

RECLAMATION

Managing Water in the West

Water and Energy Efficiency Audit Field Guidance Document

**Water and Energy Efficiency Program for Commercial, Industrial, and
Institutional Customer Classes in Southern California**

Volume 3 of 5



**U.S. Department of the Interior
Bureau of Reclamation**

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1.0 Introduction

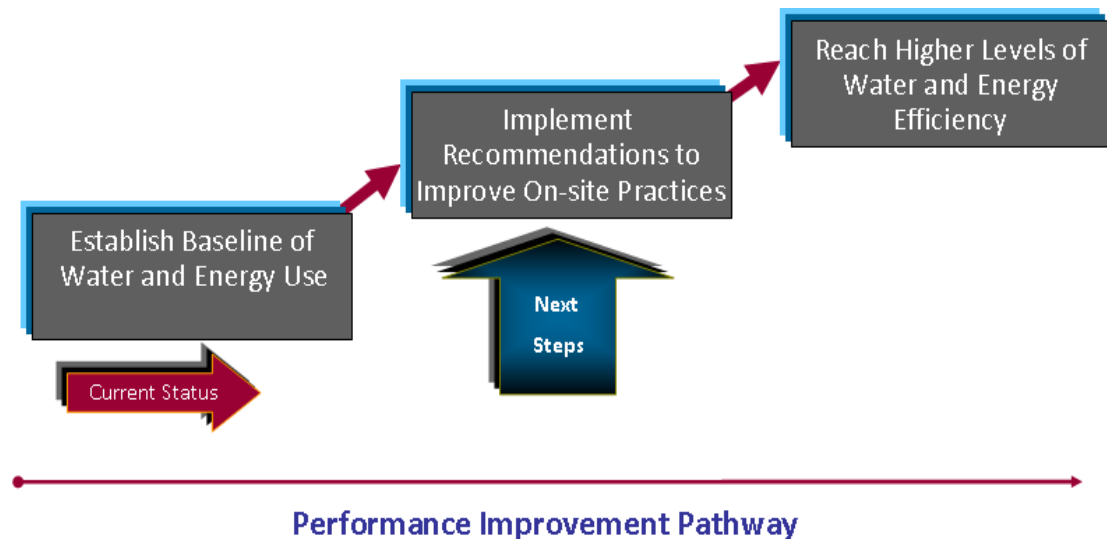
For many years, programs in southern California have promoted water efficiency or energy efficiency within the broad categories of commercial, industrial, and institutional (CII) customers. Although these programs have been relatively successful, current regional water and energy projections indicate there is an urgent need to examine water and energy efficiency in an integrated manner. The Bureau of Reclamation (Reclamation), in partnership with the California Energy Commission (CEC), and the Metropolitan Water District of Southern California (MWD), commissioned an innovative study in 2007 to develop an integrated water and energy efficiency program.

The results of the study are presented in a multi-volume report called the *Water and Energy Efficiency Program (WEEP) for Commercial, Industrial and Institutional Customer Classes in Southern California*. Volume 3 provides guidance and tools for conducting WEEP audits to identify potential water and energy efficiency opportunities at CII customer class sites.

1.1 Purpose and Scope of WEEP Audits

WEEP audits are designed to assess water and energy management activities at CII customer sites to establish a baseline from which recommendations for enhancing water and energy efficiency can be made. The performance improvement pathway underlying WEEP audits is shown in Figure 1.1.

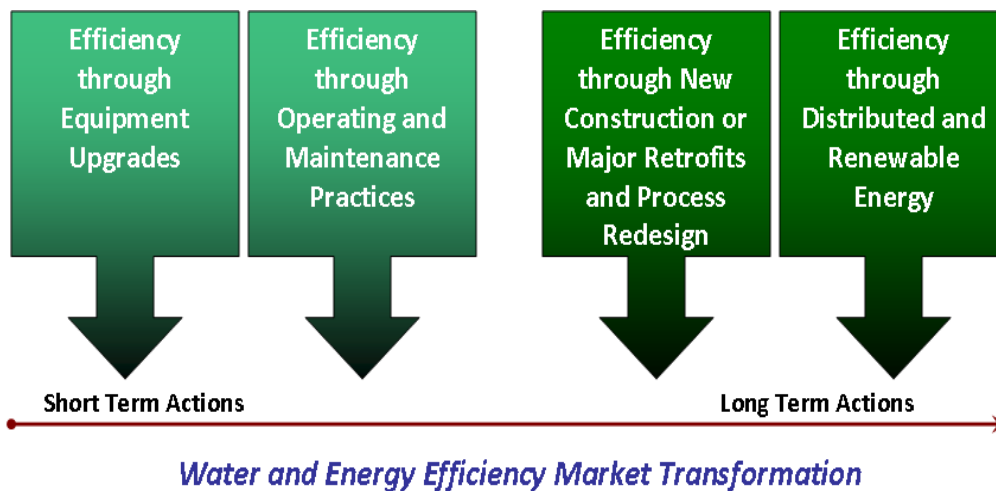
Figure 1.1: Integrated Audit Performance Improvement Pathway



WEEP audits are structured to examine options for enhancing water and energy efficiency at CII customer sites. These options include the following, which are depicted in Figure 1.2:

- **Equipment upgrades** (i.e., replacing existing equipment with new equipment characterized as being more water or energy efficient) eligible for water or energy rebates.
- **Operating and maintenance practices** to ensure that site equipment is being used as intended and consistent with load demands.
- **New construction standards and redesigned operations and activities**, as well as the use of distributed and renewable energy sources.

Figure 1.2: Water and Energy Efficiency Options



By assessing opportunities in each of these areas, the audit team provides information to help site managers direct investments, from short-term to long-term actions that will lead to a more sustained level of water and energy efficiency.

1.2 CII Customer Classes Included in an Integrated Audit Program

PAC members indicated that WEEP should focus on CII customer classes characterized as high water and energy users. Those customer classes meeting this characteristic are listed below:

- Accommodation
- Amusement, Gambling, and Recreation Industries
- Chemical Manufacturing
- Computer and Electronic Product Manufacturing
- Educational Services
- Fabricated Metal Product Manufacturing
- Food Manufacturing
- Food Services and Drinking Places
- Hospitals
- Personal and Laundry Services
- Petroleum and Coal Products Manufacturing
- Professional, Scientific, and Technical Services
- Real Estate
- Textile Mills
- Utilities

These customer classes should be the focus of integrated water and energy audits because they represent the greatest potential for water and energy reductions.

1.3 Benefits Associated with an Integrated Audit Program

1.3.1 CII Customer Benefits

CII customer benefits associated with an integrated audit include the following:

- Learning about the full range of available incentives to promote investment in water and energy efficiency improvements.
- A single report that captures the full set of benefits available to the site if water and energy efficiency measures are implemented.
- Recommendations for upgrading existing equipment or implementing process and construction changes that could significantly enhance the efficient use of water and energy.
- Reduced costs of water and energy due to efficiency improvements.

1.3.2 Energy Utility and Water District Benefits

Energy utilities and water districts benefit from implementing an integrated audit program by:

- Using staff resources more effectively within a service area.
- Leveraging available funding for incentives and other programs to increase the efficiency of resource management.
- Increasing customer satisfaction by providing easier access to incentives and information.

1.3.3 Reclamation, CEC and MWD Benefits

An integrated audit approach gives governmental agencies greater insight into both the interrelationship of, and the tradeoffs that may need to be made between water and energy use. For example, a series of audits may reveal that greater on-site reuse of water may increase a CII customer's energy use but decrease its wastewater discharges and associated fees, resulting in reduced energy and water use at an off-site wastewater treatment plant. Integrated audits also provide opportunities to leverage existing programs to decrease resource use in California.

1.4 Organization of Volume

The remainder of this Volume is organized as follows:

- Section 2.0 describes the WEEP audit process.
- Section 3.0 covers the tasks associated with pre-audit planning and preparation.
- Section 4.0 details the steps involved in conducting on-site audit activities.
- Section 5.0 highlights post audit activities.
- The Appendices include a number of documents to support audit program activities such as, but not limited to, the pre-audit questionnaire, audit field tool, example opening meeting discussion guide, example audit report, a list of acronyms, and a bibliography.

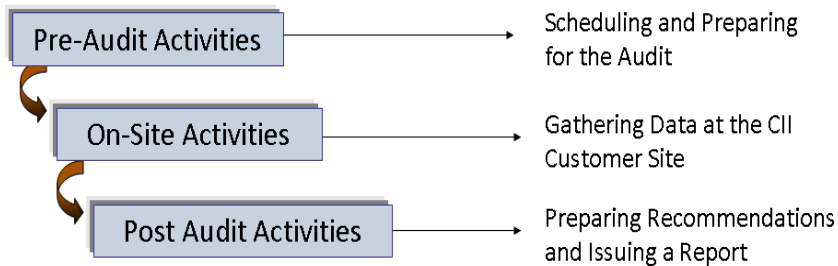
2.0 WEEP Audit Process

The WEEP audit process is a flexible, three-phase approach to assessing efficiency opportunities. Each phase and step outlined in this document can be expanded or compressed to meet the circumstances surrounding a planned audit and the scope of the audit agreed to with the CII customer.

2.1 Three Phases of the Audit Process

WEEP audits have been designed to follow the phased approach as outlined in Figure 2.1.

Figure 2.1: Phases of Weep Audit Process



The pre-audit phase includes a number of data gathering and review activities that are geared towards planning the audit so the on-site activities can be performed effectively and efficiently.

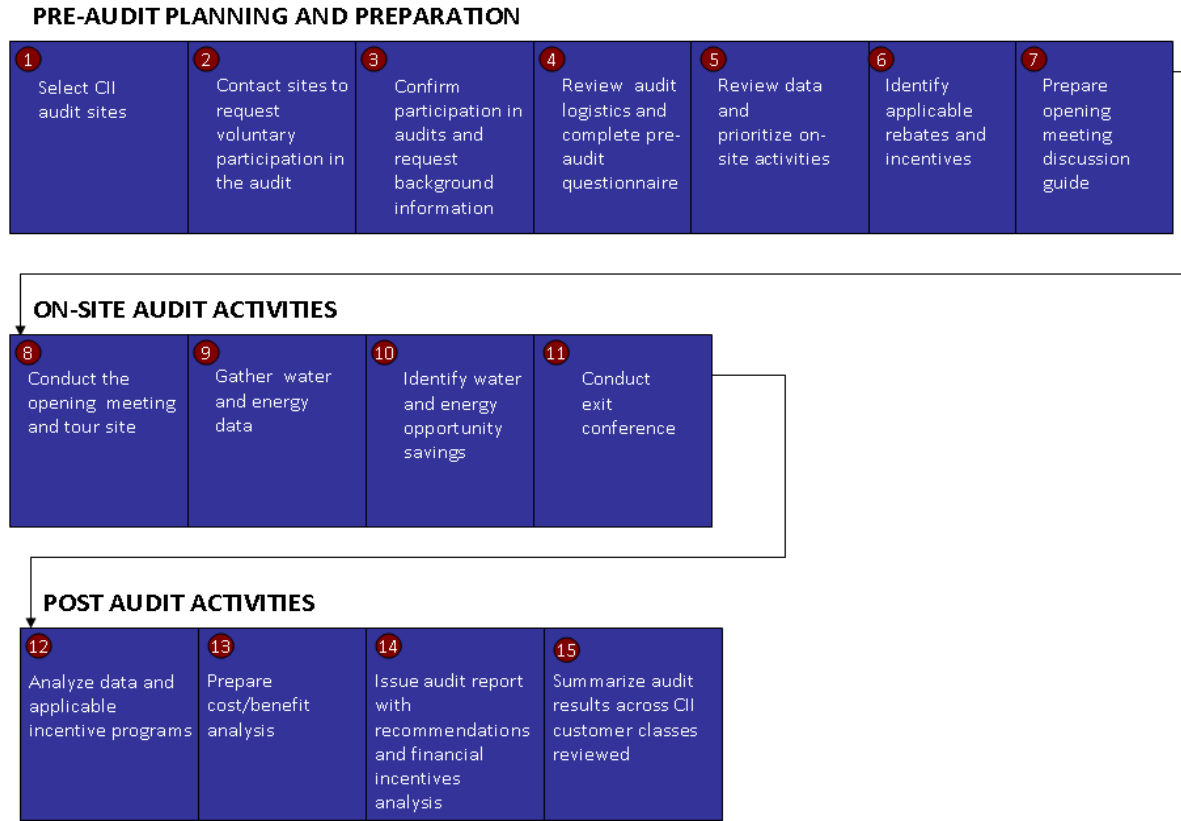
During the on-site phase, auditors gather additional data, hold discussions with site personnel, and evaluate the applicability of energy utility and water district incentive programs to site operations.

Post audit activities include conducting additional research, as needed, to analyze applicable incentives programs, preparing a cost-benefit analysis of the recommended water and energy efficiency improvements, and developing the draft and final audit reports including recommendations for enhancing performance.

Each phase of the audit process is completed in a series of steps, which are designed to be consistent with general audit practices and to achieve the

objectives of the audit. Figure 2.2 depicts the steps associated with the three phases of the audit.

Figure 2.2: WEEP Audit Steps



Each step of the WEEP audit process is described in greater detail in the sections that follow. The guidance incorporated into each of these steps reflects input from WEEP’s Project Advisory Committee (PAC).

2.2 Audit Field Tool

2.2.1 Topics Included in the Field Tool

An audit field tool was developed to guide teams in gathering and evaluating information to assess improvement opportunities and to recommend actions to enhance the on-site use of water and energy.

