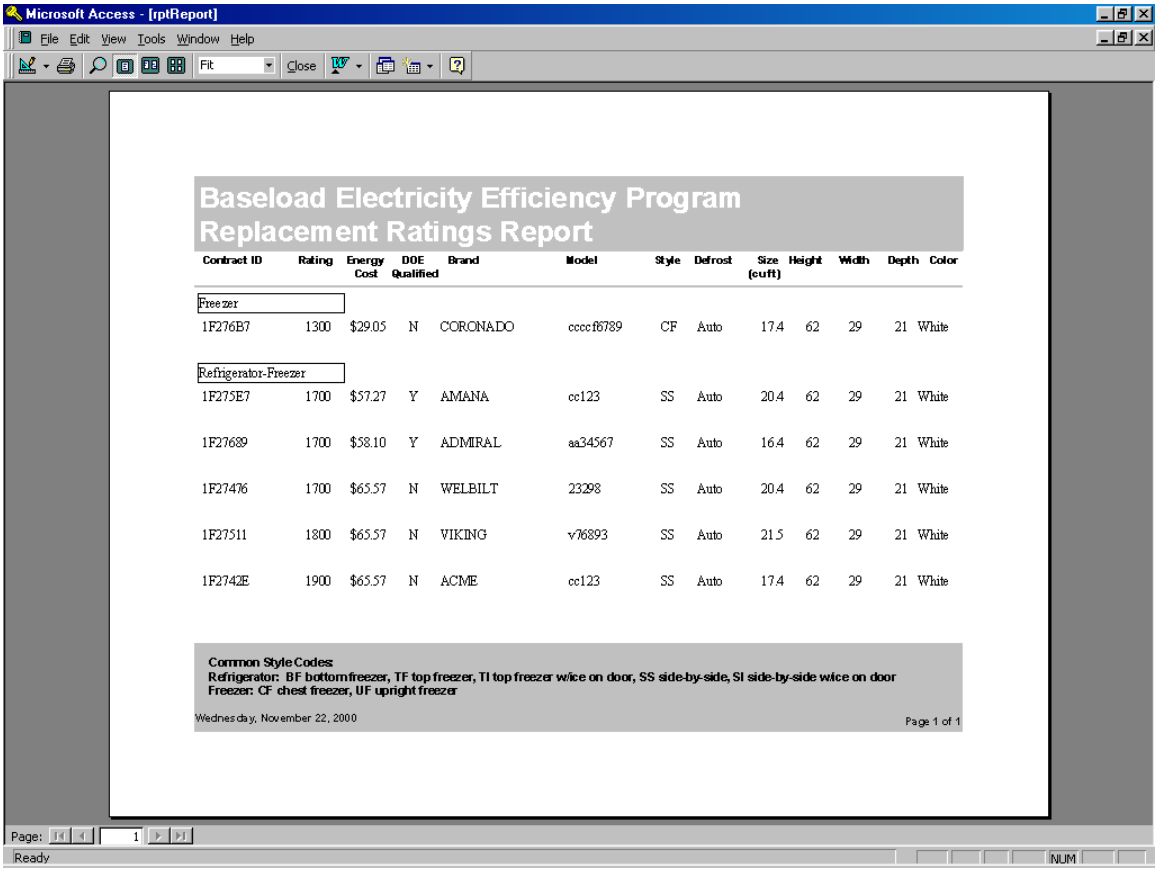
Vendor information is entered in if the Edit/View Vendor Information item is selected in the main menu. These data are optional, with the exception of the Vendor Name.



Create BEEP Rating Form

The third menu item. 'Create BEEP Rating Form', opens a form to specify if a report should be created refrigerators, freezers, or both. Selecting any of these buttons launches a preview of the BEEP Replacement Ratings form (shown on the following page). The ratings report can be printed from the preview screen.





Baseload Electricity Efficiency Program
Replacement Ratings Report

Contract ID	Rating	Energy Cost	DOE Qualified	Brand	Model	Style	Defrost	Size (cuft)	Height	Width	Depth	Color
Freezer												
1F276B7	1300	$29.05	N	CORONADO	ccccf6789	CF	Auto	17.4	62	29	21	White
Refrigerator-Freezer												
1F275E7	1700	$57.27	Y	AMANA	cc123	SS	Auto	20.4	62	29	21	White
1F27689	1700	$58.10	Y	ADMIRAL	aa34567	SS	Auto	16.4	62	29	21	White
1F27476	1700	$65.57	N	WELBILT	23298	SS	Auto	20.4	62	29	21	White
1F27511	1800	$65.57	N	VIKING	v76893	SS	Auto	21.5	62	29	21	White
1F2742E	1900	$65.57	N	ACME	cc123	SS	Auto	17.4	62	29	21	White

Common Style Codes:
Refrigerator: BF bottom freezer, TF top freezer, TI top freezer w/ice on door, SS side-by-side, SI side-by-side w/ice on door
Freezer: CF chest freezer, UF upright freezer

