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

FIELD INVESTIGATION REPORT

FI2009040701 (Maui, Water Treatment Facilities)

Date of Field Investigation: April 7, 2009	**Time** (24-hour)**:** 0830 - 1600
CWRM Staff:	Ed Sakoda, Dean Uyeno, and Chui Ling Cheng
Individuals Present:	Maui County Department of Water Supply - Paul Seitz Department of Agriculture - Sandra Kunimoto, Brian Kau
Hydrologic Unit:	
Stream Name:	

Findings:

The purpose of this field visit was to meet with representatives of the Maui County Department of Water Supply (Maui DWS) to visit the surface water treatment facilities in Upcountry Maui. Staff first visited the Olinda Water Treatment Facility. Paul Seitz, Chief of the Water Treatment Facilities Division in the Maui DWS, provided an overview of the facility. This overview is detailed below as reference.

> At the Olinda Water Treatment Facility, water first enters the flocculator where chemicals are added to help separate floc (mostly sediment) from the water. The flocculated water goes into a large reservoir (depth of 42 feet with capacity of 8.5 million gallons) where the sediment settles at the bottom. During reservoir maintenance, the floc is stored in a nearby area, where is it dried and can be used as gravel-like material to built roads and other structures. Water from the reservoir is transported into the treatment plant, where it goes through a filtering process to filter out organisms. Each filter is tube-shaped and the membrane size of the filter is 0.2 microns. The treated water is stored in a 3 million gallon capacity clearwell outside of the plant. In the winter months, the reservoir is shut down for maintenance. During that time, the backwash tank next to the reservoir is used as backup to store the flocculated water. Inside the treatment plant, membrane filters are cleaned with citric acid and chlorine. All processes are monitored in the laboratory. The capacity of the water treatment plant is 2.5 million gallons per day, which meets the demand of Upper Kula, which is on average 2 million gallons per day.

Staff then headed east 0.7 miles to the Kahakapao Reservoirs. Surrounding the reservoirs are Haleakala Ranch pastures. Kahakapao consists of two 50 million gallon reservoirs, making a total capacity of 100 million gallons. At the time of the visit, the water level in both reservoirs was about 28 feet. Water at the Kahakapao Reservoirs is treated at the Olinda Water Treatment Facility.

Staff continued to the Waikamoi Reservoirs (located about 2.2 miles east of the Kahakapao Reservoirs), near the beginning of the Upper Kula Pipeline. Between the Kahakapau and the Waikamoi Reservoirs, the Upper Kula System consists of two pipelines, a new 36-inch pipe and an old 12-inch pipe. The new 36-inch pipe is fed by Waikamoi Stream and the Waikamoi Flume. The old 12-inch pipe is fed by a group of five Maui DWS minor diversions, located about 1.8 miles east of the Kahakapao Reservoirs, that take water from various tributaries near Waikamoi Stream.

The Waikamoi Reservoirs consist of two 15 million gallon reservoirs, making a total capacity of 30 million gallons. The west reservoir is fed by 2 tributaries of Waikamoi Stream. The east reservoir is fed by the Waikamoi Flume. Water at the Waikamoi Reservoirs is treated at the Olinda Water Treatment Facility. An arch dam is located on Waikamoi Stream, about 700 feet east of the Waikamoi Reservoirs. Further downstream from the arch dam is a smaller dam that marks the end of Waikamoi Flume, where water from the flume is transported into the east Waikamoi reservoir and eventually into the new 36-inch pipe of the Upper Kula System. Staff walked the entire length of the flume. The flume captures water from Haipuaena Stream, Puohokamoa Stream and its tributaries. Staff documented all the minor diversions along the flume.

Next, staff toured the Piiholo Water Treatment Facility and the Kamole Weir Water Treatment Facility. Both facilities are similar to that of Olinda. The Piiholo Reservoir services Lower Kula. Its average daily production is 2.5 million gallons per day. The Kamole Weir Water Treatment Facility has a newly constructed 100 million gallon covered reservoir. It services Makawao, Pukalani, Haliimaile, and Haiku. In addition, the treatment plant has booster pumps to move water up to the 2,800 feet elevation, where it can be pumped to the 4,500 feet at Upper Kula. The Kamole

Water Treatment Facility was not in operation at the time of the visit. It normally operates in the summer months when water provided by the Upper Kula System is insufficient. Operating the treatment plant at Kamole is very expensive because of pumping costs incurred when providing water to Upcountry. Its average daily production is 3.6 million gallons per day.

Staff concluded the field visit at 1600 hours.

