STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
Stream Protection and Management Branch

FIELD INVESTIGATION REPORT

FI2009040801 (Maui, HC&S Sugar Mill)

Date of Field Investigation:	April 8, 2009 **Time** (24-hour)**:** 0800 - 1700
CWRM Staff:	Ed Sakoda, Dean Uyeno, and Chui Ling Cheng
Individuals Present:	Department of Agriculture - Brian Kau HC&S Staff - Donn Soares, Vice President of Sales and Marketing for Maui Brand Sugar; Rick Volner, Jr., Senior Vice President of Ag Operations; Robert Luuwai, Vice President of Factory Operations; Rodney Chin, Director of Farming Operations; Chris Benjamin, Plantation General Manager; Garret Hew, Manager of Water Resources.
Hydrologic Unit:	
Stream Name:	

Findings:

The purpose of this field visit was to meet with representatives of the Hawaiian Commercial and Sugar Company (HC&S) to learn more about their mill operations, sugar processing, field operations, drip irrigation system, and hydroelectric facilities. Water Resources Manager Garret Hew organized the day's agenda.

Maui Brand® Sugar Production

At 0800 hours, staff met with Donn Soares who provided an overview of the sugar processing, sales and marketing strategies for Maui Brand® Sugar. Staff also toured its production and packaging facility. Maui Brand® Sugar is a type of specialty sugar produced by HC&S. It comes in two varieties, Natural Hawaiian Raw Sugar (white-colored) and Premium Hawaiian Turbinado (amber-colored). The raw sugar is available to retail or wholesale customers in single-serve packets; one and two-pound gift bottles; 5-, 10- and 50-pound bags; and one-ton supersacks.

Sugar Milling and Processing

At 0900 hours, staff met with Robert Luuwai to tour the Puunene Mill and learn about the various factory operations. Generally, harvested cane stalks are unloaded from a large trailer into the cane cleaner where they are washed. Soil, rocks, and debris are removed in a "sinkfloat". Eventually, the soil is returned to the fields. Washed cane stalks are chopped into smaller pieces by a set of revolving knives, and then a shredder crushes the stalks. A series of high-pressure rollers extracts about 95% of the liquid from the cane. The liquid is then transported to the boiling house and the leftover fiber (bagasse) is used for fuel in the factory's steam generating plant. One ton of bagasse produces the same amount of energy as a barrel of crude oil. Before the liquid is heated, lime juice is added to begin the clarifying process that prevents undesirable and premature conversion of sucrose into simple sugars, which cannot be crystallized. The clarifier separates insoluble materials from the liquid, which is then condensed to syrup through an evaporation using recycled heat. This process forces the syrup to crystallize. Molasses is separated from the raw sugar crystals by a centrifuge.

Kaheka Hydroelectric Plant

At 1100 hours, staff toured the Kaheka Hydroelectric Plant. Water from EMI's Lowrie Ditch is used to produce renewable energy for HC&S' power needs. This plant is capable of producing 4.5 megawatts of power. Power generated from three of HC&S' hydroelectric plants (Kaheka, Paia, and Hamakua) and the burning of bagasse are used to satisfy sugar mill power requirements first, while the remaining power can be sold to Maui Electric Company (MECO). HC&S is currently providing about 12 megawatts of power to MECO.

Field Operations

After lunch at about 1300 hours, Rick Volner, Rodney Chin, and Garret Hew took staff to observe some of the field operations. First, staff observed field preparation, planting and irrigation installation. Generally, the soil is plowed before the planting of seed cane. Planting is done by machines that dig furrows, drop the seed cane pieces and inject irrigation tubing all at the same time. Workers were seen to assist with evening out the seed cane placement in the field. HC&S uses drip irrigation tubing that is replaced with every cane burning before harvesting. HC&S uses herbicides during the first six months of growth while the cane is still short.

Next, staff examined different fields of varying ages of cane crop. Usually, the age of the crop can be estimated by counting the number of nodes on the cane. A year of growth is indicated with three nodes. During times of drought, cane will grow slower and the length between each node is shorter. HC&S staff showed a cane stalk with stunted growth due to the lack of water.

When the cane is ready to harvest, the fields are burned to remove the leaves (the stalks do not burn). Cane burning is carefully planned to account for wind and weather conditions. It is usually done in the early morning hours to minimize impact to the plantation's neighbors. After the fields are burned, harvesting machines rip stalks from the root system and gathers them into large piles. The stalks are then loaded into trucks (weight capacity of 60 tons) to be transported to the factory. During the harvest season, the sugar mill is in operation at all times.

Staff also toured the seed cane fields.