The field tool:

- Provides guidance on collecting water and energy data to establish a baseline for assessing opportunities to improve the efficiency of on-site water and energy use.
- Directs the audit team to gather specific information through reviews of documents, direct observations, or interviews with CII customer site personnel.
- Identifies incentives offered by energy utilities and water districts. (The availability of these incentives will need to be confirmed prior to each scheduled audit since rebates may have been fully used or new incentives may have been created.)
- Includes several tables to help summarize audit findings and identify potential recommendations.
- Lists water and energy topics to review during an audit.

The audit field tool covers the following topics:

- Cooling Towers
- Combined Heat and Power Systems (CHPs)
- Compressed Air Systems
- Heating, Ventilation and Air Conditioning (HVAC) Systems
- Hospitals
- Irrigation/Landscaping Activities
- Lighting
- Large Scale or Long Term Retrofit Incentive Programs
- Lavatories
- Laundry Operations
- Motors and Pumps
- Office Equipment/Plug Load
- Process Cooling and Refrigeration
- Process Heating
- Kitchen/Food Services
- Site-Wide Water and Energy Use Activities and Equipment
- Steam Equipment
- Wastewater Treatment Facilities

These topics were selected based on information from the Flex Your Power (FYP) Web site, savings potentials (Volume 2 of the WEEP Study), U.S. Environmental Protection Agency (EPA) guidance documents, and the Watersmart Guidebook (see bibliography). Depending on the time available to conduct the audit and the

needs of the CII customer, several or all of the topics can be reviewed during an audit.

2.2.2 Entities Offering Incentives Associated with Topics in the Field Tool

A large number of energy utilities and water districts offer rebates and incentives covered in the audit field tool. They include:

• Anaheim Public Utilities	• Glendale Water & Power
• Apple Valley Ranchos Water Company	• Irvine Ranch Water District
• Azusa Light & Water	• Metropolitan Water District of Southern California (MWD)
• Burbank Water and Power	• Municipal Water District of Orange County (MWDOC)
• Calleguas Municipal Water District	• Long Beach Water Department
• Castaic Lake Water Agency	• Los Angeles Department of Water & Power (LADWP)
• Central Basin Municipal Water District	• Pasadena Water & Power
• City of Beverly Hills	• San Diego County Water Authority (SDCWA)
• City of Compton	• San Diego Gas & Electric Company (SDG&E)
• City of Fullerton	• Southern California Edison (SCE)
• City of Long Beach	• Southern California Gas Company (SoCalGas)
• City of San Fernando	• Three Valleys Municipal Water District
• City of San Marino	• Water Replenishment District of Southern California
• City of Santa Ana	• West Basin Municipal Water District
• City of Santa Monica	• Western Municipal Water District
• City of Torrance	• Upper San Gabriel Valley Municipal Water District
• Eastern Municipal Water District	

Among the other organizations in southern California that provide water and energy to CII customers—or work with them to reduce demand for those resources—are the Sanitation Districts of Los Angeles County (LACSD), Orange County Sanitation District, and the City of San Diego Sanitation Department.

2.3 Team Composition

Audit teams should be composed of at least one professional from an energy utility and one from a water district, including account managers or efficiency experts. This type of team will provide the depth of knowledge and experience necessary to conduct an audit that collects and evaluates the data necessary to achieve its goals. Audit team members should be proficient in assessing:

- The applicability of energy utility and water district rebate incentive programs to CII customer sites.
- Opportunities to engage in long-term investments in water and energy efficiency projects related to site business activities.
- Opportunities to improve operation and maintenance practices.

To help ensure that an appropriate data set is gathered to aid in the identification of site-specific recommendations, at least one team member should be skilled in or familiar with auditing techniques.

A team leader should be selected to coordinate communications with the site and oversee the completion of the audit. The audit team leader should be able to devote roughly four non-consecutive weeks to the process.

3.0 Pre-Audit Planning and Preparation

The steps in pre-audit planning and preparation are shown in Figure 3.1.

Figure 3.1: Pre-Audit Planning and Preparation Activities

1 Select CII audit sites	2 Contact sites to request voluntary participation in the audit	3 Confirm participation in audits and request background information	4 Review audit logistics and complete pre-audit questionnaire	5 Review data and prioritize on-site activities	6 Identify applicable rebates and incentives	7 Prepare opening meeting discussion guide
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3.1 Select CII Audit Sites

Each energy utility or other implementing agency such as a water district should determine which of the WEEP recommended CII customer classes to focus on, and then, within those customer classes, the sites to audit.

Factors to consider in selecting CII customer classes to audit include:

- The number of customers in the service area that are within a recommended CII customer class.
- The number of incentives potentially available to the CII customer class.
- Knowledge about audit effectiveness in enhancing the water and energy efficiency within a particular CII customer class.
- Preliminary estimates of the potential water and energy savings that could be achieved within a CII customer class if the full range of efficiency options were implemented.
- Likelihood that the site will implement suggested changes.

Factors to consider in selecting particular sites within a CII customer class to audit include:

- Customer requests for audits.
- Sites where there are a range of operations or activities that consume both water and energy.

- Technical knowledge of on-site operations to ensure the conduct of high quality audits.
- Historical information suggesting that sites within a particular customer class have not used rebates or other financial incentives to enhance efficiency practices.

3.2 Contact Sites to Request Voluntary Participation in the Audit

After the specific customer classes and sites are identified for audits, a tentative schedule should be developed for discussions with potential site contacts. The team leader will need to identify site contacts and call them to encourage their voluntary participation in the upcoming audits. During this initial communication, the team leader should:

- Explain the voluntary nature of the audits and answer any questions that are raised.
- Clearly state the potential benefits of identifying water and energy efficiency improvement opportunities and the positive impacts of reduced energy and water demand and wastewater discharges (e.g., reducing costs and increasing the dollars available to implement other types of site improvements).
- Explain why the site has been chosen to voluntarily participate in the audit process.
- Outline the purpose and scope of the study and the role of WEEP audits in identifying efficiency improvements.
- Present the benefits associated with voluntary participation, including obtaining data useful for benchmarking current site activities, recommendations for water and energy savings, and recommendations for funding efficiency measures.
- Discuss confidentiality agreements that clearly state the data will not be released without permission.
- Review the three phases of the audit: pre-audit, on-site, and post audit activities.
- Review the scope of the pre-audit request and completion of the pre-audit questionnaire.

Immediately following the conversation, the team leader should send the CII customer the audit notification and confidentiality letters, including the request to release water and energy information from the appropriate water and energy utility. Examples of these letters can be found in Appendix A.

In many instances, the CII customer may want to undertake a preliminary (e.g., two to three hour) high-level review to obtain a better understanding of the audit process and the potential benefits of a more in-depth review of water and energy practices on-site. If that situation occurs, the audit team leader should try to schedule a preliminary audit to obtain buy-in and schedule the follow-on audit within a definite period of time. The steps described in the following paragraphs can be modified to reflect the CII site's request to conduct a less comprehensive review to obtain buy-in.

3.3 Confirm Participation in the Audits and Request Background Information

Within two weeks of sending the audit notification and confidentiality letters, the team leader should contact the CII customer site to confirm participation. During this conversation the tentative dates for the audit should be established. After the site has agreed to participate in the audit and signed a confidentiality agreement, as needed, key facility contacts should receive a second letter requesting background information about on-site water and energy use. If a revised confidentiality letter needs to be submitted, it should be done at this time.

The pre-audit letter requests the information listed below:

- Water and energy metering or bills for the past two years to capture baseline information about use.
- Sewer discharge data or effluent metering data and the location and number of meters throughout the site.
- As-built plans and information on actual and planned upgrades, renovations, and reconstruction.
- Previous energy and water studies.

See Appendix A for an example of the audit participation request letter. This letter should be sent out approximately one month before the scheduled audit. The pre-audit questionnaire should be sent out along with the information request letter.

3.4 Review Audit Logistics and Complete Pre-Audit Questionnaire

After the pre-audit information has been received, the audit team leader should contact the site to re-confirm the audit dates and discuss logistics, as follows:

- Review the schedule for the on-site portion of the audit (i.e., opening meeting, site tour, interviews, data review, and exit meeting discussion).
- Identify key staff members who should be available for the opening meeting and exit conference (e.g., the site manager, the financial manager, and the environmental manager) and develop a schedule of interviews.
- Ask whether the site participates in any regional or local water or energy efficiency programs, and if it does which ones and why.
- Determine whether the site uses renewable energy on-site such as solar, wind power, or fuel cells.
- Administer and complete the pre-audit questionnaire over the telephone, if appropriate.

The pre-audit questionnaire will address the following items to help the team plan the audit and prioritize topics to review:

- Basic facility data:
 - Site name
 - Site location
 - CII customer class
 - North American Industry Classification System (NAICS), Standard Industrial Code (SIC) code, or other business classification
 - Hours of operation
- General building information:
 - Square footage
 - Process and production (no proprietary information)
 - Age of buildings
 - Number of employees (male and female)
- General system characteristics:
 - Bathrooms (fixture ratings)
 - Cafeteria and food service
 - Compressed air
 - HVAC systems
 - Industrial burners and boilers

- Laboratory space
- Irrigation and landscaping
- Lighting
- Local ventilation systems
- Plug load
- Pollution control equipment (air and water)
- Process chilled water
- Process water (not heated or cooled)
- Process hot water and steam
- Purified process water
- Water use endpoints
 - Process chemical baths
 - Cooling tower
 - General washing
 - Kitchen cold water
 - Kitchen hot water
 - Once-through cooling
 - Process cleaning and rinsing
 - Applicable discharge permits
- Onsite wastewater disposal:
 - Lagoons and oxidation ditches
 - Spray irrigation
 - Subsurface disposal (septic systems, injection)
 - Wastewater treatment operations including flow and methane capture
- The site's assessment of key areas to focus on to enhance water and energy efficiency practices.

A copy of the pre-audit questionnaire can be found in Appendix C.

3.5. Review Data and Prioritize On-site Activities

3.5.1 Summarize Pre-Audit Information

After receiving the background information the audit team should review and summarize it as follows:

- Water and energy use by month and seasonal trends
- Energy use per square foot
- Water use data

A number of tables have been prepared to summarize this information and are included in the audit field tool including:

- Overall Site Energy Consumption Patterns
- Overall Site Water Consumption Patterns
- Monthly Water and Energy Use Trends
- Seasonal Water and Energy Use Trends

3.5.2 Prioritize Topics to Review during the Audit

Information from energy utilities and water districts suggest that CII customer sites may want to have a series of audits conducted to become more comfortable with the process and to better understand the potential benefits associated with an integrated audit approach. In addition, actual time on-site may not be sufficient to examine all the applicable issues that are at the site. Therefore, audit teams should prioritize the topics they will examine to ensure that those with the greatest potential impact on enhancing water and energy efficiency practices on-site are examined first (i.e., topics with high water and high energy characteristics such as cooling towers).

The information gathered through the pre-audit information request and the completed pre-audit questionnaire should be used as the basis for identifying the high priority topics to review during the audit. The selection of topics to review should be documented in the audit field tool in order to inform site personnel about the scope of the audit and to convey the depth of the review. Tables are included in the audit field tool to summarize and document the prioritization of on-site activities.

As a starting place to prioritize audit topics to review, Figure 3.2 lists activities and equipment that, in general, are associated with high levels of water and energy use at CII customer sites.

Figure 3.2: High Water and Energy Use Activities in CII Customer Classes

COMMERCIAL	INDUSTRIAL	INSTITUTIONAL
Restrooms HVAC Landscaping Lighting Office Equipment Refrigerators/Freezers Laundry Pools Kitchens	Rinsing Landscaping Process Refrigeration Motors and Pumps Process Heating Lighting HVAC Process Cooling/Towers Wastewater Treatment Office Equipment	Restrooms HVAC Landscaping Laundry Kitchens Cooling Towers Pools

These examples reflect differences in operations at CII customer sites, and the types of activities that might be associated with the highest water and energy consumption. For additional guidance in prioritizing topics to review, see Table 3.1 for a list of activities involving high water and energy use specific to various CII customer classes.

Table 3.1: CII Customer Class Specific High Water and Energy Issues

CII Customer Classes				
Restaurants/Food Service	Accommodation (Hotel/Motel)	Commercial Buildings: Office and Retail	Schools and Colleges	Hospitals
Dishwashing Steaming Frying /Grilling / Broiling Baking General Cleaning Ice Making Refrigeration Ventilation Water Heating Plumbing Fixtures (toilets) Lighting Cooling	Cooling Towers Swimming Pools Laundry Plumbing Fixtures (toilets) Lighting Landscape Food Service	Plumbing Fixtures (toilets) Lighting Cooling Landscape Food Services	Plumbing Fixtures (toilets) Lighting Cooling Landscape Food Services	X-Ray Processors Dialysis Machines Sterilizers and Autoclaves Pump and Vacuum Systems Pipe Leak Repair Laundry Plumbing Fixtures (toilets) Lighting Cooling Landscape Food Services
Food Processing	Textiles	Fabricated Metals	Electronics	Industrial Laundries
Washing Heating and Drying Ovens Process Cooling Pumping Conveyance Equipment Motors Plumbing Fixtures Lighting Space Cooling	Preparation Scouring Dyeing Printing Washing Plumbing Fixtures (toilets) Lighting Cooling	Process Washing Plumbing Fixtures (toilets) Lighting Cooling	Rinsing Purified Water Treatment Plumbing Fixtures (toilets) Lighting Cooling	Washers Dyers Lighting Plumbing Fixtures (toilets) Cooling

3.6 Identify Applicable Rebates and Incentives

Before commencing on-site activities, the team should:

- Identify the rebates or incentives offered to the CII customer site being audited. (Note: There are a few instances in which a particular community may be eligible for member agency rebates or incentives, but not MWD rebates or incentives.)
- Determine whether the member agency offers low interest loans for certain types of upgrades.
- Review the types of rate incentives available from energy utilities and water districts to promote efficiency practices related to water reuse, renewables, and the operation of combined heat and power units (CHPs).