Wednesday, November 22, 2000

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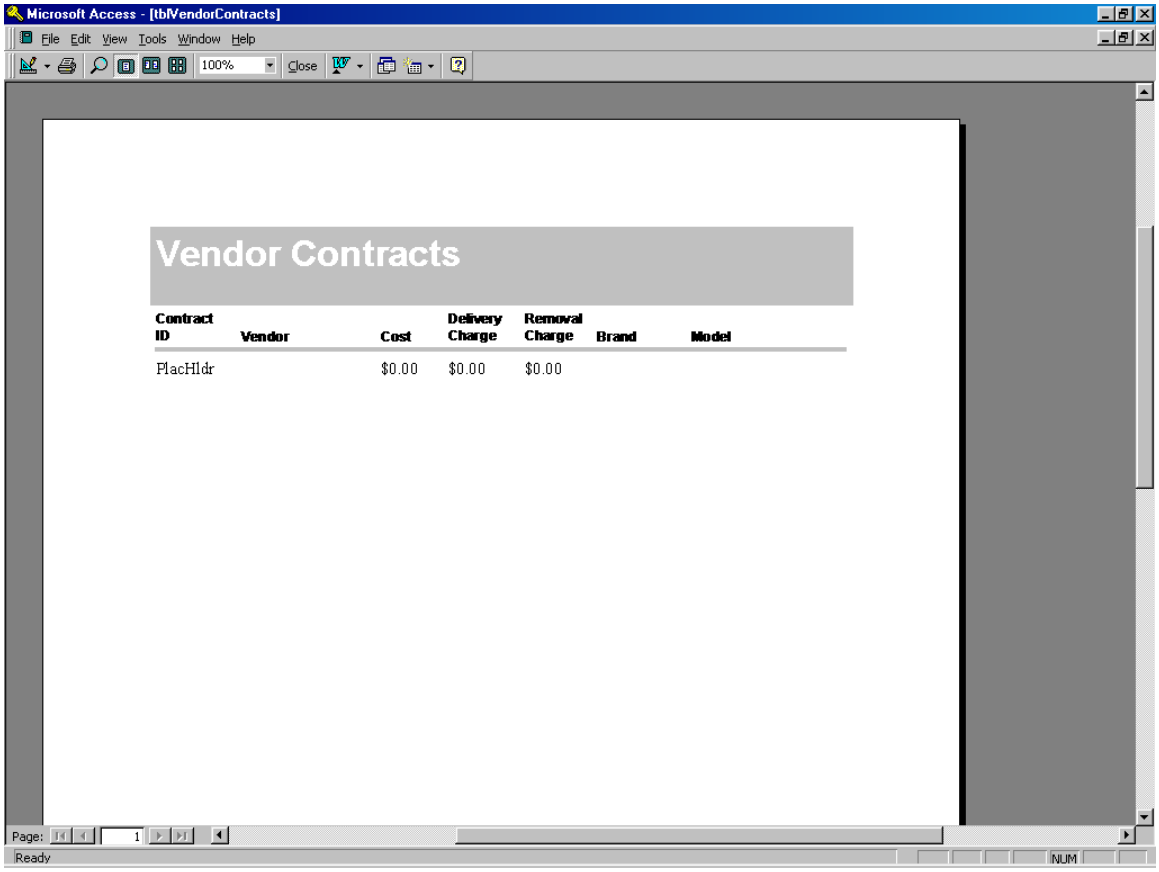
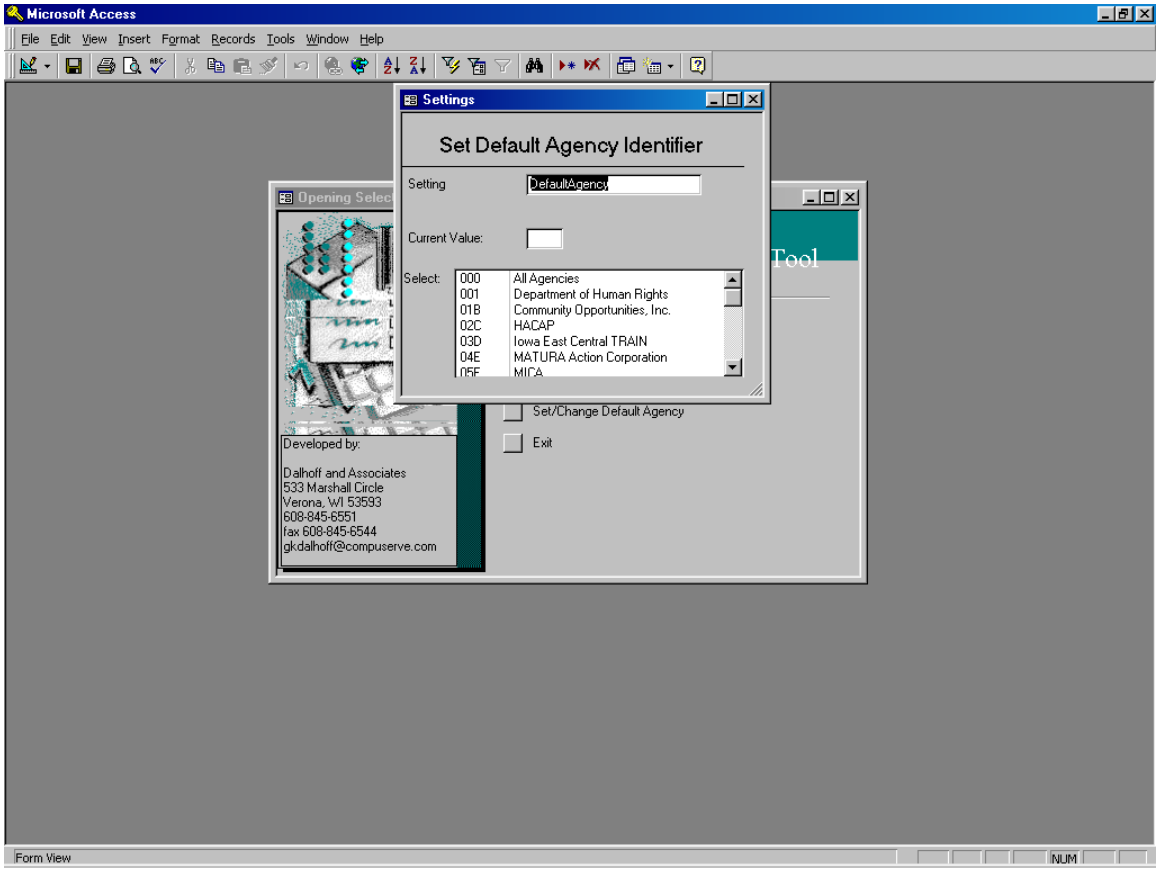
Create Vendor Contract List Menu Item

The fourth menu item, 'Create Vendor Contract List', opens a screen with a list of vendor contracts. An example (with only the initial placeholder Contract ID) is shown below:



Set/Change Default Agency

The fifth menu item, 'Set/Change Default Agency', opens the following screen:



Simply select one of the agencies in the box, and then click the 'X' in the upper right corner to close the form. This form will open each time the tool is started until a default agency is assigned. Note that the form might be partially hidden behind the main menu, in which case you can bring it forward by either selecting the menu item or by clicking on the part of the form that is exposed from behind the menu.

The 'Default Agency ID' is used to assign the agency id whenever the 'Add Record' button on the 'Edit/View Vendor Agreements' screen is clicked.

Economic and Program Cost Assumptions

A table with economic assumptions is used by the BEEP Rating System; however we do not provide access to it through menus. The table contains the values of parameters for the life cycle cost calculation (used by the BEEP Rating calculation). The table of these parameters is shown below:

Parameter	Abbreviation	Value
Administration Cost	Adm	0
Support Cost	Sup	0
Appliance Service Lifetime	LC	15
Uncertainty Factor	UF	1.0
Discount Rate	DR	0.05
Electricity Cost	FC	0.083
Administration Cost Multiplier	ACM	0
Support Cost Multiplier	SCM	0.05
Fuel Escalation Rate	FE	0.00

Administration and support costs may be calculated in two ways. The parameters Adm and Sup are fixed values per appliance. The parameters ACM and SCM are meant to be used as fractional multipliers applied to the cost of the appliances (e.g., if ACM is 0.25, the administration cost is calculated as 25% of the appliance cost). You can use the fixed and multiplier methods separately or together.

Appliance Service Lifetime: The projected duration of savings for the replacement appliances.

Uncertainty Factor: This is a multiplier on the annual energy consumption of the replacement unit. Values greater than 1.0 increase the BEEP rating. Values less than 1.0 decrease the BEEP rating. This factor is used to reduce the attractiveness of higher energy use replacement appliances.

Discount rate: Used to assess the time value of future energy consumption. Five percent is typically used for a societal discount rate.

Fuel escalation rate: The annual rate of fuel price change over the life of the appliances.

Electricity cost: The cost per KWH

Energy Consumption Conversion Table

Read-ing	Minutes 100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.01	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.02	100	100	100	100	100	100	100	100	100	100	100	100	0	0	0
0.03	200	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0.04	200	200	200	200	200	100	100	100	100	100	100	100	100	100	100
0.05	300	200	200	200	200	200	200	200	100	100	100	100	100	100	100
0.06	300	300	300	200	200	200	200	200	200	200	200	200	100	100	100
0.07	400	300	300	300	300	200	200	200	200	200	200	200	200	200	200
0.08	400	400	400	300	300	300	300	200	200	200	200	200	200	200	200
0.09	500	400	400	400	300	300	300	300	300	200	200	200	200	200	200
0.10	500	500	400	400	400	400	300	300	300	300	300	300	200	200	200
0.11	600	500	500	400	400	400	400	300	300	300	300	300	300	300	200
0.12	600	600	500	500	500	400	400	400	400	300	300	300	300	300	300
0.13	700	600	600	500	500	500	400	400	400	400	300	300	300	300	300
0.14	700	700	600	600	500	500	500	400	400	400	400	400	300	300	300
0.15	800	700	700	600	600	500	500	500	400	400	400	400	400	300	300
0.16	800	800	700	600	600	600	500	500	500	400	400	400	400	400	400
0.17	900	800	700	700	600	600	600	500	500	500	400	400	400	400	400
0.18	900	900	800	700	700	600	600	600	500	500	500	500	400	400	400
0.19	1,000	900	800	800	700	700	600	600	600	500	500	500	500	400	400
0.20	1,100	1,000	900	800	800	700	700	600	600	600	500	500	500	500	400
0.21	1,100	1,000	900	800	800	700	700	600	600	600	600	500	500	500	500
0.22	1,200	1,100	1,000	900	800	800	700	700	600	600	600	600	500	500	500
0.23	1,200	1,100	1,000	900	900	800	800	700	700	600	600	600	500	500	500
0.24	1,300	1,100	1,100	1,000	900	800	800	700	700	700	600	600	600	500	500
0.25	1,300	1,200	1,100	1,000	900	900	800	800	700	700	700	600	600	600	500
0.26	1,400	1,200	1,100	1,100	1,000	900	900	800	800	700	700	700	600	600	600
0.27	1,400	1,300	1,200	1,100	1,000	900	900	800	800	700	700	700	600	600	600
0.28	1,500	1,300	1,200	1,100	1,100	1,000	900	900	800	800	700	700	700	600	600
0.29	1,500	1,400	1,300	1,200	1,100	1,000	1,000	900	800	800	800	700	700	700	600
0.30	1,600	1,400	1,300	1,200	1,100	1,100	1,000	900	900	800	800	800	700	700	700
0.31	1,600	1,500	1,400	1,300	1,200	1,100	1,000	1,000	900	900	800	800	700	700	700
0.32	1,700	1,500	1,400	1,300	1,200	1,100	1,100	1,000	900	900	800	800	800	700	700
0.33	1,700	1,600	1,400	1,300	1,200	1,200	1,100	1,000	1,000	900	900	800	800	800	700
0.34	1,800	1,600	1,500	1,400	1,300	1,200	1,100	1,100	1,000	900	900	900	800	800	700
0.35	1,800	1,700	1,500	1,400	1,300	1,200	1,100	1,100	1,000	1,000	900	900	800	800	800
0.36	1,900	1,700	1,600	1,500	1,400	1,300	1,200	1,100	1,100	1,000	900	900	900	800	800
0.37	1,900	1,800	1,600	1,500	1,400	1,300	1,200	1,100	1,100	1,000	1,000	900	900	800	800
0.38	2,000	1,800	1,700	1,500	1,400	1,300	1,200	1,200	1,100	1,100	1,000	1,000	900	900	800
0.39	2,000	1,900	1,700	1,600	1,500	1,400	1,300	1,200	1,100	1,100	1,000	1,000	900	900	900
0.40	2,100	1,900	1,800	1,600	1,500	1,400	1,300	1,200	1,200	1,100	1,100	1,000	1,000	900	900

