

RCM AUDIT AND REPORT PREPARATION

The purpose of the RCM facility audit is to document existing equipment, conditions and resource use patterns. In the audit process data is gathered to develop strategies for improving resource efficiency. The audit is an essential analytical tool. Information from the audit is summarized in reports, complete with calculations of cost, savings and payback for different strategies. This audit report becomes the basis for preliminary decisions about resource efficiency investments. Additional analysis will likely be needed when capital funds are necessary to implement a project.

This chapter includes discussions of:

- **Pre-audit activities**
- **Facility operator pre-audit interview**
- **The RCM audit**
- **Report preparation**



Custodians, facility operators and maintenance staff are critical to the development of the RCM audit. They are your best sources for learning how your facilities operate. Every day they respond to the needs of the occupants, equipment and structure. They can be invaluable allies. But they may also be apprehensive about how resource conservation may affect their daily work. Cultivate your relationships with them carefully and patiently.



Pre-Audit Activities

APPENDIX **A**
Audits/Surveys

RESOURCE DISK **R**
aud_form.xls:
Walk-through audit forms.

Begin by reviewing all resource accounting data. Note any anomalies or areas of interest that you may want to investigate during your discussions with the facility operator or during the facility walk-through portion of the audit. From the utility data, document the number of utility meters assigned to each facility. Locate these meters (water and energy) during your visit.

Review any previous energy studies, condition surveys or other relevant studies that were done by previous administrations. To locate these studies, check with the facilities director, maintenance manager, your State Energy Office and the local utility. Previous surveys or studies could provide useful information and may be a source of resource conservation analyses that have not been incorporated into action plans.

APPENDIX **A**
Audits/Surveys

RESOURCE DISK **R**
question.doc: Interview questionnaire for facility operators.
guid_fo.doc, guid_mnt.doc, guid_kit.doc, guid_gnd.doc: Facility-specific operations checklists.

Provide resource conservation training and information (facility-specific operation checklists) to the facility operators, cooks and maintenance staff. This will enable them to provide useful input during the audit. It will also heighten their awareness and get them thinking about resource usage at their facilities.

Prior to your visit, fill out as much as you can of the facility and occupancy description on the RCM Audit Form. Most of this can be done using resource billing information and facility architectural plans.

The balance of Section A of the RCM Audit Form can be completed during the pre-audit interview with the facility operator(s) just before commencing the walk-through audit. Use a questionnaire to make your time with the facility operator as productive as possible.

Keep in mind that RCM activities are added duties for facility operators and staff. Be sure to let them know their input is valuable and their efforts are greatly appreciated.

Obtain a copy of an uncluttered floor plan on 8-1/2 x 11 or 11 x 17 inch paper (a fire escape plan works well). You may have to draw a simple floor plan from the architectural plans. This will be used to document:

- Age of each section of the facility
- Building identification number(s) and room numbers
- Square footage
- Meter locations
- Heating fuel
- Location of HVAC equipment and other major equipment
- Location and direction from which photos are taken

Facility Operator Pre-Audit Interview

Set up an interview with the facility operator(s) and appropriate maintenance staff. Be sure to include people who:

- Can demonstrate the use of the HVAC control system
- Know about the maintenance of the HVAC equipment
- Have access to mechanical spaces
- Know the occupancy patterns of the facility

Select a room at the facility where you won't be disturbed. The interview should take between 30 and 60 minutes, depending on the amount of discussion generated.

Bring an annual summary of the resource accounting data showing monthly profiles of energy consumption, electric demand, water use and garbage service. Discuss any anomalies that may be present in the data. Also have Energy Use Index (EUI) figures (Btu/SF/Yr) for comparison with other facilities in the organization.

You may want to use the questionnaire in the appendix and on the Resource Disk together with the audit form. The questionnaire provides some of the probing questions that will help you complete sections of the audit form prior to performing the walk-through portion of the audit.

With the facility operator, review the floor plan you obtained. Add any changes. Make sure to keep a clean set of floor plans. These will be used at the completion of the audit for the transfer of field notes.

Refer to **Chapter 2, Task 3**
for more on EUI.

APPENDIX **A**
Audits/Surveys

RESOURCE DISK **R**
question.doc: A questionnaire
for facility operators that can be
used during pre-audit
interviews.