Table 3.2 is a summary of available rebates and other financial incentives.

Table 3.2: Available Water District and Energy Utility Rebates

<p>HVAC</p> <ul style="list-style-type: none"> • Advanced evaporative cooler • Natural gas furnaces • Adjustable frequency drives • Reflective window film • Packaged terminal air conditioners • Thermal energy storage • Chillers for space air conditioning • Air cooled versus water cooled equipment • Ceiling fans • Cool roofs <p>Cooling Towers</p> <ul style="list-style-type: none"> • Cooling tower controllers • pH cooling tower controllers • Cooling tower retrofits <p>Hospitals</p> <ul style="list-style-type: none"> • X-ray processors • Dialysis machines • Dry vacuum pumps • Steam sterilizer retrofits <p>Large Scale or Long Term Retrofit Incentive Programs</p> <ul style="list-style-type: none"> • Standard Performance Contracts • Business Energy/Water Efficiency Programs • Savings by Design • California Solar Initiative • Self Generation Program • Grants Program • Energy Net Metering Program <p>Irrigation and Landscaping Activities</p> <ul style="list-style-type: none"> • Synthetic turf • Low water consuming plants • Weather based irrigation scheduling • Smart irrigation controllers • High efficiency nozzles • Rotating nozzles <p>Lavatories</p> <ul style="list-style-type: none"> • High efficiency toilets • Ultra low flush toilets • Zero water urinals • High efficiency urinals <p>Laundry Operations</p> <ul style="list-style-type: none"> • High efficiency commercial washers • ENERGY STAR clothes washers <p>Motors and Pumps</p> <ul style="list-style-type: none"> • High efficiency motors <p>Office Equipment/Plug Load</p> <ul style="list-style-type: none"> • Sleep mode for computer software • Plug load occupancy sensors 	<p>Kitchen Services</p> <ul style="list-style-type: none"> • Connectionless steam cookers • Pre-rinse spray valves • Energy efficient dishwashers • High efficiency ventilation systems • ENERGY STAR commercial dishwashers • High efficiency commercial fryers • High efficiency commercial griddles • High efficiency commercial electric combination ovens • High efficiency commercial gas combination ovens • High efficiency commercial electric convection ovens • High efficiency commercial gas convection ovens • ENERGY STAR commercial ice machines • ENERGY STAR commercial pressureless steam cookers • ENERGY STAR solid door refrigerators and freezers • Double rack/single rack ovens • Commercial insulated hot food holding cabinets • Night covers for open vertical and horizontal display cases • High efficiency refrigeration display case with special doors • High efficiency vending machine controllers • High efficiency evaporative fan motors • Refrigerator door gaskets and anti-sweat devices • Auto-closers for main cooler or freezer doors • Ice machines (air and water cooled) <p>Lighting</p> <ul style="list-style-type: none"> • Fluorescent lamps • Fluorescent tubes and magnetic ballasts • High intensity discharge (HID) lamps and high-bay fluorescent fixtures • Occupancy sensors • Light emitting diodes (LED) <p>Process Heating</p> <ul style="list-style-type: none"> • Insulation <p>Site-Wide Water and Energy Use Activities and Equipment</p> <ul style="list-style-type: none"> • Car washing • Fire suppression systems • Laboratories • Conveyor systems • Battery charging operations • Pool covers • Commercial pool heaters • Storage water heaters • Instantaneous hot water heaters • Pressurized waterbrooms • Backup generators • Plumbing fixtures <p>Steam Equipment</p> <ul style="list-style-type: none"> • Steam traps • High efficiency boilers
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3.7 Prepare Opening Meeting Discussion Guide

Prior to conducting the on-site audit, the team leader should prepare an opening meeting discussion guide.¹ This document describes the goals of the audit, how the results will be used, and the schedule. See Appendix D for an example of this guide.

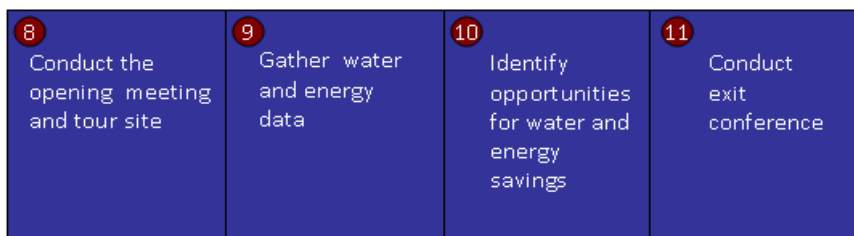
If the CII customer site requests a preliminary two to three hour audit the information in the opening meeting discussion guide should be reviewed with site personnel over the telephone.

¹ Opening meeting is a term used in the auditing profession and refers to the face-to-face initial meeting the team has with facility management at the site being audited.

4.0 On-Site Activities

The on-site portion of the audit consists of the activities listed in Figure 4.1 and described below. These steps follow the pre-audit planning activities and can be compressed or expanded depending upon the length of the audit agreed to with the CII customer.

Figure 4.1: On-Site Audit Activities



4.1 Conduct the Opening Meeting and Tour the Site

To begin the audit, an opening meeting is held with site personnel. Using the opening meeting discussion guide, the team leader should:

- Introduce the audit team members.
- Explain the purpose and scope of WEEP and the audit process.
- Confirm the schedule for on-site auditing activities including interviews with site personnel.
- Explain the overall data gathering activities.
- Answer any questions raised by site personnel.
- Request a brief overview of on-site activities.

The opening meeting influences, to a large extent, the outcome of the audit. This meeting should be conducted in a professional manner that allows an exchange of information between the team and site personnel and allows facility management to meet and understand the work experience and academic backgrounds of the

audit team members. It also provides the team with the opportunity to describe how an audit can help improve productivity and reduce water and energy costs.

Immediately following the opening meeting, audit team members should tour the site with facility staff. In conducting the tour, the auditor team should:

- Obtain an overview of site operations.
- Identify areas to explore in greater depth during the detailed data gathering portion of the audit.
- Gather additional information and begin looking for activities that explain observed patterns in water and energy use.

Information observed during the tour should be recorded in the audit field tool. (See Appendix E)

4.2 Gather Water and Energy Data

Next, the audit team should meet with site personnel to review information obtained during the pre-audit planning phase, the team's assessment of the pre-audit information, and any observations made during the tour. The team should ask whether there have been any recent increases or decreases in water or energy use at the site, the reasons for the changes, and any efforts made to access rebates to supplement investments in water- or energy-efficient equipment.

After this meeting, the team should gather data to complete its review of selected water and energy topics. In general, data should be gathered through:

- Interviews with site personnel (e.g., water manager, energy manager, and maintenance personnel).
- Review of water and energy bill or consumption information and estimates of water and energy utilization.
- Physical observation to document the range of water and energy uses on-site.

Data should be gathered according to the guidance provided in the audit field tool.

4.3 Identify Water and Energy Savings Opportunities

To identify opportunities to enhance water and energy efficiency on-site, the team should assess site practices to determine whether:

- Rebates for equipment upgrades are applicable and, if used, would reduce water and energy demand.
- Operation and maintenance practices could be enhanced.
- Site activities would benefit from having technical experts assess potential facility or production process enhancements.

The tables “Summary of On-site Water and Energy Use Patterns” and “Summary of Recommended Efficiency Opportunities” in the audit field tool should be completed prior to the exit conference. Information summarized in these tables will be further analyzed during post audit activities.

4.4 Conduct Exit Meeting

The final step of the on-site portion of the audit is the exit conference the team conducts with site management. During the exit meeting, the team should:

- Review all observations with site management.
- Provide preliminary information about the potential reduction in wastewater discharge payback periods and cost savings associated with recommended improvement opportunities.
- Discuss any noteworthy practices observed and ask as to whether they can be shared anonymously with other CII customers.
- Outline the process for drafting and issuing the audit report.

5.0 Post Audit Activities

The primary objectives of post audit activities are to draft the written audit findings, prepare the formal audit report, and distribute the report to the appropriate levels of management in the organization. The tasks associated with this phase are depicted in Figure 5.1 and follow the on-site activities.

Figure 5.1: Post Audit Activities

12 Analyze data and applicable incentive programs	13 Prepare cost/benefit analysis	14 Issue audit report with recommendations and financial incentives analysis	15 Summarize audit results across CII customer classes reviewed
---	--	--	---

5.1 Analyze Data and Applicable Incentive Programs

Before preparing the audit report, the team should:

- Review the data gathered during the on-site evaluation.
- Develop high level engineering estimates of potential water and energy savings associated with the recommended actions.
- Determine whether any incentives apply to the recommended actions.

5.2 Prepare Cost/Benefits Analysis

Information about the recommended actions for improving water and energy efficiency is included in a cost/benefit analysis to determine project feasibility and return on investment. In the course of this analysis, the data may suggest that trade-offs between energy savings and water savings will need to be made. Thus, the cost/benefit analysis will include an evaluation of water and energy efficiency measures. A tracking sheet has been prepared for this purpose. (See Volume 2 of the WEEP Study for additional information on the cost/benefit analysis and the example evaluation that has been prepared to assist in completing this type of analysis.)

5.3 Issue Audit Report with Recommendations and Financial Incentives Analysis

Two to three weeks after the audit, the site should receive a concise report including:

- A summary of water and energy uses on-site.
- Noteworthy practices.
- Recommendations outlining actions the facility can take to reduce water and energy use.
- List of contacts at local and regional organizations that provide funding through incentives and loans.
- Incentives analysis.

There are several established guidelines for writing audit findings. If these simple guidelines are followed when the audit report is prepared, the audited sites will be able to more effectively and efficiently develop and implement corrective actions in response to the audit results. The guidelines instruct auditors to:

- Be specific about the issues identified, instead of making broad statements.
- Avoid using words that can be interpreted differently and, in most instances, negatively.
- Prepare a preliminary analysis of the costs and benefits of implementing the recommendations. (The exit conference should highlight these costs and benefits, but a more detailed analysis needs to be done as part of the report preparation process.)

The draft audit report should be sent to the site for review. Within two weeks of receiving comments from the site, a final audit report should be issued. Examples of an audit report transmittal letter and an audit report are included in Appendix F.

5.4 Summarize Audit Results across CII Customer Classes Reviewed

After the draft and final reports are issued, each utility or water district may want to evaluate the results by CII customer class or for all audited sites to identify trends and opportunities for further enhancing water and energy efficiency within the service area. A tracking sheet has been prepared for this purpose. (See Volume 2 of the WEEP Study)

Appendices

Appendix A
Audit Participation Request Letter

Initial Audit Participation Request Letter

Date

Mr/Ms
Position
Company
Address

Dear Mr/Ms:

Thank you very much for expressing an interest in having an integrated water and energy efficiency audit undertaken. As we discussed over the telephone, the overall purpose of an integrated audit is to assess current activities to establish a baseline measurement of water and energy use patterns. The baseline will be used to recommend a strategy for enhancing water and energy efficiency.

The benefits associated with your participation include, but are not limited to, obtaining information about the range of financial incentives available for investing in site or equipment improvements, an analysis to help explain and justify the potential financial payback in implementing recommended actions, and a method for accessing both water and energy rebates through a single one-stop process.

We recognize that to obtain your participation in the audit, the data we gather will need to be maintained in a confidential manner. We have prepared a draft confidentiality letter for your consideration. Within the next two weeks, XXX from YYY will call you to discuss participation in an audit and to answer any questions you may have about the activity. If you agree to participate we will prepare a confidentiality agreement (an example is provided as an attachment to this letter). Additionally, the audit team will submit a pre-audit information request including a pre-audit questionnaire to obtain information for the on-site portion of the audit.

Please do not hesitate to contact me at AA or BB. We look forward to hearing from you soon.

Sincerely,

Name
Title
Organization

Confidentiality Letter

Date

Mr/Ms
Position
Company
Address

Dear Mr/Ms:

We recognize that during the course of conducting an integrated water and energy audit, information related to your water and energy use will be shared with the team. This information may be of a confidential nature and proprietary.

Our goal is to help you identify and justify the implementation of activities in order to reduce water and energy demand. Therefore, the information gathered during the audit will be maintained in a confidential manner and will not be shared with anyone outside of your organization. By signing this agreement you are authorizing us to obtain and review information on your behalf regarding water and energy use practices on-site.

Thank you very much for your consideration. Please sign this agreement and return a copy to XXX.

Name

Title

Company Name

Date

Appendix B
Pre-Audit Information Request Letter

Date

Mr/Ms
Position
Company
Address

Dear Mr/Ms:

Thank you very much for agreeing to participate in an integrated water and energy efficiency audit. As mentioned during our previous conversations, a variety of background information exists about water and energy uses on-site. This information is critical to understanding your current baseline and helping the team prioritize the topics to audit in order to ensure that the issues having the greatest potential impact on reducing water and energy demand at your site are reviewed in detail.

To help us plan for the audit, please complete the attached pre-audit questionnaire. If possible, send us any available information in either the hard copy or the electronic format that is referenced in the questionnaire or listed on Attachment A. If the information cannot be sent in advance, we would appreciate that it be available during the on-site portion of the review.