Energy Consumption Conversion Table

Read-ing	Minutes 100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
0.41	2,200	2,000	1,800	1,700	1,500	1,400	1,300	1,300	1,200	1,100	1,100	1,000	1,000	900	900
0.42	2,200	2,000	1,800	1,700	1,600	1,500	1,400	1,300	1,200	1,200	1,100	1,100	1,000	1,000	900
0.43	2,300	2,100	1,900	1,700	1,600	1,500	1,400	1,300	1,300	1,200	1,100	1,100	1,000	1,000	900
0.44	2,300	2,100	1,900	1,800	1,700	1,500	1,400	1,400	1,300	1,200	1,200	1,100	1,100	1,000	1,000
0.45	2,400	2,200	2,000	1,800	1,700	1,600	1,500	1,400	1,300	1,200	1,200	1,100	1,100	1,000	1,000
0.46	2,400	2,200	2,000	1,900	1,700	1,600	1,500	1,400	1,300	1,300	1,200	1,200	1,100	1,100	1,000
0.47	2,500	2,200	2,100	1,900	1,800	1,600	1,500	1,500	1,400	1,300	1,200	1,200	1,100	1,100	1,000
0.48	2,500	2,300	2,100	1,900	1,800	1,700	1,600	1,500	1,400	1,300	1,300	1,200	1,100	1,100	1,100
0.49	2,600	2,300	2,100	2,000	1,800	1,700	1,600	1,500	1,400	1,400	1,300	1,200	1,200	1,100	1,100
0.50	2,600	2,400	2,200	2,000	1,900	1,800	1,600	1,500	1,500	1,400	1,300	1,300	1,200	1,100	1,100
0.51	2,700	2,400	2,200	2,100	1,900	1,800	1,700	1,600	1,500	1,400	1,300	1,300	1,200	1,200	1,100
0.52	2,700	2,500	2,300	2,100	2,000	1,800	1,700	1,600	1,500	1,400	1,400	1,300	1,200	1,200	1,100
0.53	2,800	2,500	2,300	2,100	2,000	1,900	1,700	1,600	1,500	1,500	1,400	1,300	1,300	1,200	1,200
0.54	2,800	2,600	2,400	2,200	2,000	1,900	1,800	1,700	1,600	1,500	1,400	1,400	1,300	1,200	1,200
0.55	2,900	2,600	2,400	2,200	2,100	1,900	1,800	1,700	1,600	1,500	1,400	1,400	1,300	1,300	1,200
0.56	2,900	2,700	2,500	2,300	2,100	2,000	1,800	1,700	1,600	1,500	1,500	1,400	1,300	1,300	1,200
0.57	3,000	2,700	2,500	2,300	2,100	2,000	1,900	1,800	1,700	1,600	1,500	1,400	1,400	1,300	1,200
0.58	3,000	2,800	2,500	2,300	2,200	2,000	1,900	1,800	1,700	1,600	1,500	1,500	1,400	1,300	1,300
0.59	3,100	2,800	2,600	2,400	2,200	2,100	1,900	1,800	1,700	1,600	1,600	1,500	1,400	1,300	1,300
0.60	3,200	2,900	2,600	2,400	2,300	2,100	2,000	1,900	1,800	1,700	1,600	1,500	1,400	1,400	1,300
0.61	3,200	2,900	2,700	2,500	2,300	2,100	2,000	1,900	1,800	1,700	1,600	1,500	1,500	1,400	1,300
0.62	3,300	3,000	2,700	2,500	2,300	2,200	2,000	1,900	1,800	1,700	1,600	1,600	1,500	1,400	1,400
0.63	3,300	3,000	2,800	2,500	2,400	2,200	2,100	1,900	1,800	1,700	1,700	1,600	1,500	1,400	1,400
0.64	3,400	3,100	2,800	2,600	2,400	2,200	2,100	2,000	1,900	1,800	1,700	1,600	1,500	1,500	1,400
0.65	3,400	3,100	2,800	2,600	2,400	2,300	2,100	2,000	1,900	1,800	1,700	1,600	1,600	1,500	1,400
0.66	3,500	3,200	2,900	2,700	2,500	2,300	2,200	2,000	1,900	1,800	1,700	1,700	1,600	1,500	1,400
0.67	3,500	3,200	2,900	2,700	2,500	2,300	2,200	2,100	2,000	1,900	1,800	1,700	1,600	1,500	1,500
0.68	3,600	3,200	3,000	2,700	2,600	2,400	2,200	2,100	2,000	1,900	1,800	1,700	1,600	1,600	1,500
0.69	3,600	3,300	3,000	2,800	2,600	2,400	2,300	2,100	2,000	1,900	1,800	1,700	1,600	1,600	1,500
0.70	3,700	3,300	3,100	2,800	2,600	2,500	2,300	2,200	2,000	1,900	1,800	1,800	1,700	1,600	1,500
0.71	3,700	3,400	3,100	2,900	2,700	2,500	2,300	2,200	2,100	2,000	1,900	1,800	1,700	1,600	1,600
0.72	3,800	3,400	3,200	2,900	2,700	2,500	2,400	2,200	2,100	2,000	1,900	1,800	1,700	1,600	1,600
0.73	3,800	3,500	3,200	3,000	2,700	2,600	2,400	2,300	2,100	2,000	1,900	1,800	1,700	1,700	1,600
0.74	3,900	3,500	3,200	3,000	2,800	2,600	2,400	2,300	2,200	2,000	1,900	1,900	1,800	1,700	1,600
0.75	3,900	3,600	3,300	3,000	2,800	2,600	2,500	2,300	2,200	2,100	2,000	1,900	1,800	1,700	1,600
0.76	4,000	3,600	3,300	3,100	2,900	2,700	2,500	2,300	2,200	2,100	2,000	1,900	1,800	1,700	1,700
0.77	4,000	3,700	3,400	3,100	2,900	2,700	2,500	2,400	2,200	2,100	2,000	1,900	1,800	1,800	1,700
0.78	4,100	3,700	3,400	3,200	2,900	2,700	2,600	2,400	2,300	2,200	2,000	2,000	1,900	1,800	1,700
0.79	4,200	3,800	3,500	3,200	3,000	2,800	2,600	2,400	2,300	2,200	2,100	2,000	1,900	1,800	1,700
0.80	4,200	3,800	3,500	3,200	3,000	2,800	2,600	2,500	2,300	2,200	2,100	2,000	1,900	1,800	1,800