The RCM Audit

When you schedule audits, be sure to set them up so people who know the facilities can accompany you. This includes those who have access to all mechanical spaces and who are knowledgeable about operations, occupancy schedules, etc. Include staff who can demonstrate how to operate the HVAC controls and the energy management control system (EMCS), if there is one.

How Long Will the Audit Take?

The amount of time is based on:

- The level of detail you want
- The size and complexity of the facility
- How many potential RCM measures you find

For facilities that are 30,000 to 200,000 sq. ft., expect to spend three to six hours.

Some opportunities are more complex and take more time to quantify. A lighting upgrade recommendation may require that you count all the fixtures in the facility. This is time consuming, but is necessary to determine whether the project is worth pursuing. In this example, you could take representative samples that you can analyze to determine if a full count is warranted.

Come equipped to perform the audit

Be Thorough During the Audit

Take detailed photos to document mechanical equipment, lighting, interior spaces, windows, roofs, walls, doors, etc. Indicate on floor plans the location and direction from which the photos are taken. Get the film developed soon after performing the audit, so the information is fresh in your mind and you can document what the photos show.

Talk to building occupants for their perspectives regarding comfort, lighting levels, occupancy patterns, indoor air quality and hours of operation. This may lead to additional ideas for RCM opportunities.

Identify RCM Opportunities

What you learn during your audit and what you observe through resource accounting will help identify areas for efficiency opportunities. As you consider the possibilities, involve the people who are impacted to ensure that any change will be well accepted. Use the RCM teams when applicable.

APPENDIX **A**
Audits/Surveys
 List of tools for the walk-through audit.

APPENDIX **A**
Helpful Contacts

If you feel you are lacking the technical expertise to properly evaluate certain capital improvements, simply make a note that additional analysis may be needed. You may want to recruit the assistance of an engineer for that analysis. See the **Helpful Contacts** section of the Appendix for a list of sources for free or low-cost assistance.

Efficiency measures can be generally grouped into four broad categories:

- *Administrative*—usually no-cost, such as removing sewer charges from irrigation meters.
- *Operational*—usually no-cost, such as getting night staff to turn the lights on only in the rooms where they are working.
- *Maintenance*—usually no- to low-cost, such as repairing steam traps for better heating efficiency.
- *Capital*—usually mid- to high-cost, such as a lighting upgrade or chiller replacement.

APPENDIX **A**
Audits/Surveys

RESOURCE DISK **R**
measures.doc: Annotated list of resource conservation opportunities.

The RCM audit form also contains a key-word list of RCM opportunities. These correspond to the RCM opportunities descriptions presented in the Appendix and on the Resource Disk. Review the list of opportunities and their descriptions so you are familiar with them before conducting the audit. You may want to take the list along as a reference. The list of descriptions is somewhat generic, and your situation may vary from the explanation given. In your audit report, you can “cut and paste” descriptions from the Resource Disk. However you may want to modify the descriptions to more closely match your situation.

Organize and Verify Your Findings

Immediately after completing the audit, take time to review and clarify your notes. Review your findings with the facility operator(s) and maintenance staff to get their input. Revise the list of opportunities you identified based on these discussions.

Organize the audit forms, photos and field notes into a three-ring binder, such as the “Organizer” that accompanies this Guidebook. Resource auditing is an on-going process. By keeping all the building information in a dedicated binder or file, records can be easily added or updated. This can be very useful to architects and engineers who perform future building upgrades.

Audit Report Preparation

The audit report includes a facility description, resource accounting summary information, identification of training needs and resource conservation opportunity recommendations. Your report could also include an implementation plan. Or you can present the plan separately after the report is completed.

APPENDIX **A**
Audits/Surveys

RESOURCE DISK **R**
aud_rpt.doc: Sample format
for the RCM report.

When developing your report, use the RCM opportunity descriptions provided on the Resource Disk. You can use “copy” and “paste” computer commands to insert the applicable descriptions into your report. Modify the descriptions as appropriate.

Present the draft report to the facility team for their review and comment. Include their feedback as a part of the final report.

Once finalized, copies of the report should be directed to facilities staff, the organization’s administration, and of course, retain a copy for your records.