Information contained in this report represents an overview of what was presented to CWRM staff during the field visit. CWRM staff is working with HC&S representatives to compile more detailed information on the plants' operations.

Staff concluded the site visit at 1700 hours.

Image Listing: (Attach PDF of image contact sheet)

File Name:	Brief Description:
20090408001	Sugar production facility at HC&S Sugar Mill.
20090408004	Sugar production at HC&S Sugar Mill.
20090408009	Sugar production at HC&S Sugar Mill. Difference between fine grain and larger grain of sugar.
20090408010	Sugar production at HC&S Sugar Mill. The grain size of this sugar is not the right size so is it rejected.
20090408015	Sugar packaging facility at HC&S Sugar Mill.
20090408016	Sugar packaging facility at HC&S Sugar Mill.
20090408017	Sugar packaging facility at HC&S Sugar Mill.
20090408019	Sugar packaging facility at HC&S Sugar Mill.
20090408022	Sugarcane harvest from the field and transported to the factory for processing.
20090408023	Sugarcane collected from the field and transported to the factory for processing. The sugarcane goes into the cane cleaner where soil and debris are removed from the cane.
20090408024	Sugarcane collected from the field and transported to the factory for processing. The sugarcane goes into the cane cleaner where soil and debris are removed from the cane.
20090408025	Sugarcane collected from the field and transported to the factory for processing. The sugarcane goes into the cane cleaner where soil and debris are removed from the cane.
20090408026	Garret Hew, Robert Luuwai, and CWRM staff outside the HC&S Sugar Mill.
20090408028	Sugarcane cleaning at HC&S Sugar Mill.
20090408029	A series of high-pressure rollers extracting liquid from the sugarcane at the HC&S Sugar Mill.
20090408031	Liquid extracted from the sugarcane at the HC&S Sugar Mill.
20090408034	A series of high-pressure rollers extracting liquid from the sugarcane at the HC&S Sugar Mill.
20090408041	Raw sugar travels by conveyor belt to storage.
20090408042	This separates the mud from the water so that the water can be reused.
20090408047	HC&S Sugar Mill.
20090408053	Control house at the HC&S Sugar Mill.
20090408054	Control house at the HC&S Sugar Mill.
20090408055	Kaheka Hydroelectric Plant.
20090408057	Inside the Kaheka Hydroelectric Plant.
20090408058	Control machinery at the Kaheka Hydroelectric Plant.
20090408060	Rick Volner, Rodney Chin, and CWRM staff at the Kaheka Hydroelectric Plant.
20090408064	Lowrie Ditch outside the Kaheka Hydroelectric Plant.
20090408070	Rows of seed corn planted at one of the HC&S fields.
20090408071	Installing drip irrigation tubing at one of the HC&S fields.
20090408075	Drip irrigation tubing at one of the HC&S fields.
20090408077	Drip irrigation tubing at one of the HC&S fields.
20090408079	Rick Volner explaining the effects of water shortage to the growth of sugarcane.
20090408081	An example of sugarcane that has experienced water shortage during its growth.
20090408083	Rick Volner and Garret Hew at one of the HC&S fields.
20090408089	Rodney Chin explaining the effects of water shortage to the growth of sugarcane.
20090408091	Damage of aphids on sugarcane leaves.
20090408096	Rodney Chin showing the inside of a ripe sugarcane.
20090408102	Harvesting of sugarcane. The sugarcane are loaded onto truck and transported to the plant for processing.
20090408106	Harvesting of sugarcane. The sugarcane are loaded onto truck and transported to the plant for processing.
20090408110	Seed corn harvesting.
20090408112	Seed corn harvesting.

20090408113	Machine that is used to harvest seed corn.
20090408119	Dust control near one of the HC&S seed corn fields.

GPS Listing:

Shapefiles: (List file names of all shapefiles created and a brief description of each)

File Name:	Brief Description:

Waypoints: (List all waypoints in decimal degrees and provide a brief description of each)

WP No.	Latitude	Longitude	Brief Description:

Attachments:

Brief Description:

1. Image Contact Sheet

Recommendations:

IMAGE CONTACT SHEET

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IMAGE CONTACT SHEET

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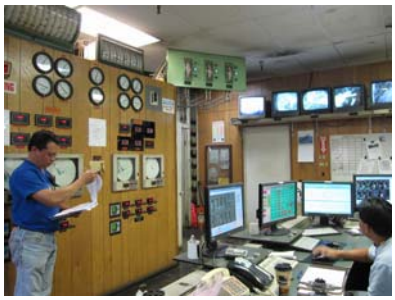

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IMAGE CONTACT SHEET

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IMAGE CONTACT SHEET

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