Energy Consumption Conversion Table

Read-ing	Minutes 100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
0.81	4,300	3,900	3,500	3,300	3,000	2,800	2,700	2,500	2,400	2,200	2,100	2,000	1,900	1,900	1,800
0.82	4,300	3,900	3,600	3,300	3,100	2,900	2,700	2,500	2,400	2,300	2,200	2,100	2,000	1,900	1,800
0.83	4,400	4,000	3,600	3,400	3,100	2,900	2,700	2,600	2,400	2,300	2,200	2,100	2,000	1,900	1,800
0.84	4,400	4,000	3,700	3,400	3,200	2,900	2,800	2,600	2,500	2,300	2,200	2,100	2,000	1,900	1,800
0.85	4,500	4,100	3,700	3,400	3,200	3,000	2,800	2,600	2,500	2,400	2,200	2,100	2,000	1,900	1,900
0.86	4,500	4,100	3,800	3,500	3,200	3,000	2,800	2,700	2,500	2,400	2,300	2,200	2,100	2,000	1,900
0.87	4,600	4,200	3,800	3,500	3,300	3,000	2,900	2,700	2,500	2,400	2,300	2,200	2,100	2,000	1,900
0.88	4,600	4,200	3,900	3,600	3,300	3,100	2,900	2,700	2,600	2,400	2,300	2,200	2,100	2,000	1,900
0.89	4,700	4,300	3,900	3,600	3,300	3,100	2,900	2,800	2,600	2,500	2,300	2,200	2,100	2,000	1,900
0.90	4,700	4,300	3,900	3,600	3,400	3,200	3,000	2,800	2,600	2,500	2,400	2,300	2,200	2,100	2,000
0.91	4,800	4,300	4,000	3,700	3,400	3,200	3,000	2,800	2,700	2,500	2,400	2,300	2,200	2,100	2,000
0.92	4,800	4,400	4,000	3,700	3,500	3,200	3,000	2,800	2,700	2,500	2,400	2,300	2,200	2,100	2,000
0.93	4,900	4,400	4,100	3,800	3,500	3,300	3,100	2,900	2,700	2,600	2,400	2,300	2,200	2,100	2,000
0.94	4,900	4,500	4,100	3,800	3,500	3,300	3,100	2,900	2,700	2,600	2,500	2,400	2,200	2,100	2,100
0.95	5,000	4,500	4,200	3,800	3,600	3,300	3,100	2,900	2,800	2,600	2,500	2,400	2,300	2,200	2,100
0.96	5,000	4,600	4,200	3,900	3,600	3,400	3,200	3,000	2,800	2,700	2,500	2,400	2,300	2,200	2,100
0.97	5,100	4,600	4,200	3,900	3,600	3,400	3,200	3,000	2,800	2,700	2,500	2,400	2,300	2,200	2,100
0.98	5,200	4,700	4,300	4,000	3,700	3,400	3,200	3,000	2,900	2,700	2,600	2,500	2,300	2,200	2,100
0.99	5,200	4,700	4,300	4,000	3,700	3,500	3,300	3,100	2,900	2,700	2,600	2,500	2,400	2,300	2,200
1.00	5,300	4,800	4,400	4,000	3,800	3,500	3,300	3,100	2,900	2,800	2,600	2,500	2,400	2,300	2,200
1.01	5,300	4,800	4,400	4,100	3,800	3,500	3,300	3,100	2,900	2,800	2,700	2,500	2,400	2,300	2,200
1.02	5,400	4,900	4,500	4,100	3,800	3,600	3,400	3,200	3,000	2,800	2,700	2,600	2,400	2,300	2,200
1.03	5,400	4,900	4,500	4,200	3,900	3,600	3,400	3,200	3,000	2,800	2,700	2,600	2,500	2,400	2,300
1.04	5,500	5,000	4,600	4,200	3,900	3,600	3,400	3,200	3,000	2,900	2,700	2,600	2,500	2,400	2,300
1.05	5,500	5,000	4,600	4,200	3,900	3,700	3,400	3,200	3,100	2,900	2,800	2,600	2,500	2,400	2,300
1.06	5,600	5,100	4,600	4,300	4,000	3,700	3,500	3,300	3,100	2,900	2,800	2,700	2,500	2,400	2,300
1.07	5,600	5,100	4,700	4,300	4,000	3,700	3,500	3,300	3,100	3,000	2,800	2,700	2,600	2,400	2,300
1.08	5,700	5,200	4,700	4,400	4,100	3,800	3,500	3,300	3,200	3,000	2,800	2,700	2,600	2,500	2,400
1.09	5,700	5,200	4,800	4,400	4,100	3,800	3,600	3,400	3,200	3,000	2,900	2,700	2,600	2,500	2,400
1.10	5,800	5,300	4,800	4,400	4,100	3,900	3,600	3,400	3,200	3,000	2,900	2,800	2,600	2,500	2,400
1.11	5,800	5,300	4,900	4,500	4,200	3,900	3,600	3,400	3,200	3,100	2,900	2,800	2,700	2,500	2,400
1.12	5,900	5,400	4,900	4,500	4,200	3,900	3,700	3,500	3,300	3,100	2,900	2,800	2,700	2,600	2,500
1.13	5,900	5,400	4,900	4,600	4,200	4,000	3,700	3,500	3,300	3,100	3,000	2,800	2,700	2,600	2,500
1.14	6,000	5,400	5,000	4,600	4,300	4,000	3,700	3,500	3,300	3,200	3,000	2,900	2,700	2,600	2,500
1.15	6,000	5,500	5,000	4,600	4,300	4,000	3,800	3,600	3,400	3,200	3,000	2,900	2,700	2,600	2,500
1.16	6,100	5,500	5,100	4,700	4,400	4,100	3,800	3,600	3,400	3,200	3,000	2,900	2,800	2,700	2,500
1.17	6,100	5,600	5,100	4,700	4,400	4,100	3,800	3,600	3,400	3,200	3,100	2,900	2,800	2,700	2,600
1.18	6,200	5,600	5,200	4,800	4,400	4,100	3,900	3,600	3,400	3,300	3,100	3,000	2,800	2,700	2,600
1.19	6,300	5,700	5,200	4,800	4,500	4,200	3,900	3,700	3,500	3,300	3,100	3,000	2,800	2,700	2,600
1.20	6,300	5,700	5,300	4,900	4,500	4,200	3,900	3,700	3,500	3,300	3,200	3,000	2,900	2,700	2,600

BEEP APPLIANCE RATING TOOL (BART) OPERATIONS MANUAL

Iowa Weatherization Program

Department of Human Rights
Division of Community Action Agencies
Lucas State Office Building, 2nd Floor
Des Moines, Iowa 50319
Website: www.weatherization.iowa.gov