Sincerely,

Name
Title
Organization

Attachment A

Information Request List

1. Water and energy metering and/or bills for the past two years (or request permission to collect the information directly from utilities for each relevant meter number or account) as follows:
 - 24 months of kilowatt hour (kWh) data
 - 24 months of peak monthly kilowatt (kW) demand data
 - 24 months of natural gas, propane, and fuel oil use
 - 24 months of purchased water data
 - 24 months of data on other water sources:
 - Surface water withdrawals
 - Groundwater withdrawals
2. Information about load demands for water and energy
3. Sewer and discharge data:
 - National Pollutant Discharge Elimination System (NPDES) discharge
 - Pretreatment discharged (more common)
 - On-site wastewater disposal
 - Lagoons and oxidation ditches
 - Description of water use processes
 - Wastewater treatment operations (e.g., methane capture, wastewater flow)
4. Landscaping activities
5. On-site wastewater disposal:
 - Lagoons, oxidation ditches
 - Spray irrigation
 - Subsurface disposal (septic systems, injection)
6. As-built plans and information on actual and planned renovations, and reconstruction
7. Reports:
 - Previous energy and water studies
 - Other applicable reports
8. General building information:
 - Square footage
 - Process and production (no proprietary information)
 - Age of building
 - Number of employees (male and female)

Appendix C
Pre-Audit Questionnaire

Pre-Audit Questionnaire
Water and Energy Efficiency Program (WEEP) for Commercial, Industrial,
and Institutional (CII) Customer Classes in Southern California

This pre-audit questionnaire is a tool to obtain basic information regarding baseline water and energy use. This background information is intended to assist the auditor(s) in planning and conducting WEEP audits of CII customer sites and should be completed prior to the site visit.

Company Name	
Street Address	
City	
County	
State/Province	
Zip Code/Postal Code	
Phone/Fax Number	
Date Questionnaire Completed	
NAICS/SIC Code	

**Pre-Audit Questionnaire
 Water and Energy Efficiency Program (WEEP) for Commercial, Industrial,
 and Institutional (CII) Customer Classes in Southern California**

Facility Contacts	Name	Telephone Number
Location Manager		
Facility Manager		
Accounting Contact (e.g., Chief Financial Officer [CFO], or Controller)		
Maintenance Manager		
Other Key Contacts: _____ _____ _____		

General Background Questions

1. What is the primary business of this location (e.g., products and services)?

2. Briefly describe the key operational processes performed at this location.

Pre-Audit Questionnaire
Water and Energy Efficiency Program (WEEP) for Commercial, Industrial,
and Institutional (CII) Customer Classes in Southern California

3. Please describe any ancillary or supporting operations performed at this location (e.g., administrative offices, sales, and servicing).

4. How large is the facility/site (e.g., acreage, number of buildings, square footage, size of process/production area, and age of building)?

5. How many employees work at the site (full/part time, salaried/hourly)?

6. Do you own or lease this location?

7. If this location is leased, what services does the landlord provide versus what you provide (e.g., heat and/or steam from boilers)?

Pre-Audit Questionnaire
Water and Energy Efficiency Program (WEEP) for Commercial, Industrial,
and Institutional (CII) Customer Classes in Southern California

8. If this location is leased, are there any other landlord or tenant operations activities conducted at this location? _____

If yes, please describe.

9. If this location is owned, do you lease it to other tenant(s)? _____

If yes, please describe the tenant(s) operations and activities. _____

10. If this location is owned, what services do you provide as the landlord versus what the tenant(s) provide (e.g., heat and/or steam from boilers)?

11. How many shifts does the plant operate? What are the hours of operation?

Pre-Audit Questionnaire
Water and Energy Efficiency Program (WEEP) for Commercial, Industrial,
and Institutional (CII) Customer Classes in Southern California

12. Have there been any significant increases or decreases in water and/or energy use over the past two years?

If yes, please explain.

13. Does this location experience any significant seasonal water and/or energy use trends? _____

If yes, please explain.

14. Do you know of any particular areas in which water and energy use could be reduced? _____

If yes, please explain.

**Pre-Audit Questionnaire
Water and Energy Efficiency Program (WEEP) for Commercial, Industrial,
and Institutional (CII) Customer Classes in Southern California**

15. Have any energy or water related studies been performed at this location?

If so, please describe briefly.

16. Have you ever considered installing energy and water efficient equipment for which energy or water rebates or incentives are available?

If so, please describe briefly.

17. Briefly describe the nature of the lighting at this location (e.g., installation and use of LEDs or HID bulbs).

18. Briefly describe the nature of the office equipment at this location.

Pre-Audit Questionnaire
Water and Energy Efficiency Program (WEEP) for Commercial, Industrial,
and Institutional (CII) Customer Classes in Southern California

19. Briefly describe the number and type of lavatories at this location (e.g., bathroom fixture ratings).

	Yes	No	N/A
--	-----	----	-----

General Water and Energy Data

20. Do you have any of the following energy-related data:

- | | | | |
|--|-----|-----|-----|
| • 24 months of kWh data? | ___ | ___ | ___ |
| • 24 months of peak monthly kW demand data? | ___ | ___ | ___ |
| • 24 months of natural gas, propane, and fuel oil use? | ___ | ___ | ___ |
| • 24 months of purchased water data? | ___ | ___ | ___ |
| • 24 months of data on other water sources? | ___ | ___ | ___ |
| • Surface water withdrawals? | ___ | ___ | ___ |
| • Groundwater withdrawals? | ___ | ___ | ___ |

21. Do you have any of the following water-related data:

- | | | | |
|--|-----|-----|-----|
| • 24 months of NPDES discharge data? | ___ | ___ | ___ |
| • 24 months of sewer discharge data? | ___ | ___ | ___ |
| • 24 months of on-site wastewater disposal data? | ___ | ___ | ___ |

Pre-Audit Questionnaire
Water and Energy Efficiency Program (WEEP) for Commercial, Industrial,
and Institutional (CII) Customer Classes in Southern California

	Yes	No	N/A
<ul style="list-style-type: none"> • Other water data (e.g., lagoons, oxidation ditches, etc.)? 	—	—	—
22. Does this location have any of the following meters:			
<ul style="list-style-type: none"> • Space condition metering? 	—	—	—
<ul style="list-style-type: none"> • Electrical metering? 	—	—	—
<ul style="list-style-type: none"> • Water and fuel metering? 	—	—	—
<ul style="list-style-type: none"> • Other metering? 	—	—	—
23. Do you have any of the following “as built” plans for this location relative to:			
<ul style="list-style-type: none"> • Equipment and industrial/business operations? 	—	—	—
<ul style="list-style-type: none"> • Modifications made since the original construction? 	—	—	—
<ul style="list-style-type: none"> • Water/plumbing diagrams? 	—	—	—
<ul style="list-style-type: none"> • Other? _____ 	—	—	—
24. Has this location implemented any water/energy conservation or efficiency measures over the past two years? Have these been related to:	—	—	—
<ul style="list-style-type: none"> • Process changes? 	—	—	—
<ul style="list-style-type: none"> • Modifications in maintenance practices? 	—	—	—

**Pre-Audit Questionnaire
 Water and Energy Efficiency Program (WEEP) for Commercial, Industrial,
 and Institutional (CII) Customer Classes in Southern California**

	Yes	No	N/A
• Participation in efficiency programs?	___	___	___
• Other? _____	___	___	___
If yes to any of the above, please describe briefly. _____			

25. Does this location have spray irrigation?	___	___	___
If yes, how many acres are irrigated?			

26. Does this location conduct any subsurface water disposal?	___	___	___
If yes, please describe.			

Applicable Site Activities

27. Does this location use or have any of the following:			
• Heating, ventilation, and air conditioning (HVAC) systems?	___	___	___
• Local ventilation systems?	___	___	___
• Irrigation or landscaping activities?	___	___	___
• Combined heat and power systems (CHPs)?	___	___	___

Pre-Audit Questionnaire
Water and Energy Efficiency Program (WEEP) for Commercial, Industrial,
and Institutional (CII) Customer Classes in Southern California

	Yes	No	N/A
• Steam equipment, industrial burners, boilers, process hot water?	—	—	—
• Process heating?	—	—	—
• Cooling towers?	—	—	—
• Once-through cooling?	—	—	—
• Process cooling and refrigeration?	—	—	—
• Motors and pumps?	—	—	—
• Compressed air systems?	—	—	—
• Wastewater treatment facilities?	—	—	—
• Process chilled water?	—	—	—
• Process water (not heated or cooled)?	—	—	—
• Purified process water?	—	—	—
• Pollution control equipment (air and water)?	—	—	—
• Process chemical baths?	—	—	—
• Process cleaning and rinsing?	—	—	—
• General washing?	—	—	—
• Kitchen/food services or cafeteria and food service?	—	—	—

**Pre-Audit Questionnaire
 Water and Energy Efficiency Program (WEEP) for Commercial, Industrial,
 and Institutional (CII) Customer Classes in Southern California**

	Yes	No	N/A
• Laundry operations?	—	—	—
• Laboratory space?	—	—	—
• Other site water and energy use activities?	—	—	—
Please explain:			

• Other industrial water and energy use activities?	—	—	—
Please explain:			

Appendix D
Opening Meeting Discussion Guide

Site Name

[Address]

[City, Country]

Audit Team

[Team leader name]

[Team member name]

Site Contacts

[Location contact name]

Site Address

[Location name]

[Street address]

[City, country, postal code]

[Phone number]

Date of Audit

[Start date to end date]

Purpose of Audit

The objectives of the audit program are to:

- Evaluate water and energy use.
- Examine opportunities to enhance water and energy efficiency by focusing on operation and maintenance practices.
- Determine whether increased efficiency can be achieved through equipment upgrades (e.g., purchase and installation of ENERGY STAR[®] equipment or equipment with high energy efficiency ratings).
- Evaluate whether the site is eligible or should apply for financial incentives to offset the financial costs associated with large process improvements.

Approach

The audit is based on:

- A physical survey of the site.
- Examination of a sample of records made available to the team.
- Interviews and discussions with key site management and staff.

Reporting

At the conclusion of the audit, the team will meet with site personnel to review the preliminary audit observations and conclusions. Two weeks after the audit, a draft report will be issued for review and comment. The audit report will include the following:

- A summary of water and energy uses on-site.
- Noteworthy practices.
- Recommendations outlining actions the facility can take to reduce water and energy use.
- Incentives analysis (i.e., cost/benefit analysis).

Comments on the draft report should be returned within two weeks. Two weeks after the team receives comments on the draft report, a final report will be issued.

Appendix E

Audit Field Tools

Attachment 1 Field Audit Tool

**The Water and Energy Efficiency Program (WEEP) for
Commercial, Industrial, and Institutional Customer Classes in
Southern California**

Audit Field Tool

Site Name _____

Site Location _____

CII Customer Class _____

Key Site Contacts _____

Dates of Audit _____

The Water and Energy Efficiency Program Audit Field Tool is designed to be completed by energy utility and water district personnel, customer representatives, or water and energy efficiency vendors. The data will be gathered through interviews with site personnel (e.g., water manager, energy manager, and maintenance personnel), review of water and energy bill/use information, water and energy utilization estimates, and physical observation of the site to document the range of water and energy uses there.

The technical information contained in this field tool was obtained from the Flex Your Power (FYP) Web site and FYP's Manufacturers Best Practice Guide,² U.S. Environmental Protection Agency's (EPA) ENERGY STAR[®] program,³ and Watersmart Guidebook – A Water-Use Efficiency Plan Review Guide for New Businesses 2008. References to energy utilities and water districts that offer rebates or other financial incentives are provided.

² <http://www.fypower.org>

³ <http://www.energystar.gov>

1. Audit Field Tool Design

A. Content of Field Tool

The WEEP audit field tool consists of the following sections:

Attachment 1: Audit Planning and Implementation Document

- Design of Audit Field Tool
- Conduct Pre-Audit Planning and Preparation
- Initiate On-site Activities
- Gather Site Water and Energy Use Data
- Identify Opportunities for Water and Energy Savings
- Schedule and Conduct the Exit Meeting
- Conduct Post Audit Activities
- Site Examples of Audit Metering Activities

Attachment 2: Heating Ventilation, and Air Conditioning (HVAC) Systems

Attachment 3: Irrigation and Landscaping Activities

Attachment 4: Lavatories

Attachment 5: Wastewater Treatment Facilities (WWTF)

Attachment 6: Cooling Towers

Attachment 7: Combined Heat and Power Systems (CHPs)

Attachment 8: Motors and Pumps

Attachment 9: Compressed Air Systems

Attachment 10: Steam Equipment

Attachment 11: Process Cooling and Refrigeration

Attachment 12: Process Heating

Attachment 13: Office Equipment/Plug Load

Attachment 14: Kitchen/Food Services

Attachment 15: Laundry Operations

Attachment 16: Site-Wide Water and Energy Use Activities and Equipment

- Car Washing
- Fire Suppression Systems

- Laboratories
- Backup Generators
- Battery Charging Operations
- Conveyor Systems
- Storage Water Heaters
- Pressurized Waterbrooms
- Instantaneous Hot Water Heaters
- Pools (covers and heaters)
- Plumbing Fixtures

Attachment 17: Lighting

Attachment 18: Hospitals

Attachment 19: Large Scale or Long Term Retrofit Incentive Programs

- Standard Performance Contracts
- Business/Industrial Efficiency Programs
- Savings by Design
- California Solar Initiative
- Self Generation Program
- Grant Program
- Net Energy Metering Program

Attachment 20: California Approved Uses of Recycled Water

With the exception of lighting, each of these systems involves a combination of water and energy use in the form of embedded energy (pumping water) or the use of energy and water to undertake an operation (e.g., cooling towers, CHPs, laundry operations, and kitchens).