Image Listing: (Attach PDF of image contact sheet)

File Name:	Brief Description:
20090407002	Paul Seitz at the Olinda Water Treatment Facility.
20090407004	Flocculator at the Olinda Water Treatment Facility. Chemicals are mixed into the water to help separate the sediment from the water.
20090407005	Flocculator at the Olinda Water Treatment Facility. Chemicals are mixed into the water to help separate the sediment from the water.
20090407006	Flocculator at the Olinda Water Treatment Facility. Chemicals are mixed into the water to help separate the sediment from the water.
20090407007	Gates where the flocculated water flows into the reservoir at the Olinda Water Treatment Facility.
20090407008	Reservoir with the flocculated water at the Olinda Water Treatment Facility. The sediment settles at the bottom of the reservoir.
20090407011	Sediment-free water flows out of the reservoir into the Olinda Water Treatment Plant.
20090407013	Sediment-free water flows out of the reservoir into the Olinda Water Treatment Plant.
20090407015	Olinda Water Treatment Facility. The sediment that settles at the bottom of the reservoir is transported into this area, where it is dried and can be used as gravel for building roads.
20090407018	Olinda Water Treatment Facility.
20090407019	Backwash tank at the Olinda Water Treatment Facility that is used as the backup reservoir when the large open reservoir (that holds the flocculated water) is in maintenance or repair.
20090407020	Olinda Water Treatment Facility.
20090407023	Pipes that transport flocculated water (without sediment) to the membrane filters in the Olinda Water Treatment Facility.
20090407024	Membrane filters in the Olinda Water Treatment Facility that filters bacteria and other organisms from the water. The size of the membrane filters is 0.2 microns.
20090407025	This device monitors the water being treated at the Olinda Water Treatment Facility.
20090407028	This device monitors the turbidity of the treated at the Olinda Water Treatment Facility.
20090407029	Olinda Water Treatment Facility. Backwash tank that cleans the membrane filters with citric acid and chlorine.
20090407030	Control house at the Olinda Water Treatment Facility.
20090407032	Chlorinator at the Olinda Water Treatment Facility.
20090407034	The actual membrane filter used at the Olinda Water Treatment Facility.
20090407036	Laboratory at the Olinda Water Treatment Facility.
20090407038	Kahakapao Reservoir consists of two 50 million gallon reservoirs.
20090407041	Kahakapao Reservoir consists of two 50 million gallon reservoirs.
20090407043	Control house at the Kahakapao Reservoir.
20090407044	Maui DWS minor diversion from various tributaries near Waikamoi Stream into the Upper Kula Pipeline.
20090407047	Maui DWS minor diversion from various tributaries near Waikamoi Stream into the Upper Kula Pipeline.
20090407049	Part of the Upper Kula Pipeline.
20090407051	Waikamoi Reservoir consists of two 15 million gallon reservoirs.
20090407054	Waikamoi Reservoir consists of two 15 million gallon reservoirs.
20090407055	Waikamoi Reservoir consists of two 15 million gallon reservoirs.
20090407060	Waikamoi Stream upstream from the arch dam about 0.2 miles east of the reservoirs.
20090407061	Arch dam on Waikamoi Stream about 0.2 miles east of the reservoirs.
20090407064	Waikamoi Stream downstream from the arch dam about 0.2 miles east of the reservoirs.
20090407065	Bottom of the arch dam on Waikamoi Stream about 0.2 miles east of the reservoirs.
20090407071	Control gate of the arch dam on Waikamoi Stream about 0.2 miles east of the reservoirs.
20090407072	Arch dam on Waikamoi Stream about 0.2 miles east of the reservoirs.
20090407073	Lower dam on Waikamoi Stream.
20090407077	Lower dam on Waikamoi Stream.
20090407078	Lower dam on Waikamoi Stream.
20090407079	Ed Sakoda and Sandra Kunimoto at the lower dam on Waikamoi Stream.
20090407080	Lower dam on Waikamoi Stream.
20090407083	Water from Waikamoi flume flows into the lower dam on Waikamoi Stream.
20090407085	Water from Waikamoi flume flows into the lower dam on Waikamoi Stream.
20090407087	Waikamoi flume sign.
20090407092	Waikamoi flume east of Waikamoi Stream that takes water from Haipuaena Stream and its tributaries, and Puohokamoa Stream and its tributaries.
20090407095	Waikamoi flume capturing water from a tributary of Puohokamoi Stream.

20090407098	Waikamoi flume at Haipuaena Stream.
20090407100	Waikamoi flume at Haipuaena Stream.
20090407101	Grate structure where water from Haipuaena Stream flows into the Waikamoi Flume.
20090407102	Small dam on Haipuaena Stream that captures water from the stream into the Waikamoi Flume.
20090407104	Paul Seitz at Waikamoi Flume on Haipuaena Stream.
20090407106	Waikamoi flume at Haipuaena Stream, looking downstream.
20090407107	Water is captured from a tributary of Haipuaena Stream into the Waikamoi flume.
20090407183	Entering the Makawao Forest Reserve to visit the Piiholo Water Treatment Facility.
20090407184	Piiholo Reservoir.
20090407187	Piiholo Water Treatment Facility.
20090407189	Staff at the Piiholo Water Treatment Facility.
20090407194	End of Wailoa Ditch at Kamole Weir Water Treatment Facility.
20090407195	End of Wailoa Ditch at Kamole Weir Water Treatment Facility.
20090407196	Membrane filters at the Kamole Weir Water Treatment Facility.
20090407200	Power generator at Kamole Weir Water Treatment Facility.

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:

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