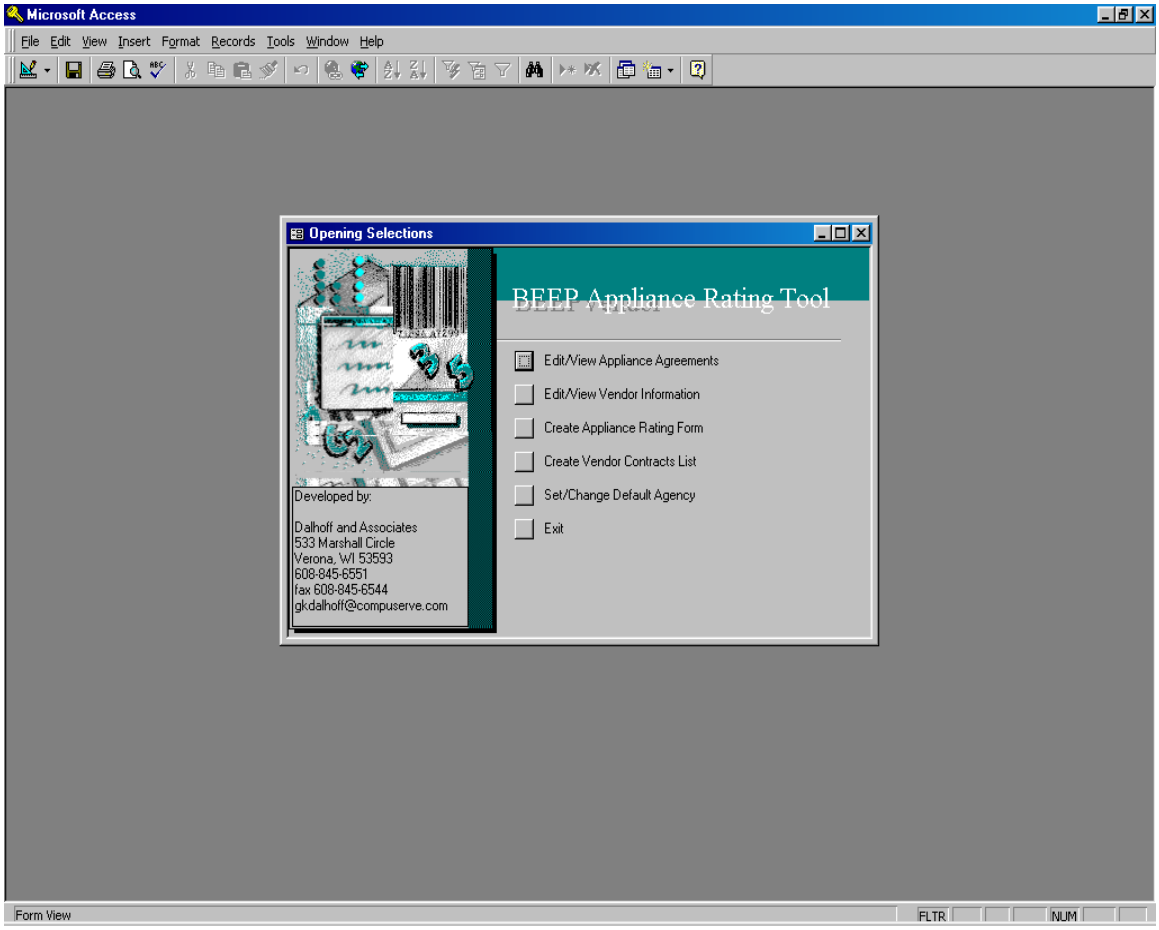
Table of Contents

BEEP Appliance Rating Tool

We developed the BEEP Appliance Rating Tool (BART) to simplify calculating the BEEP rating and to allow the user to print the BEEP Ratings Report[1].

BART should be installed in c:\BART so that WAMS can find it easily.

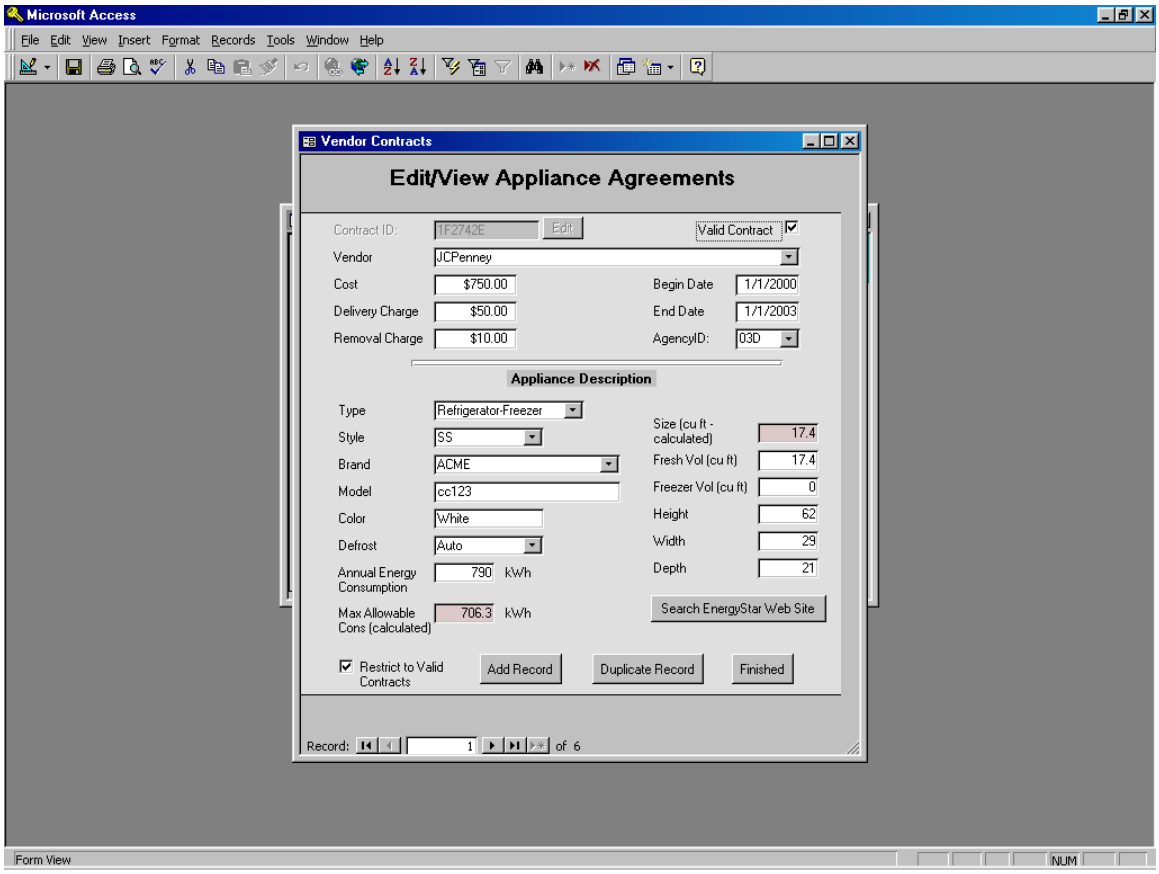
The opening screen has six choices:



[1] The BEEP Rating Tool is provided as an Access executable (.mde) file.

Edit/View Appliance Agreements Menu Item

The first selection, Edit/View Appliance Agreements, opens the screen below. Basic vendor agreement and appliance data is entered on this screen. This data is used for creating the BEEP Rating Report. All of the data is required, except for the beginning and end dates for the agreement, and the color of the appliance.



The Max Allowable Consumption is calculated for DOE qualified refrigerators (top and bottom mounted refrigerators, and side by side refrigerators, all without through-the-door ice service). It is set for 9,999 for all freezers and non-qualified refrigerators.