In planning for audits, the teams will need to select the attachments that apply to the CII customer site for use during the review. For example, an audit of a hospital might include the attachment for hospitals as well as the lighting, lavatories, cooling towers, and HVAC attachments to guide data gathering.

B. Utilities and Water Districts Offering Incentives and Referenced In the Field Tool

The audit field tool references energy utilities and water districts offering rebates and incentives, including:

Web Site Address	
Anaheim Public Utilities http://www.anaheim.net/section.asp?id=54	Irvine Ranch Water District http://www.irwd.com
Apple Valley Ranchos Water Company http://www.avrwater.com	Long Beach Water Department http://www.lbwater.org
Azusa Light & Water http://www.ci.azusa.ca.us/index.asp?nid=132	Los Angeles Department of Water & Power (LADWP) http://www.ladwp.com/ladwp/homepage.jsp
Burbank Water and Power http://www.burbankwaterandpower.com	Metropolitan Water District of Southern California (MWD) http://www.mwdh2o.com
Calleguas Municipal Water District http://www.calleguas.com/index.html	Municipal Water District of Orange Country (MWDOC) http://www.mwdoc.com
Castaic Lake Water Agency http://www.clwa.org	Pasadena Water & Power http://ci.pasadena.ca.us/waterandpower
Central Basin Municipal Water District http://www.centralbasin.org	San Diego County Water Authority (SDCWA) http://www.sdcwa.org
City of Beverly Hills http://www.beverlyhills.org	San Diego Gas & Electric Company (SDG&E) http://www.sdge.com/index
City of Compton http://www.comptoncity.org	Sanitation Districts of Los Angeles County (LACSD) http://www.lacsd.org
City of Fullerton http://www.cityoffullerton.com	South Bay Environmental Services Center (SBESC) http://www.sbesc.com
City of Long Beach http://www.ci.long-beach.ca.us	Southern California Edison (SCE) http://www.sce.com
City of San Fernando http://www.ci.san-fernando.ca.us	Southern California Gas Company (SoCalGas) http://www.socalgas.com/index
City of San Marino http://www.ci.san-marino.ca.us	Three Valleys Municipal Water District http://www.threevalleys.com
City of Santa Ana http://www.ci.santa-ana.ca.us	Water Replenishment District of Southern California http://www.wrd.org
City of Santa Monica http://www.smgov.net	West Basin Municipal Water District http://www.westbasin.org
City of Torrance http://www.ci.torrance.ca.us	Western Municipal Water District http://www.wmwd.com
Eastern Municipal Water District http://www.emwd.org	Upper San Gabriel Valley Municipal Water District http://www.usgvmwd.org
Glendale Water & Power http://www.glendalewaterandpower.com	

2. Conduct Pre-Audit Planning and Preparation

A. Request Background Data

To make the most effective use of the on-site audit process, the team should request the information listed below from the site prior to starting on-site activities. This request should be made at least one month before the scheduled audit to allow sufficient time for the site to gather the information and send it to the team.

1. Water and energy metering and/or bills for the past two years (or request permission to collect the information directly from their utilities for each relevant meter number or account), including:
 - 24 months of kWh data
 - 24 months of peak monthly kW demand data
 - 24 months of natural gas, propane, and fuel oil use
 - 24 months of purchased water data
 - 24 months of data on other water sources
 - Surface water withdrawals
 - Groundwater withdrawals
2. Information about load demands for water and energy
3. Sewer and discharge data and related bills:
 - National Pollutant Discharge Elimination System (NPDES) discharge
 - Pretreatment discharged (more common)
 - On-site wastewater disposal
 - Lagoons, oxidation ditches
 - Effluent metering devices and locations
 - Description of water use processes
 - Wastewater treatment operations (e.g., methane capture, wastewater flow)
4. Landscaping activities
5. On-site wastewater disposal:
 - Lagoons, oxidation ditches
 - Spray irrigation
 - Subsurface disposal (septic systems, injection)
 - Flow and methane capture
6. As built-plans and information on actual and planned renovations, reconstruction

7. Reports:
 - Previous energy and water demand studies
 - Other applicable reports related to energy and water efficiency
8. General building information:
 - Square footage
 - Process and production (no proprietary information)
 - Age of building
 - Number of employees (male and female)

B. Pre-Audit Questionnaire

As part of the pre-audit planning process, the pre-audit questionnaire should be administered to site contacts.

C. Analyze Background Information

1. Overall Water and Energy Use On-Site
Based on a review of water and energy bills, record the overall use of water and energy on Tables 1 and 2.

Table 1: Overall Site Energy Consumption Patterns

Type of Energy	Energy Use/Consumption over the Past 12 Months (Units) ⁴	Energy Use/Consumption Trend over Last 2 Years (Units)
Electricity		
Natural Gas		
Heating Oil		
Renewables (note source and type on-site)		

⁴ Record units of measure.

Table 2: Overall Site Water Consumption Patterns

Water	Water Use /Consumption over the Past 12 Months (Units)	Water Use/Consumption Trend over Last 2 Years (Units)
Purchased Water (for domestic drinking water, recycled water for use on-site)		
Water Extracted from Underground Sources		
Wastewater		

2. **Monthly Seasonal Water and Energy Use Patterns**
 Based on the information received from the site, record the monthly and seasonal aspects of water and energy use, using the Tables 3 and 4 below.

Table 3: Monthly Water and Energy Use Trends

Season	Water	Wastewater	Electric	Gas
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

Table 4: Seasonal Average and Peak Water and Energy Use Trends

Season	Water		Wastewater		Electric		Gas	
	Average Daily Use	Peak Demand	Average Daily Use	Peak Discharge	Average Daily Use	Peak Demand	Average Daily Use	Peak Demand
Winter								
Spring								
Summer								
Fall								

Table 5: CII Customer Class Water and Energy Activities

CII Customer Classes				
Restaurants/Food Service	Accommodation (Hotel/Motel)	Commercial Buildings: Office and Retail	Schools and Colleges	Hospitals
<ul style="list-style-type: none"> • Dishwashing • Steaming • Frying/Grilling/ Broiling • Baking • General Cleaning • Ice Making • Refrigeration • Ventilation • Water Heating • Plumbing Fixtures (toilets) • Lighting • Cooling 	<ul style="list-style-type: none"> • Swimming Pools • Laundry • Plumbing Fixtures (toilets) • Lighting • Landscape • Food Service • Cooling Towers 	<ul style="list-style-type: none"> • Plumbing Fixtures (toilets) • Lighting • Cooling • Landscape • Food Services 	<ul style="list-style-type: none"> • Plumbing Fixtures (toilets) • Lighting • Cooling • Landscape • Food Services 	<ul style="list-style-type: none"> • X-Ray Processors • Dialysis Machines • Sterilizers and Autoclaves • Pump and Vacuum Systems • Pipe Leak Repair • Laundry • Plumbing Fixtures (toilets) • Lighting • Cooling • Landscape • Food Services
Food Processing	Textiles	Fabricated Metals	Electronics	Industrial Laundries
<ul style="list-style-type: none"> • Washing • Heating and Drying • Process Cooling • Pumping, Conveyance, Motors • Plumbing Fixtures • Lighting • Space Cooling 	<ul style="list-style-type: none"> • Preparation Scouring • Dyeing • Printing • Washing • Plumbing Fixtures (toilets) • Lighting • Cooling 	<ul style="list-style-type: none"> • Process Washing • Plumbing Fixtures (toilets) • Lighting • Cooling 	<ul style="list-style-type: none"> • Rinsing • Purified Water Treatment • Plumbing Fixtures (toilets) • Lighting • Cooling 	<ul style="list-style-type: none"> • Washers • Dyers • Lighting • Plumbing Fixtures (toilets) • Cooling

Table 6: Topics Selected for Review during WEEP Audit

Topic	Check (√) To Be Reviewed	Briefly Explain Decision ⁵
Heating, Ventilation and Air Conditioning Systems		
Irrigation and Landscaping Activities		
Lavatories		
Wastewater Treatment Facilities		
Cooling Towers		
Combined Heat and Power Systems (CHP)		
Motors and Pumps		
Compressed Air Systems		
Steam Equipment		
Process Cooling and Refrigeration		
Process Heating		
Office Equipment/Plug Load		
Kitchen/Food Services (Cafeterias)		
Laundry Operations		
Lighting		
Hospitals		
Site-Wide Water and Energy Use Activities and Equipment: <ul style="list-style-type: none"> • Car washing • Fire suppression systems • Laboratories • Conveyor systems • Battery charging operations • Pressurized waterbrooms • Storage water heaters • Instantaneous hot water heaters • Backup generators • Pool covers • Commercial pool heaters • Plumbing fixtures 		
Large Scale or Long Term Retrofit Incentive Programs: <ul style="list-style-type: none"> • Standard Performance Contracts • Industrial Efficiency Programs • Savings by Design (new construction) • California Solar Program • Self Generation Program • Energy Net Metering Program • Grant Programs 		

⁵ For example, the service area offers a number of incentives to improve performance.

E. Identify Applicable Rebate and Incentive Programs

Prior to commencing on-site activities, the team should engage in the following:

- Identify the rebates or incentives available to the CII customer site being audited. There may be instances in which a particular community is eligible for member agency rebates/incentives but not MWD rebates/incentives. In addition, new rebates may become available and others may no longer be available.
- Determine if the member agency is offering low interest loans for certain types of upgrades.
- Review the types of rate incentives available from energy utilities and water districts for efficiency practices related to reuse of water, renewables, and operation of CHPs.

Table 7 provides a list of equipment and programs associated with water and energy efficiency rebates.

Table 7: Listing of Equipment and Activities for Which Rebates and other Financial Incentives are Available

<p>HVAC</p> <ul style="list-style-type: none"> • Advanced evaporative cooler • Natural gas furnaces • Adjustable frequency drives • Reflective window film • Packaged terminal air conditioners • Thermal energy storage • Chillers for space air conditioning • Air cooled versus water cooled equipment • Ceiling fans • Cool roofs <p>Cooling Towers</p> <ul style="list-style-type: none"> • Cooling tower controllers • pH cooling tower controllers • Cooling tower retrofits <p>Hospitals</p> <ul style="list-style-type: none"> • X-ray processors • Dialysis machines • Dry vacuum pumps • Steam sterilizer retrofits <p>Large Scale or Long Term Retrofit Incentive Programs</p> <ul style="list-style-type: none"> • Standard Performance Contracts • Business Energy/Water Efficiency Programs • Savings by Design • California Solar Initiative • Self Generation Program • Grants Program • Energy Net Metering Program <p>Irrigation and Landscaping Activities</p> <ul style="list-style-type: none"> • Synthetic turf • Low water consuming plants • Weather based irrigation scheduling • Smart irrigation controllers • High efficiency nozzles • Rotating nozzles <p>Lavatories</p> <ul style="list-style-type: none"> • High efficiency toilets • Ultra low flush toilets • Zero water urinals • High efficiency urinals <p>Laundry Operations</p> <ul style="list-style-type: none"> • High efficiency commercial washers • ENERGY STAR clothes washers <p>Motors and Pumps</p> <ul style="list-style-type: none"> • High efficiency motors <p>Office Equipment/Plug Load</p> <ul style="list-style-type: none"> • Sleep mode for computer software • Plug load occupancy sensors <p>Process Heating</p> <ul style="list-style-type: none"> • Insulation 	<p>Kitchen Services</p> <ul style="list-style-type: none"> • Connectionless steam cookers • Pre-rinse spray valves • Energy efficient dishwashers • High efficiency ventilation systems • ENERGY STAR commercial dishwashers • High efficiency commercial fryers • High efficiency commercial griddles • High efficiency commercial electric combination ovens • High efficiency commercial gas combination ovens • High efficiency commercial electric convection ovens • High efficiency commercial gas convection ovens • ENERGY STAR commercial ice machines • ENERGY STAR commercial pressureless steam cookers • ENERGY STAR solid door refrigerators and freezers • Double rack/single rack ovens • Commercial insulated hot food holding cabinets • Night covers for open vertical and horizontal display cases • High efficiency refrigeration display case with special doors • High efficiency vending machine controllers • High efficiency evaporative fan motors • Refrigerator door gaskets and anti-sweat devices • Auto-closers for main cooler or freezer doors • Ice machines (air and water cooled) <p>Lighting</p> <ul style="list-style-type: none"> • Fluorescent lamps • Fluorescent tubes and magnetic ballasts • High intensity discharge (HID) lamps and high-bay fluorescent fixtures • Occupancy sensors • Light emitting diodes (LED) <p>Site-Wide Water and Energy Use Activities and Equipment</p> <ul style="list-style-type: none"> • Car washing • Fire suppression systems • Laboratories • Conveyor systems • Battery charging operations • Storage water heaters • Instantaneous hot water heaters • Pressurized waterbrooms • Backup generators • Pool covers • Commercial pool heaters • Plumbing fixtures <p>Steam Equipment</p> <ul style="list-style-type: none"> • Steam traps • High efficiency boilers
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Can any of these improvements be implemented in other areas or operations of the site?

4. Gather Site Water and Energy Use Information

Complete the applicable attachments of the audit field tool based on the prioritization scheme established for the audit.

Each of the topics included in the attachments contain a number of subtopics to explore with site personnel. The team should record audit notes in the spaces provided.