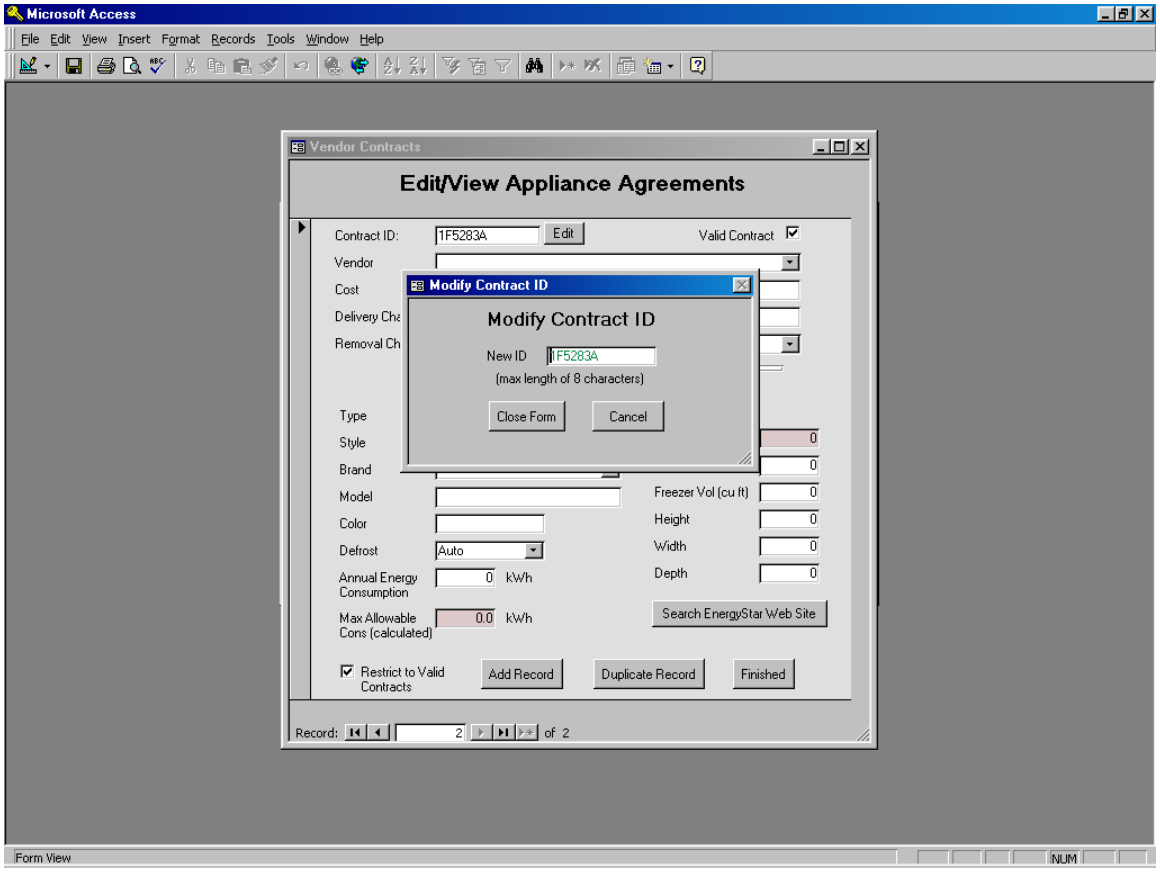
The user can add new Vendor/Appliance combinations by clicking the 'Add Record' or 'Duplicate Record' buttons. In each case, a unique Contract ID is assigned. A blank record is created if the 'Add Record' button is used, and all data (with the exception of the Contract ID) is copied if the 'Duplicate Record' button is clicked.

If a contract is no longer valid, uncheck the 'Valid Contract' checkbox. Unchecking this box will prevent this record from appearing in the BEEP Rating reports. It will continue to be shown in this screen however, unless the checkbox in the lower left corner 'Restrict to Valid Contracts' is checked.

The button "Search Energy Star Website" will launch the web browser and take you to Energy Star refrigerator search page.

Contract ID

The Contract ID is automatically created when a new record is added (either using the 'Add Record' or the 'Duplicate Record' buttons). A unique ID is used for each Vendor/Appliance combination. The user can edit the Contract ID by clicking the 'Edit' button next to the 'Contract ID'. Clicking the 'Edit' button opens the 'Modify Contract ID' dialog box (See next figure).



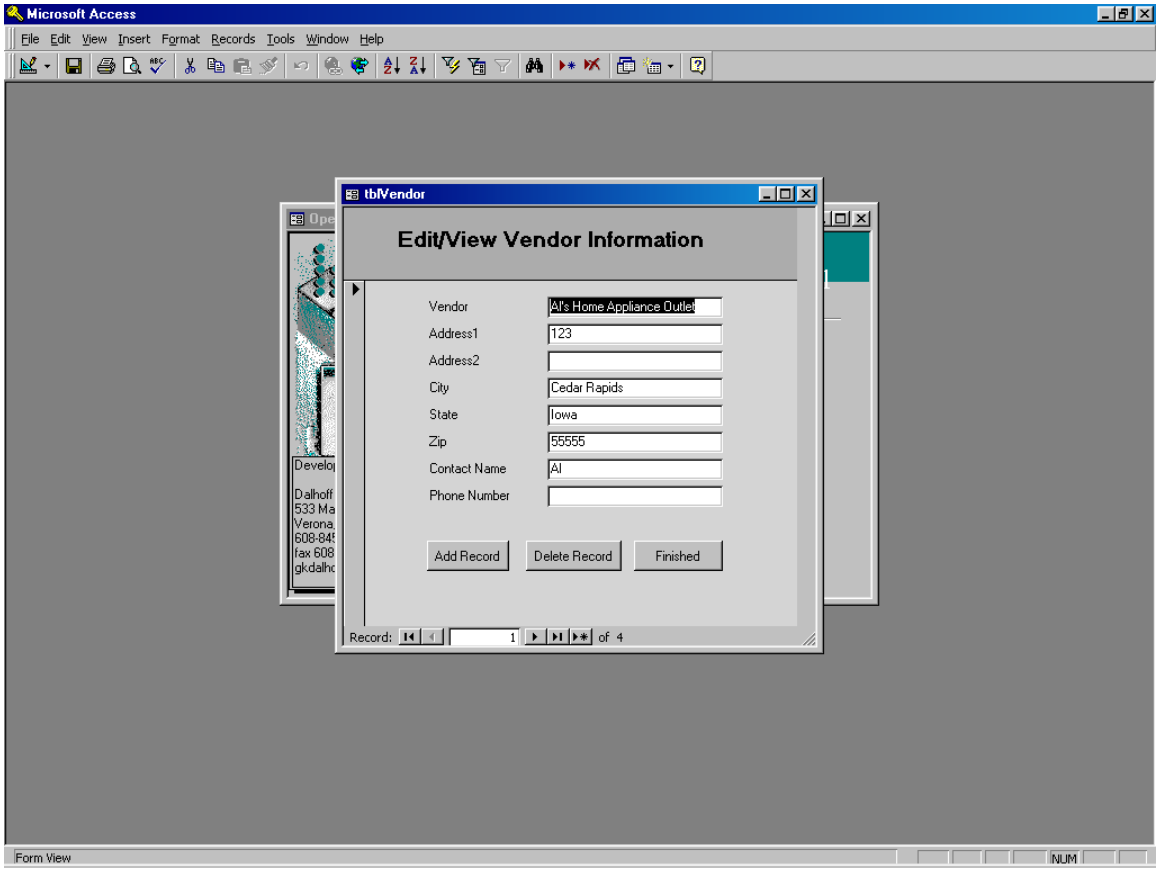
The color of the text in the 'New ID' box is green if the ID is unique, otherwise the text is red. The modified ID will not be saved unless the ID is unique: a warning appears if the user attempts to assign a duplicate Contract ID.

Pressing the 'Cancel' button will revert to the original ID.

The BEEP Rating Tool is provided with a blank record with the ID 'PlacHldr'. The user will probably wish to uncheck the 'Valid Contract' checkbox for this record, *but this should not be done until the user has added a new record to the database with either the 'Add Record' or 'Duplicate Record' buttons.*