5. Identify Opportunities for Water and Energy Savings

A. Summarize On-site Water and Energy Use Patterns

Based on the site tour and information received from facility personnel, summarize the major water and energy uses on-site, completing Table 8. This information will be used as input for identifying water and energy efficiency opportunities.

Table 8: Preliminary Summary of Water and Energy Use Patterns On-site

	Water	Electric	Gas	Seasonal Factors	Peak Demand
On-site Activities	High (H) Medium (M) Low (L)	High (H) Medium (M) Low (L)	High (H) Medium (M) Low (L)	Winter (W) Spring (S) Summer (SS) Fall (F)	
On-Site Support systems (e.g., compressed air)					
Food Services					
Office Activities					
Lavatories					
Landscaping					
Lighting					
HVAC					
Cleaning					
Wastewater Treatment					
Motors and Pumps					
Others (e.g., rinse tanks, dyeing machines, ovens)					

B. Identify Efficiency Opportunities

Review the water and energy use data with site personnel to identify any potential opportunities for increasing water and energy efficiency. Record all savings potentials on Table 9, including incentives.

Table 9: Summary of Efficiency Opportunities

Water and Energy Efficiency Savings Opportunity	On-site Activities Identified for Improvement (Record Location(s) On-site)	Applicable Rebates/Incentive Categories
Equipment Upgrades (e.g., motors, pumps, lighting)		
Operations and Maintenance Practices (e.g., cooling towers)		
Process Changes		
Self Generation Potentials (e.g., solar, wind, fuel cells, CHPs)		
New Construction (Save by Design)		
Landscaping		
Others		

6. Schedule and Conduct Exit Meeting

Review the actions taken to complete each step of the protocol. Summarize your conclusions about the site’s water and energy use status and prepare a written list of your preliminary observations and use as a basis for discussion with facility staff during the exit meeting.

Record any pertinent comments provided during the exit conference:

7. Prepare Audit Report

After completing on-site audit activities, an audit report should be prepared and sent to the CII customer site within a two-week period of time. The report should include a summary of findings, recommendations for enhancing water and energy efficiency, and an analysis of the range of incentives available (i.e., cost/benefit analysis).

8. Examples of Site Metering⁶

A. Space Condition Metering

1. Review site for metering locations using building plans or consider a walk through.
2. Choose locations that are representative of directed conditions. For light operations, note locations of day lighting and security lighting fixtures. Do not locate temperature sensors directly below supply air registers for space heating applications.
3. Fill out a meter location sheet, activate meter, and affix to surface. Note locations on site map. For enclosed placements, note placement of meter with indicator tape on outside of room or enclosure. Digitally photograph meter as installed.

B. Electrical Metering

1. Choose equipment or circuit to be metered.
2. Find panel, transformer, or disconnect serving the equipment.
3. Assess voltage, amperage, access points, and condition of equipment.
 - Maximum voltage to be metered is 600V alternating current (AC). No work will take place in a confined space (i.e., limited egress spaces) as defined by Occupational Safety and Health Administration (OSHA) rules.

⁶ The guidance included in this section of the field tool is intended to serve as an example of the types of metering that could be used to further understand on-site water and energy use. The site may wish to engage in focused process metering to understand energy and water usage with efficiency opportunities.

- Personnel will follow all requirements of National Fire Prevention Association (NFPA) 70E for personal protective equipment (PPE) and procedures.
 - Whenever possible equipment should be de-energized (no voltage) and all lock out tag out procedures (energized systems are isolated and rendered inoperable) followed.
4. Open panel door and photograph the panel for later reference on what circuits the panel serves.
 5. Remove panels to expose phase conductors. Use equipment such as a Fluke 41b power analyzer and circuit ratings to determine actual and maximum expected current (Amps).
 6. Fill out panel metering form in paper or electronic form. Choose current transformers (CTs) so that capacity will not be exceeded during metering period.
 7. Photograph electrical equipment prior to placement of CTs and meter.
 8. Place CTs and attach to logging meter.
 9. Photograph electrical equipment after placement of CTs and meter.
 10. Return panel to original condition. Place indicator tape on outside of enclosure noting date, equipment placed, and technician's initials.
 11. Photograph closed panel.
 12. Place indicator tape on outside of mechanical or electrical room if in a closed area.
 13. Reverse procedure at meter removal.

C. Water and Fuel Metering

Water meters should be installed by licensed plumbing and pipe fitting personnel or by site workers. Where possible temporary meters should be installed in flanged connections so that the piping can be easily returned to its original condition. Fuel metering should be undertaken as needed making sure to comply with all local and state codes and to do so only with full approval by the site. Examples include gas metering.

D. Other Metering

Other parameters should be metered as needed including temperature, pressure, on and off times of equipment, and noise as needed using various sensors and multi-channel logging meter.

Attachment 2 Heating, Ventilation, and Air Conditioning (HVAC) Systems

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Determine whether any of the following HVAC related-equipment has been installed to reduce water and resource demands:

Adjustable speed drives (ASDs) that save energy by changing the speed of the fan motors to match the amount of air that is needed to heat or ventilate an area. (SoCalGas, SCE, PG&E, SDG&E)	
An advanced evaporative cooler that can save approximately 25% to 35% of energy costs per year. (SoCalGas, SCE, PG&E, SDG&E)	
New air conditioners with high energy efficiency ratings. (SoCalGas, SCE, PG&E, SDG&E)	
Natural gas water furnaces. (SoCalGas, SCE, PG&E, SDG&E, LADWP)	
Chillers for space conditioning. (LADWP)	
Air-cooled equipment instead of water cooled equipment that uses more energy.	
A high efficiency packaged HVAC system. (Burbank Water and Power) (Note: These can use up to 40% less energy than systems that meet minimum standards such as a high SEER [Seasonal Energy Efficiency Ratio] or, on larger units, EER [Energy Efficiency Ratio].)	

Attachment 2 Heating, Ventilation, and Air Conditioning (HVAC) Systems

<p>An energy management system (EMS). (An EMS can save 30% to 40% on an investment annually by selecting different cooling temperatures for different zones, optimizing equipment start and stop times, and control strategies that keep building occupants comfortable while minimizing energy use.)</p>	
<p>Reflective window film. (SoCalGas, SCE, PG&E, SDG&E)</p>	
<p>Central air conditioning units with high efficiency equipment. (Azusa Light & Water Riverside Public Utilities)</p>	

2. Determine whether the site has considered installing a cool roof for new construction or re-roofing of non-residential facilities to reduce energy and water demands related to HVAC systems. (Burbank Water and Power)

3. Determine whether the site has considered:

<p>Installing thermal energy storage to reduce energy consumption.</p>	
<p>Shifting demand toward the use of small air conditioners from peak to off shift. (Burbank Water and Power)</p>	

Attachment 2 Heating, Ventilation, and Air Conditioning (HVAC) Systems

4. Determine whether the site has considered:

<p>Reducing its air conditioning and heating hours by installing a time clock to turn off the system when the building is unoccupied or installing an ENERGY STAR programmable thermostat to manage daily/hourly cooling and heating needs.</p>	
<p>Adding timers and switches to shut off exhaust fans when they are not needed.</p>	

5. Determine whether the site’s cooling towers can produce cooler water that can be used by on-site chillers to reduce their energy use.

6. Discuss with facility staff the feasibility of:

<p>Installing cogeneration facilities that can burn by-product gases to generate electricity and heat for process use that can also provide space heating in office buildings or plant workspaces.</p>	
<p>Using water source pumps that have a high energy efficiency rating and can use heat from treated effluent to supply space heating.</p>	

Attachment 2 Heating, Ventilation, and Air Conditioning (HVAC) Systems

7. Discuss with site personnel the feasibility of installing shade trees to reduce air conditioning use. (Burbank Water and Power, Riverside Public Utilities, LADWP)

Attachment 3 Irrigation and Landscaping Activities

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Determine whether the facility has considered installing any of the following equipment that can reduce water and energy demands:

<p>Smart irrigation controllers to avoid over-watering and excessive run-off by scheduling the amount of irrigation based on the type of landscape and current weather conditions. (MWD and its member agencies, Azusa Light & Water, Burbank Water and Power)</p>	
<p>High efficiency nozzles for large rotary sprinklers. (MWD and its member agencies, LADWP, Burbank Water and Power, Azusa Light & Water)</p>	
<p>Rotating nozzles for pop-up spray heads. (MWD and its member agencies, LADWP, Burbank Water and Power, Azusa Light & Water, Glendale Water & Power)</p>	

Attachment 3 Irrigation and Landscaping Activities

2. Evaluate whether the facility has considered any of the following management practices to minimize water and energy use associated with irrigation and landscaping:

<p>Reducing sprinkler discharge pressure by use of pressure reducing valves. (Note: Lower discharge pressures, friction losses and pumping pressures using flow control and pressure regulators can save as much as 25% of the electricity used.)</p>	
<p>Maintaining filters, pressure reducing valves, and installing appropriately sized pipes. (Note: Economical pipe sizing and maintenance of filters greatly improve the energy efficiency of pumping systems.)</p>	
<p>Testing well pumps and improving the combined efficiency of the pump and motor or engine (overall pumping plant efficiency).</p>	
<p>Using variable speed drives (VSDs) for lift pumps. (SDG&E, SoCalGas, PG&E, SCE) (Note: VSDs save energy in that the water lifted matches the water available with very little air entrained.)</p>	

Attachment 3 Irrigation and Landscaping Activities

3. Evaluate whether the facility has considered any of the following management practices to reduce the water and energy burden associated with irrigation and landscaping:

Installing synthetic turf. (MWD and its member agencies, Burbank Water and Power, Azusa Light & Water)	
Using low water consuming plants. (Azusa Light & Water)	
Implementing weather based irrigation scheduling or other types of landscape water reduction activities [e.g., irrigation performance programs]. (City of San Diego Water Department, LADWP, MWD and its member agencies, Azusa Light & Water, Irvine Ranch Water District)	
Using recycled water for irrigation purposes. ⁷ (City of San Diego Water Department, Glendale Water & Power, MWD and its member agencies, Orange Country Municipal Water District, Irvine Ranch Water District)	

⁷ See Attachment 20 for listing of California approved uses of recycled water.

Attachment 4 Lavatories

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Determine whether the following equipment has been considered for installation:

<p>High efficiency toilets and upgrades. (MWD and its member agencies, LADWP, Burbank Water and Power, Azusa Light & Water, Glendale Water & Power, Riverside Public Utilities)</p>	
<p>Ultra low flush toilets. (MWD and its member agencies, LADWP, Burbank Water and Power, Azusa Light & Water, Glendale Water & Power, Riverside Public Utilities, San Diego Water Department)</p>	
<p>Zero water urinals and upgrades. (MWD and its member agencies, LADWP, Burbank Water and Power, Azusa Light & Water, Glendale Water & Power)</p>	
<p>High efficiency urinals (HEU). (MWD and its member agencies, Azusa Light & Water, LADWP, Burbank Water and Power, Glendale Water & Power)</p>	
<p>High efficiency faucets.</p>	

Attachment 5 Wastewater Treatment Facilities

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Discuss with site personnel the feasibility of reducing water and energy use by examining each of the following practices:

<p>Operating the Wastewater Treatment Plant (WWTP) air-activated sludge system’s blowers on lower speeds or use fewer blowers during times when the Biological Oxygen Demand (BOD) is not at its maximum for the day. (Note: This action can reduce an aeration system’s energy usage up to 35%.)</p>	
<p>Installing smaller blowers alongside existing larger ones until influent levels increase, or using only the lower-horsepower blowers in order to save between 5% and 40% of aeration system usage.</p>	
<p>Switching to airlift pumps.</p>	
<p>Using ultraviolet disinfecting systems.</p>	
<p>Using low-pressure membrane filtration systems.</p>	
<p>Installing a combined heat and power (CHP) option for anaerobic digesters for WWPTs > 5 million gallons per day (MGDs). (CA favorable gas rate provisions offered by utilities for energy efficient technologies.) (Note: Biogas generated from digesters could be used to fire boilers and hot water heaters, generate electricity to operate pumps and blowers, micro turbines.)</p>	

Attachment 5 Wastewater Treatment Facilities

2. Determine whether the site can use its treated wastewater for landscaping, cooling water, etc.⁸

⁸ See Attachment 20 for listing of California approved uses of recycled water.

Attachment 6 Cooling Towers

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Based on interviews with site personnel, determine the feasibility of installing the following equipment to improve water and energy efficiency:

Cooling tower controllers. (MWD and its member agencies, LADWP, Burbank Water and Power, Azusa Light & Water, Glendale Water & Power)	
pH cooling tower controllers. (MWD and its member agencies, LADWP, Burbank Water and Power, Azusa Light & Water, Glendale Water & Power)	

2. Discuss with site personnel whether it would be feasible to retrofit cooling towers to improve water efficiency. (MWD and its member agencies)

3. Determine if the site treats cooling water to eliminate corrosion and blockage as a means to increase efficiency and to reduce blow down.

4. If the site has cooling tower controllers in place, confirm that they are being inspected and maintained on a periodic basis to ensure performance.

Attachment 7 Combined Heat and Power Systems (CHPs)

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Determine whether the site has considered installing CHP systems to reduce operating costs associated with energy use for hot water and heat and cooling processes. (CA favorable gas rate provisions offered by utilities for energy efficient technologies [feed in tariffs]).

2. If a CHP has been installed or is being considered for installation, determine whether it has been sized appropriately and that it will be used throughout most of the year.