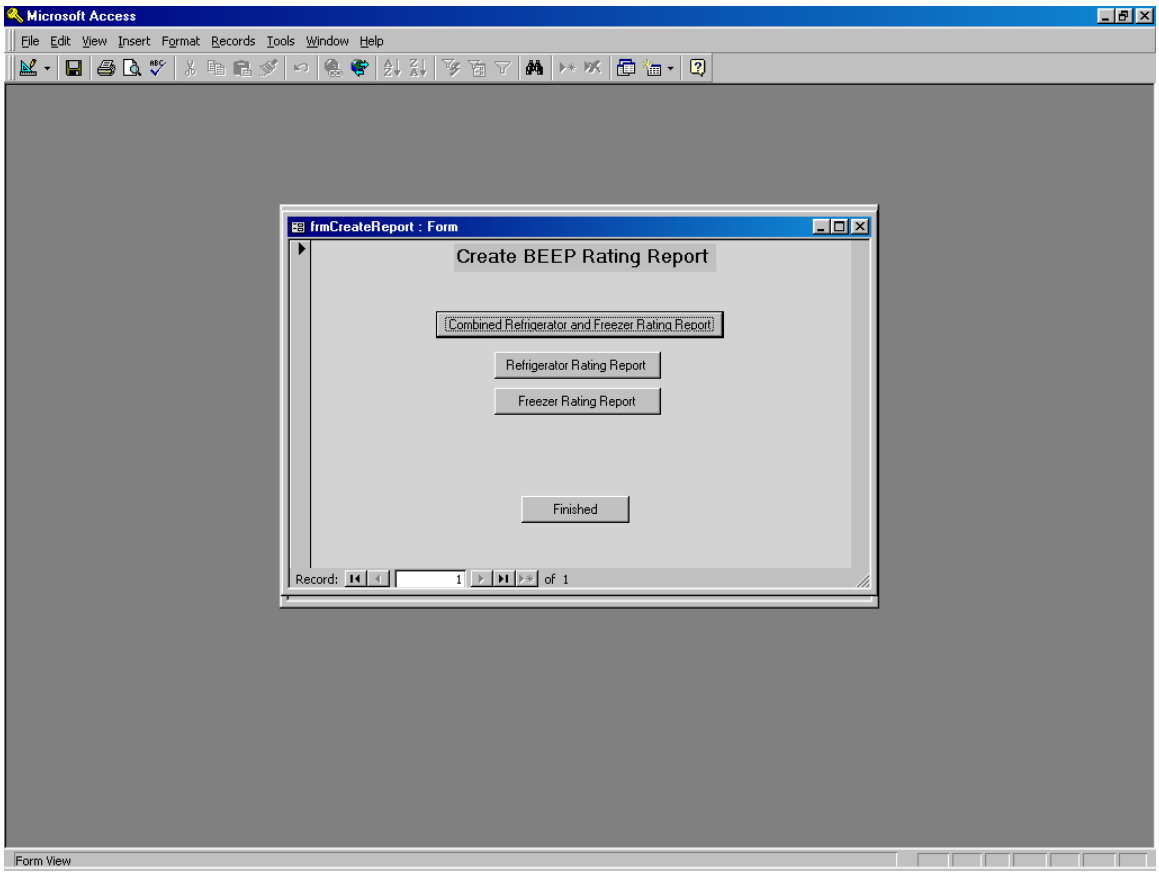
Edit/View Vendor Information Menu Item

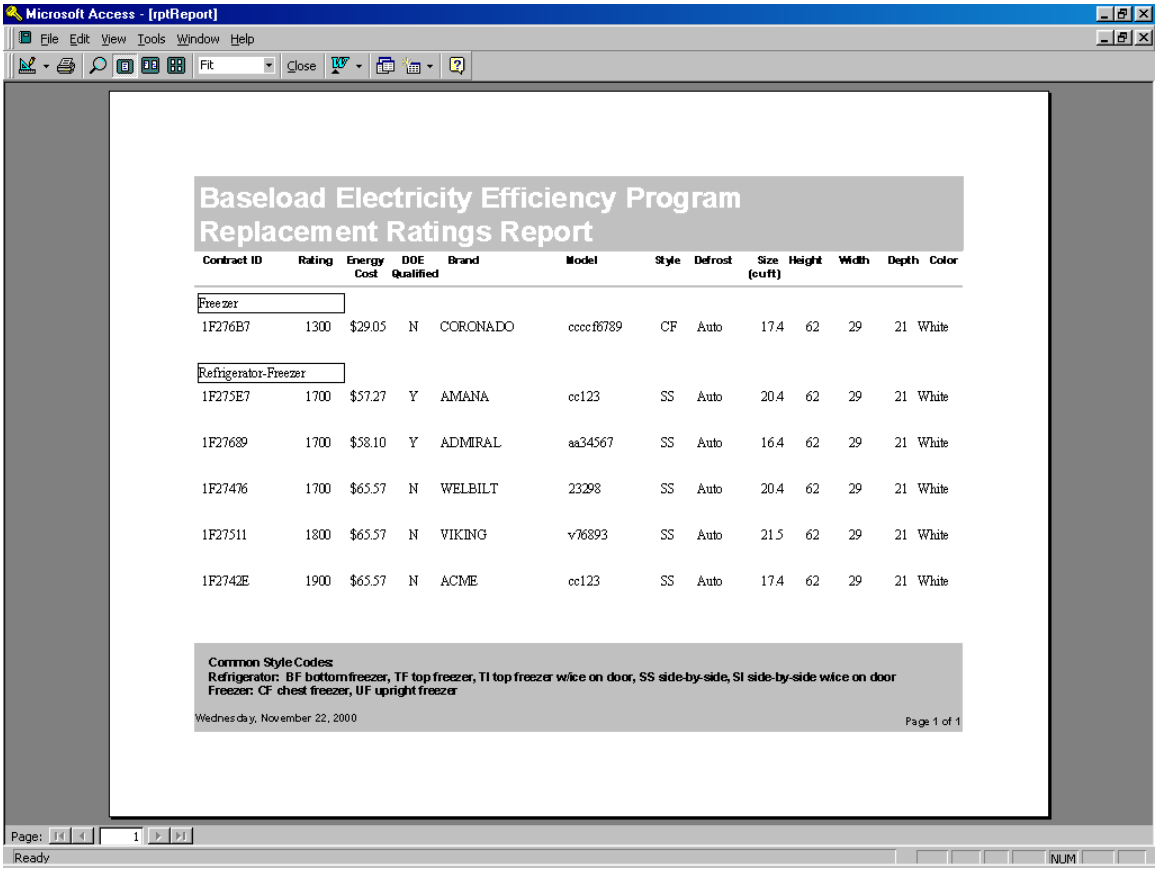
Vendor information is entered in if the Edit/View Vendor Information item is selected in the main menu. These data are optional, with the exception of the Vendor Name.



Create BEEP Rating Form

The third menu item. 'Create BEEP Rating Form', opens a form to specify if a report should be created refrigerators, freezers, or both. Selecting any of these buttons launches a preview of the BEEP Replacement Ratings form (shown on the following page). The ratings report can be printed from the preview screen.





Baseload Electricity Efficiency Program
Replacement Ratings Report

Contract ID	Rating	Energy Cost	DOE Qualified	Brand	Model	Style	Defrost	Size (cuft)	Height	Width	Depth	Color
Freezer												
1F276B7	1300	$29.05	N	CORONADO	ccccf6789	CF	Auto	17.4	62	29	21	White
Refrigerator-Freezer												
1F275E7	1700	$57.27	Y	AMANA	cc123	SS	Auto	20.4	62	29	21	White
1F27689	1700	$58.10	Y	ADMIRAL	aa34567	SS	Auto	16.4	62	29	21	White
1F27476	1700	$65.57	N	WELBILT	23298	SS	Auto	20.4	62	29	21	White
1F27511	1800	$65.57	N	VIKING	v76893	SS	Auto	21.5	62	29	21	White
1F2742E	1900	$65.57	N	ACME	cc123	SS	Auto	17.4	62	29	21	White

Common Style Codes:
Refrigerator: BF bottom freezer, TF top freezer, TI top freezer w/ice on door, SS side-by-side, SI side-by-side w/ice on door
Freezer: CF chest freezer, UF upright freezer