Attachment 8 Motors and Pumps

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Discuss with site personnel the following options to reduce energy demand:

Matching the motor drive size with load.	
Adjusting the impeller in pumps to maximize efficiency.	
Installing parallel systems for highly variable loads. (Note: This can save as much as 30% in energy use.)	
Installing timers, level sensors, material sensors, or other controls for automatic operation and/or to shut off equipment.	
Replacing throttle controls with a solid-state variable system drive control and fan discharges with inlet vane controls. (Note: These measures can save as much 50% of system energy.)	
Installing variable frequency drives (VSD) or ASDs to adjust the speed of an electric motor by modulating the power being delivered. (SDD&E, SCE, PG&E, SoCalGas) (Note: VSDs match motor speed to the specific demands of the work being performed.)	

Attachment 8 Motors and Pumps

Installing of energy-efficient motors to reduce energy consumption. (Burbank Water and Power, Riverside Public Utilities) (Note: Higher motor performance is related to design improvements such as lengthening the core and using lower-electrical-loss steel, thinner stator laminations, and more copper in the windings to reduce electrical losses.)	
Installing pumps and engines that provide increased energy efficiency. (SoCalGas, SCE)	

2. Discuss whether the site has selected the optimum number of pumps to operate by matching the required flow rates with the efficient operating ranges of the individual pumps.

Attachment 9 Compressed Air Systems

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Evaluate whether the following operational practices are in place to maintain the efficiency of compressed air systems:

Air receivers/surge tanks are used to buffer short-term demand changes and reduce on/off recycling of the compressors.	
Cooler intake air is used to reduce energy demands.	
The compressed air system does not run when the plant is not in use (i.e., overnight or on the weekends; this action can save up to 20% of a system's electricity usage).	
Smaller air compressors have been installed and are used to serve minimal after-hour needs.	
Compressed air is not used for cleaning purposes; instead blowers or hand sweeping equipment is used, which can save up to 10% of compressed air system usage.	
The size of the compressor is matched against load size and end uses.	

Attachment 9 Compressed Air Systems

2. Determine whether the site has installed air storage in a strategic manner to minimize system horsepower requirements and improve delivery of air.

(Note: This measure can reduce the system’s electricity usage by 15% to 35%.)

3. Determine whether multiple compressors are sequenced using automatic sequencing controls to reduce energy use.

(Note: Shutoff timers should be used on all air compressors. Installing microprocessor controls on compressor systems can yield savings in the 2% to 4% range.)

4. Confirm that:

Air leaks are repaired to reduce compressor use time.	
Air filters are maintained to optimize the efficiency of the system.	
Compressor pressure is checked periodically to confirm that air is produced at a pressure high enough to overcome pressure losses.	

Attachment 10 Steam Equipment

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Look at equipment drawings and discuss with site personnel the size of the boiler system to determine whether it has been sized appropriately (i.e., steam output/fuel input, piping) to reduce energy/water demands.

2. Assess whether the site has analyzed the flue gas to measure the amount of oxygen and the stack gas temperature to calculate boiler efficiency and made adjustments to optimize the level of excess air and incoming air temperatures.

3. Evaluate the extent to which the site treats feed water before it is pumped into the boiler to help maintain efficiency.

4. Determine whether the site regularly maintains steam traps or plans to install steam traps. (SoCalGas, SCE, PG&E, SDG&E)

(Note: A site can save 2% of its total energy use and 10% to 20% of the boiler's fuel use.)

Attachment 10 Steam Equipment

5. Tour the site to assess whether steam and condensate return lines, boilers and pipes are properly insulated. (SDG&E, PG&E, SoCalGas, SCE)

(Note: Insulation can typically reduce total facility energy consumption by 1% and help ensure proper steam pressure at plant equipment.)

6. Discuss with site personnel the feasibility of installing the following equipment to reduce energy use:

<p>A condensate return loop. (Note: Condensate return to the boiler is essential for energy efficiency. Direct contact condensation heat recovery can save 8% to 20% of a boiler’s fuel use.)</p>	
<p>Heat economizers to recover waste heat from the stack.</p>	
<p>Air steam atomizing burners. (Note: This action reduces boiler fuel use by 2% to 8%.)</p>	
<p>High efficiency commercial boilers, process boilers, and/or space heat boilers. (SoCalGas, SCE, PG&E, SDG&E)</p>	

Attachment 10 Steam Equipment

7. Discuss with site personnel the feasibility of implementing the following operational changes to reduce water and energy demands:

Use of blowdown heat recovery to reduce a boiler's fuel use by 2% to 5%.	
Use of electronic controllers to automate bottom blowdown so as to reduce the frequency without allowing buildup of impurities.	
Re-configuring the boiler to use biomass.	

Attachment 11 Process Cooling and Refrigeration

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded.

1. Discuss with site personnel whether the following actions have been considered or undertaken to reduce energy and water use:

Load shifting during periods of high-energy use and/or using thermal storage during periods of low-energy use to reduce the total energy demand.	
Eliminating losses from leaks and improper defrosting. (Note: This action can reduce refrigeration system energy use by 10% to 20%)	
Freezing products in batches rather than continuously. (Note: This measure can reduce the freezing process energy use by up to 20%.)	
Adding evaporator capacity to reduce evaporator approach temperature and raise suction pressure.	
Installing a thermosyphon cooling system to cool the compressor oil.	
Installing additional condensing capacity to reduce discharge pressure. (Note: Reducing condenser pressure by 10 psi can decrease refrigeration system energy use per ton of refrigeration by about 6%.)	
Replacing constant speed drives with variable speed drives to reduce cooling system energy use. (SoCalGas, SCE, PG&E, SDG&E)	

Attachment 11 Process Cooling and Refrigeration

<p>Insulating the cooler/freezer area. (SoCalGas, SCE, PG&E, SDG&E)</p>	
<p>Investing in mechanical sub cooling. (Note: This is a method of cooling liquid refrigerant below saturation pressure in order to increase system capacity and improve efficiency. Energy savings can be achieved up to 25%.)</p>	

Attachment 12 Process Heating

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Determine whether the following efficiency measures are being used:

<p>Appropriate operating temperatures for part load activities to avoid long “soak” or overheating. (Note: This action can save up to 10% of current energy use.)</p>	
<p>Direct natural gas firing is used instead of indirect steam heating. (Note: This measure can save 33% to 45% of the energy used by a process heating system.)</p>	
<p>Fixtures, trays and baskets. (Note: These upgrades can save up to 25% of a system’s energy usage.)</p>	
<p>Adequate and optimum insulation for process heating equipment is used. (SoCalGas, SCE, PG&E,SDG&E)</p>	

Attachment 13 Office Equipment and Plug Load

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Discuss with site personnel whether or not the following practices are in place to reduce energy use:

Turning off office equipment such as printers, computers, fax machines, and coffee maker at night.	
Installing personal computer (PC) software that puts monitors in sleep mode when not in use. (SoCalGas, SCE, PG&E, SDG&E) (Note: According to FYP information, this can save \$0.085/kWh of the power used by networks.)	
Using PC network software, capable of measuring and managing power consumption for each PC (and report the energy saving results).	
Using plug load occupancy sensors set at 50 watts or more. (SoCalGas, SCE, PG&E, SDG&E)	

Attachment 13 Office Equipment and Plug Load

2. Determine if the site has considered installing the following types of equipment:

ENERGY STAR air room cleaners	
ENERGY STAR copiers and fax machines	
ENERGY STAR digital duplicator	
ENERGY STAR mailing machines	
ENERGY STAR printers and scanners	
ENERGY STAR battery charging systems	
ENERGY STAR dehumidifiers	

Attachment 14 Kitchen and Food Services

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Determine whether the following actions have been considered or implemented to reduce water and energy consumption:

<p>Purchasing insulated cooking equipment whenever possible (e.g., fryers, ovens, coffee machine). (Note: Insulation retains more heat in the equipment.)</p>	
<p>Replacing old, high-volume kitchen sprayers with high-velocity, low-flow models.</p>	
<p>Checking temperature settings of refrigerators. (Note: The most common recommended settings are between -14 degrees and -8 degrees Fahrenheit for freezers and between 35 degrees and 38 degrees Fahrenheit for refrigerators.)</p>	
<p>Returning and reusing condensate for all boiler type steam kettles.</p>	
<p>Insulating condensate return lines.</p>	
<p>Installing a plastic strip curtain over the entrance to the walk in refrigerator/freezer to minimize cooling losses during loading/unloading.</p>	

<p>Performing scheduled maintenance on refrigeration units. (Note: It is recommended that sites keep evaporator coils clean and free of ice buildup.)</p>	
<p>Installing energy efficient connectionless steam cookers that use less energy and less water, where applicable or feasible. (MWD and its member agencies, LADWP, Burbank Water and Power, Azusa Light & Water, Central Basin Municipal Water District, Glendale Water & Power)</p>	
<p>Installing energy efficient dishwashers. (SoCalGas, SCE, PG&E, SDG&E)</p>	
<p>Installing pre-rinse spray valves that save energy by using less hot water. (MWD and its member agencies, LADWP, Burbank Water and Power, Glendale Water & Power)</p>	
<p>Installing energy efficient garbage disposers.</p>	
<p>Reducing temperature of fryers and grills during standby times.</p>	
<p>Opting to use ovens, steamers, and/or fryers to minimize the use of range tops, griddles, and broilers.</p>	
<p>Directing cooling fans towards employees instead of equipment.</p>	

Installing ENERGY STAR ventilation systems. (SoCalGas, SCE, PG&E, SDG&E)	
Installing ENERGY STAR commercial dishwaters. (MWD and its member agencies, LADWP, Burbank Water and Power, Azusa Light & Water, Glendale Water & Power, SoCalGas, SCE, PG&E, SDG&E)	
Using high efficiency commercial fryers [gas or electric]. (SoCalGas, SCE, PG&E, SDG&E)	
Using high efficiency commercial griddles [gas or electric]. (SoCalGas, SCE, PG&E, SDG&E)	
Using high efficiency commercial electric combination ovens. (SoCalGas, SCE, PG&E, SDG&E)	
Using high efficiency commercial gas combination ovens. (SoCalGas, SCE, PG&E, SDG&E)	
Using commercial high efficiency electric convection ovens. (SoCalGas, SCE, PG&E, SDG&E)	
Using commercial high efficiency gas convection ovens. (SoCalGas, SCE, PG&E, SDG&E)	
Using commercial high efficiency conveyor ovens. (SoCalGas, SCE, PG&E, SDG&E)	
Installing ENERGY STAR commercial ice machines. (SoCalGas, SCE, PG&E, SDG&E, LADWP, MWD and its member agencies)	

Attachment 14

Kitchen and Food Services

Using ENERGY STAR commercial pressureless steam cookers. (SoCalGas, SCE, PG&E, SDG&E)	
Using commercial ENERGY STAR solid door refrigerators and freezers. (SoCalGas, SCE, PG&E,SDG&E)	
Using double rack/single rack ovens. (SoCalGas)	
Using commercial insulated hot food holding cabinets. (SoCalGas, SCE, PG&E, SDG&E)	
Using night covers for open vertical and horizontal display cases. (SoCalGas, SCE, PG&E, SDG&E, LADWP)	
Using high efficiency refrigeration display cases with special doors. (SoCalGas, SCE, PG&E, SDG&E)	
Installing high efficiency vending machine controllers. (SoCalGas, SCE, PG&E, SDG&, LADWP)	
Installing efficient evaporative fan motors. (SoCalGas, SCE, PG&E, SDG&E, LADWP)	
Periodically installing refrigerator door gaskets and anti-sweat devices. (SoCalGas, SCE, PG&E, SDG&, LADWP)	
Installing auto-closers for main cooler or freezer doors. (SoCalGas, SCE, PG&E, SDG&E, LAWP)	

Attachment 15 Laundry Operations

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Determine whether the site has considered the following equipment purchases to reduce resource use:

<p>Installing high-efficiency commercial washers, including but not limited to front-loading machines. (MWD and its member agencies, Burbank Water and Power, Azusa Light & Water, Glendale Water & Power) (Note: This can cut energy costs up to 50% and use about 30% less energy.)</p>	
<p>Installing high efficiency ENERGY STAR clothes washers. (MWD and its member agencies, Burbank Water and Power, Azusa Light & Water, Glendale Water & Power, SoCalGas, SCE, PG&E, SDG&E, LADWP, Riverside Public Utilities, City of San Diego Water Department)</p>	

Attachment 16 Site Wide Water and Energy Activities and Equipment

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Discuss with site personnel alternative practices to reduce energy and water use associated with the following activities:

Car washing (e.g., use water for irrigation)	
Fire suppression systems	
Conveyor systems	
Laboratories (check for operation of equipment and sources of water use)	
Battery charging operations	
Pressurized waterbrooms	
Instantaneous hot water heaters	
Storage water heaters	
Pool covers to reduce evaporation and save water and energy	
Commercial pool heaters	

2. Determine whether the site has considered installing water-conserving plumbing fixtures prior to a change in property ownership resulting from a purchase or sale. Record any suggested improvements.

Attachment 17 Lighting

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Determine whether the site has considered the following measures to reduce energy use:

Replacement of incandescent bulbs with compact fluorescent lamps [T8s, T5s, and T5H0s]. (Burbank Water and Power, LADWP, SoCalGas, SCE, PG&E, SDG&E, Riverside Public Utilities)	
Replacement of fluorescent tubes and magnetic ballasts with T8 and T5 tubes and electronic fixtures. (SoCalGas, SCE, PG&E, SDG&E, LADWP, Riverside Public Utilities)	
Replacement of warehouse and other high bay lighting with HID (high intensity discharge) lamps or high-bay fluorescent fixtures. (SoCalGas, SCE, PG&E, SDG&E, LADWP)	
Installation of occupancy sensors in general usage areas so that lights turn on only when the area is occupied and turn off automatically when the area is not. (SoCalGas, SCE, PG&E, SDG&E, LADWP)	
Use of LED (light emitting diode) exit signs and other LED lighting and signage. (SoCalGas, SCE, PG&E, SDG&E, LADWP)	
Rewiring of restroom fans to operate when lights are turned on and turn off after a time when the restroom is unoccupied.	
Installation of energy management system (EMS) technology to control lighting systems automatically.	

Attachment 18 Hospitals

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

1. Discuss with hospital personnel alternative practices to reduce energy and water use associated with the following activities or equipment:

<p>X-ray processors. (LADWP, MWD and its member utilities, Burbank Water and Power, Azusa Light & Water, Central Basin Municipal Water District, Glendale Water & Power)</p>	
<p>Installation of dry vacuum pumps. (MWD and its member utilities, LADWP, Burbank Water and Power, Azusa Light & Water, Glendale Water & Power)</p>	
<p>Steam sterilizer retrofits. (MWD and its member utilities, LADWP, Burbank Water and Power, Azusa Light & Water, Glendale Water & Power)</p>	

Examples of energy utilities or water districts offering incentives are included in parenthesis. Audit comments should be recorded in the space provided.

Discuss with site personnel alternative practices to reduce energy and water use associated with the incentive programs below.

<p>Standard Performance Contracts - Involving retrofits of existing equipment or systems with new high efficiency equipment. (SDG&E, SCE)</p>	
<p>Business/Industrial Efficiency Programs - (e.g., Water Savings Performance Program) Designed for customers with equipment replacements or process improvements that result in demonstrated savings. For example:</p> <ul style="list-style-type: none"> • Installation of equipment to capture, treat and reuse water that would otherwise be discharged to the sewer. • Replacement of existing equipment with more efficient process improvements resulting in reduced water or energy demand. • Leaks associated with distribution lines. • Process modifications that reduce water or energy usage. <p>(Glendale Water & Power, Riverside Public Utilities, Azusa Light & Power, SCE, SoCalGas, PG&E, SDG&E, LADWP, MWD and its member agencies)</p>	

<p>Savings by Design - Design, expand, or change new or existing processes and facilities to encourage energy efficient building design and construction. (LADWP, SoCalGas, Burbank Water and Power, Riverside Public Utilities, PG&E, SDG&E, SCE)</p>	
<p>California Solar Initiative - Focused on the installation of solar technologies to reduce reliance on fossil fuels. (LADWP, Azusa Light & Water, Glendale Water & Power, Riverside Public Utilities, SCE, PG&E, SDG&E)</p>	
<p>Self Generation Incentive - Program for businesses installing eligible renewable energy-efficient self generation equipment [i.e., installation wind, fuel cells or distributed generation facilities to meet all or a portion of their energy needs]. (PG&E, SCE, SDG&E)</p>	
<p>Grant Programs - Undertake research, development and use of innovative energy technologies. (Riverside Public Utilities)</p>	
<p>Net Energy Metering - Program to offset utility charges with credits from on-site power production [solar, wind, biogas, fuel cells]. (PG&E, SCE, SDG&, SoCalGas)</p>	

TREATMENT LEVEL⁹				
Use of Recycled Water	Disinfected Tertiary Recycled Water	Disinfected Secondary-2.2 Recycled Water	Disinfected Secondary-23 Recycled Water	Un-disinfected Secondary Recycled Water
<i>Irrigation of:</i>				
Food crops where recycled water contacts the edible portion of the crop, including all root crops	Allowed	Not allowed	Not allowed	Not allowed
Parks and playgrounds	Allowed	Not allowed	Not allowed	Not allowed
School yards	Allowed	Not allowed	Not allowed	Not allowed
Residential landscaping	Allowed	Not allowed	Not allowed	Not allowed
Unrestricted-access golf courses	Allowed	Not allowed	Not allowed	Not allowed
Any other irrigation uses not prohibited by other provisions of the California Code of Regulations	Allowed	Not allowed	Not allowed	Not allowed
Food crops, surface-irrigated, above-ground edible portion, and not contacted by recycled water	Allowed	Allowed	Not allowed	Not allowed
Cemeteries	Allowed	Allowed	Allowed	Not allowed
Freeway landscaping	Allowed	Allowed	Allowed	Not allowed
Restricted-access golf courses	Allowed	Allowed	Allowed	Not allowed
Ornamental nursery stock and sod farms with unrestricted public access	Allowed	Allowed	Allowed	Not allowed
Pasture for milk animals for human consumption	Allowed	Allowed	Allowed	Not allowed
Non-edible vegetation with access control to prevent use as a park, playground or school yard	Allowed	Allowed	Allowed	Not allowed
Orchards with no contact between edible portion and recycled water	Allowed	Allowed	Allowed	Allowed
Vineyards with no contact between edible portion and recycled water	Allowed	Allowed	Allowed	Allowed
Non food-bearing trees, including Christmas trees not irrigated less than 14 days before harvest	Allowed	Allowed	Allowed	Allowed
Fodder and fiber crops and pasture for animals not producing milk for human consumption	Allowed	Allowed	Allowed	Allowed

⁹ This summary is prepared for WateReuse Association from the December 2, 2000-adopted Title 22 Water Recycling Criteria and supersedes all earlier versions (www.watereuse.org).

Attachment 20

California Approved Uses of Reused Water

Seed crops not eaten by humans	Allowed	Allowed	Allowed	Allowed
Food crops undergoing commercial pathogen-destroying processing before consumption by humans	Allowed	Allowed	Allowed	Allowed
<i>Supply for impoundment:</i>				
Non-restricted recreational impoundments, with supplemental monitoring for pathogenic organisms	Allowed ²	Not allowed	Not allowed	Not allowed
Restricted recreational impoundments and publicly accessible fish hatcheries	Allowed	Allowed	Not allowed	Not allowed
Landscape impoundments without decorative fountains	Allowed	Allowed	Allowed	Not allowed
Supply for cooling or air conditioning:				
Industrial or commercial cooling or air conditioning involving cooling tower, evaporative condenser, or spraying that creates a mist	Allowed ³	Not allowed	Not allowed	Not allowed
Industrial or commercial cooling or air conditioning not involving cooling tower, evaporative condenser, or spraying that creates a mist	Allowed	Allowed	Allowed	Not allowed

Appendix F
Example Audit Report and Transmittal Letter

Date

Name (Site Manager or equivalent)

Address

Subject: WEEP Audit

Dear XX:

Thank you very much for the cooperation your staff exhibited during the Water and Energy Efficiency (WEEP) audit conducted on *(Date)*. The assistance your staff provided was extremely useful in helping the team conduct an efficient and thorough review. Furthermore, we appreciate the open and candid discussions the team had with your staff. We believe this contributed to the overall quality of the audit, the team's ability to evaluate water and energy use, and the identification of opportunities to enhance performance in an objective and systematic manner.

The audit report, covering a review of water and energy efficiency options and financial incentives for your site, is attached for your review. Please send me your comments by *(Date - two weeks after issuance of the draft report)*. I plan to issue the final audit report to you on *(Date - two weeks after receipt of comments)*.

Thank you.

Sincerely,

XXX

Attachment

Water and Energy Efficiency Audit of XXX Site

*Example Final Report to
BBB Company*

Conducted by XXX

Date

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I. Introduction

A. Purpose and Scope

The purpose of the Water and Energy Efficiency Program (WEEP) audit conducted at the XX site is to assess current activities to establish a basis for enhancing the level of water and energy efficiency at the site. Specifically, the audit was designed to:

- Evaluate water and energy use.
- Examine opportunities to enhance water and energy efficiency by focusing on operation and maintenance practices.
- Determine whether increased efficiency can be achieved through equipment upgrades (e.g., purchase and installation ENERGY STAR[®] equipment or equipment with high energy efficiency ratings).
- Evaluate whether the site is eligible and should apply for incentives to help finance the costs associated with large process improvements.

B. Audit Approach

The fieldwork portion of the audit was conducted (*Dates of Audit*). The audit was based on:

- Physical inspections of the site.
- Examination of selected electric and water administrative and operating records made available to the team.
- Interviews and discussions with key facility management and staff.

The audit followed the audit field tool that was developed for WEEP. It should be noted that efforts were directed toward sampling major facets of water and energy performance and was undertaken within a relatively short period of time. Thus, additional improvement opportunities might be determined through subsequent audits.

I. Introduction

C. Report Format

Section II includes the team's overall audit summary and specific audit findings. Section III includes recommendations and an analysis of the various incentives available to help facility personnel justify or support activities to enhance water and energy efficiency on-site.

II. Audit Findings

A. Overall Summary

On the basis of our review, the audit team identified the following general observations:

Summarize Key Findings

- The largest uses of water and energy on-site include wastewater treatment, process heating, and kitchen services.
- The average and peak water and energy demands occur in the winter when production activities are high.
- The site has actively pursued the installation of high efficiency equipment and has applied for incentives to cover large scale process improvements.

Provide Overall Assessment for Enhancing Water and Energy Efficiency Practices On-site

- Opportunities exist to enhance water and energy efficiency on-site through the self generation incentive program.

For each section below, summarize site activities and specific topical findings. If no issues were identified, indicate there were no findings.

B. Heating, Ventilation and Air Conditioning Systems

No findings or recommendations were noted.

C. Irrigation/Landscaping Activities

The site irrigates daily and uses approximately XX of water for this purpose but has not considered the purchase of smart controllers or the use of low watering plants. Upgrading the system with XX controllers and XX water plants would decrease energy and water use by approximately X%.

D. Lavatories

There are 49 toilets on-site; none of these have been replaced with high efficiency toilets. This would save approximately X% energy and X% water.

II. Audit Findings

E. Wastewater Treatment Facilities

Currently the site is using XX treatment equipment that consumes approximately XX% of energy and YY% of water per year. This equipment is more than 10 years old. Installation of new equipment could reduce water and energy consumption by 10%.

F. Cooling Towers

This topic was not included in the scope of the audit.

G. Combined Heat and Power Systems (CHPs)

The site does not generate sufficient steam or waste to justify the installation of a combined heat and power system.

H. Motors and Pumps

This topic was not included in the scope of the audit.

I. Compressed Air Systems

This topic was not included in the scope of the audit.

J. Steam Equipment

The site generates very little steam to support operations or as a by-product of manufacturing activities.

K. Process Cooling and Refrigeration

This topic was not included in the scope of the audit.

L. Process Heating

This topic was not included in the scope of the audit.

II. Audit Findings

M. Office Equipment/Plug Load

The site has not installed computer software to reduce the plug load demand of its office computers. The areas on-site where office computers are used include X, Y, and Z.

N. Kitchen/Food Services

This topic was not included in the scope of the audit.

O. Laundry Operations

This topic was not included in the scope of the audit.

P. Other Site Water and Energy Use Activities

This topic was not included in the scope of the audit.

Q. State Business Incentive Programs

This topic was not included in the scope of the audit.

R. Lighting

The site uses approximately XX of electricity to meet its lighting needs. The lighting system has not been upgraded to reduce energy demand.

S. Other Industrial Water and Energy Use Activities

This topic was not included in the scope of the audit.

III. Recommendations and Incentives Analysis

A. Recommendations

- *List recommendations for enhancing performance. For example:*

By installing energy efficiency lighting in sections A, B, and C of the site, energy consumption could be reduced by approximately 25%. This is based on

B. Incentives Analysis

- *Discuss the relative merit associated with implementing the recommendations as a function of the incentives analysis. For example:*

By requesting lighting rebates the site could save \$2000 in the cost of new equipment. This would offset the overall installation cost by 10%. The energy savings would be achieved in 2 years. Incentives are available from XX.

C. Water and Energy Efficiency Measures

- Discussion of the effects, if any, the water and energy efficiency measures will have on operational/product quality or customer activities.
- Impact of proposed water efficiency measures on effluent discharge authorizations or permit.

Appendix G

Acronyms

AC	Alternating Current
ASD	Adjustable Speed Drives
BOD	Biological Oxygen Demand
CEC	California Energy Commission
CFO	Chief Financial Officer
CHP	Combined Heat and Power
CHPS	Collaborative for High Performance Schools
CII	Commercial, Industrial and Institutional
CPUC	California Public Utilities Commission
CT	Current Transformers
DWR	Department of Water Resources
EER	Energy Efficiency Ratio
EMS	Energy Management System
EPA	U.S. Environmental Protection Agency
FYP	Flex Your Power
HEU	High Efficiency Urinals
HID	High Intensity Discharge
HVAC	Heating, Ventilation, and Air Conditioning
kW	Kilowatt
kWh	Kilowatt Hour
MWD	Metropolitan Water District of Southern California

LADWP	Los Angeles Department of Water and Power
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
MGD	Million Gallons per Day
NAICS	North American Industry Classification System
NFPA	National Fire Prevention Association
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PAC	Project Advisory Committee
PPE	Personal Protective Equipment
PC	Personal Computer
Reclamation	Bureau of Reclamation
PG&E	Pacific Gas and Electric Company
SCE	Southern California Edison
SDCWA	San Diego County Water Authority
SDG&E	San Diego Gas & Electric Company
SIC	Standard Industrial Classification
SEER	Seasonal Energy Efficiency Ratio
VSD	Variable Speed Drives
WWTP	Wastewater Treatment Plant

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