Wednesday, November 22, 2000

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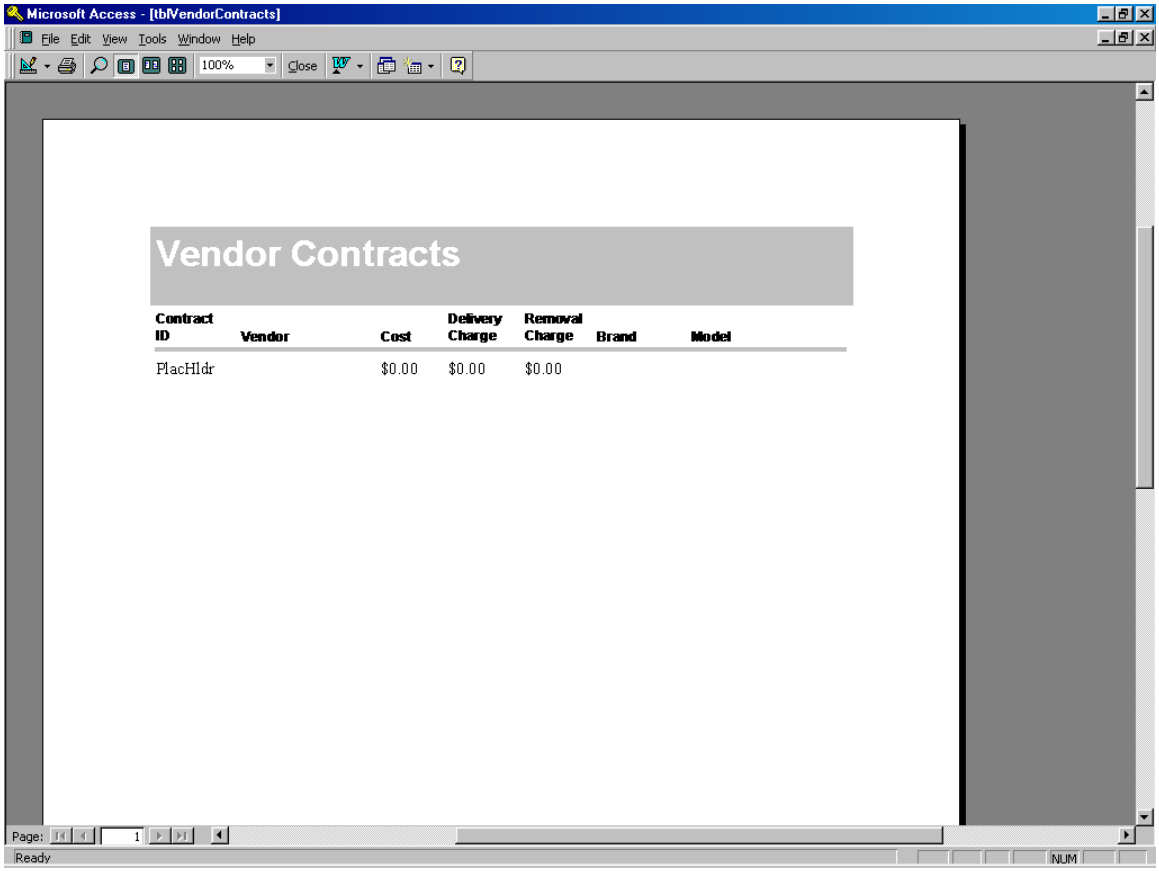
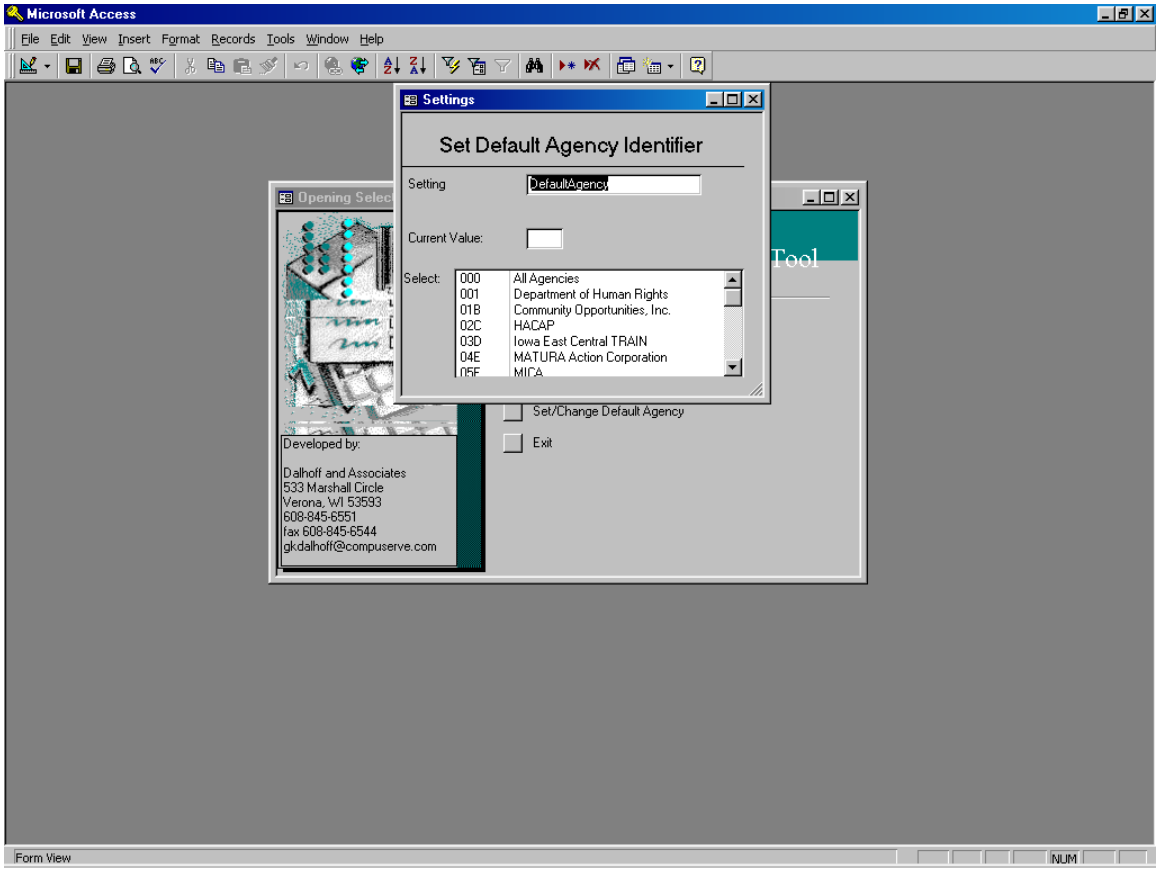
Create Vendor Contract List Menu Item

The fourth menu item, 'Create Vendor Contract List', opens a screen with a list of vendor contracts. An example (with only the initial placeholder Contract ID) is shown below:



Set/Change Default Agency

The fifth menu item, 'Set/Change Default Agency', opens the following screen:



Simply select one of the agencies in the box, and then click the 'X' in the upper right corner to close the form. This form will open each time the tool is started until a default agency is assigned. Note that the form might be partially hidden behind the main menu, in which case you can bring it forward by either selecting the menu item or by clicking on the part of the form that is exposed from behind the menu.

The 'Default Agency ID' is used to assign the agency id whenever the 'Add Record' button on the 'Edit/View Vendor Agreements' screen is clicked.

Economic and Program Cost Assumptions

A table with economic assumptions is used by the BEEP Rating System; however we do not provide access to it through menus. The table contains the values of parameters for the life cycle cost calculation (used by the BEEP Rating calculation). The table of these parameters is shown below:

Parameter	Abbreviation	Value
Administration Cost	Adm	0
Support Cost	Sup	0
Appliance Service Lifetime	LC	15
Uncertainty Factor	UF	1.0
Discount Rate	DR	0.05
Electricity Cost	FC	0.083
Administration Cost Multiplier	ACM	0
Support Cost Multiplier	SCM	0.05
Fuel Escalation Rate	FE	0.00

Administration and support costs may be calculated in two ways. The parameters Adm and Sup are fixed values per appliance. The parameters ACM and SCM are meant to be used as fractional multipliers applied to the cost of the appliances (e.g., if ACM is 0.25, the administration cost is calculated as 25% of the appliance cost). You can use the fixed and multiplier methods separately or together.

Appliance Service Lifetime: The projected duration of savings for the replacement appliances.

Uncertainty Factor: This is a multiplier on the annual energy consumption of the replacement unit. Values greater than 1.0 increase the BEEP rating. Values less than 1.0 decrease the BEEP rating. This factor is used to reduce the attractiveness of higher energy use replacement appliances.

Discount rate: Used to assess the time value of future energy consumption. Five percent is typically used for a societal discount rate.

Fuel escalation rate: The annual rate of fuel price change over the life of the appliances.

Electricity cost: The cost per KWH