ALAN M. ARAKAWA
MAYOR

200 South High Street
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Telephone (808) 270-7855
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OFFICE OF THE MAYOR
County of Maui

'03 DEC 24 P3:23
RECEIVED
OFC. OF ENVIRONMENTAL QUALITY CONTROL

December 22, 2003

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
State of Hawaii
235 South Beretania Street, Suite 702
Honolulu HI 96813

Re: Request to Publish in *The Environmental Notice* a Notice of the Withdrawal of the Acceptance of the EIS for Phases II through VI of the East Maui Water Development Plan

Dear Ms. Salmonson:

This letter is written on behalf of the County of Maui, which has the statutory authority to accept the Final EIS and the Final Supplemental EIS for the East Maui Water Development Plan (the "EM Plan") on Maui.

An EIS was prepared for the EM Plan in 1992 and 1993.

The Board of Water Supply of the County of Maui approved the Final EIS on June 29, 1993 and notice of the acceptance of this Final EIS was published in the August 8, 1993 edition of the OEQC Bulletin.

A judicial proceeding was instituted challenging the acceptance of this EIS in the Second Circuit Court in The Coalition to Protect East Maui Water Resources, et al. v. the Board of Water Supply, et al., Civil No. 93-0734(3).

On August 23, 1994, Circuit Court Judge Boyd P. Mossman entered an Order declaring the Final EIS inadequate and remanding the matter to the Board of Water Supply for the preparation of a Supplemental EIS on the EM Plan.

A Supplemental EIS for the EM Plan was prepared between 2001 and 2002.

The Board of Water Supply of the County of Maui, upon proper delegation, accepted the Final Supplemental EIS on October 15, 2002 and notice of the acceptance of this Final Supplemental EIS was published in the November 8, 2002 issue of *The Environmental Notice*.

A Judicial proceeding challenging the acceptance of this Final Supplemental EIS was initiated in The Coalition to Protect East Maui Water Resources, et al. v. The Board of Water Supply, et al., Civil No. 03-1-0008(3) in the Circuit Court of the Second Circuit.

The above-referenced cases have been settled through the entry of a Consent Decree. By one of the terms of this Consent Decree, the acceptance of the Final Supplemental EIS for the EM Plan shall be valid for Phase I only of the EM Plan and the acceptance of the EIS, whether for the original Final EIS or for the Supplemental Final EIS, for all Phases beyond Phase I, namely for Phases II through VI, is withdrawn and has no legal force or effect.

The County has agreed to have published in *The Environmental Notice* the withdrawal of any acceptance of the Final EIS or the Final Supplemental EIS for the remainder (all Phases beyond Phase I, namely Phases II through VI) of the EM Plan.

Based upon all of the foregoing on behalf of the County of Maui and its Board of Water Supply, I respectfully request that you publish this letter in *The Environmental Notice as notice* of the withdrawal of the acceptance of the Final EIS and the Final Supplemental EIS for Phases II through VI of the EM Plan.

If you have any questions regarding the foregoing, please feel free to contact Jane E. Lovell, Deputy Corporation Counsel, at 270-7740.

Very truly yours,

ALAN M. ARAKAWA
Mayor, County of Maui

xc: Board of Water Supply
Isaac Davis Hall, Esq.

Publ. 11/8/02

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

RECEIVED
02 OCT 30 P3:49
OFC. OF ENVIRONMENTAL QUALITY CONTROL

October 15, 2002

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Subject: Acceptance Notice for East Maui Water Development Plan
Final Supplemental Environmental Impact Statement

On October 15th, the Board of Water Supply accepted the FSEIS, by a vote of 5 to 2, with corrections as proposed by the consultant, Mink & Yuen, Inc. Therefore, I am notifying you of our acceptance of the Final Supplemental Environmental Impact Statement (FSEIS) for the proposed East Maui Water Development Plan (EMPLAN), as satisfactorily fulfilling the content requirements of the EIS law (Hawaii Revised Statues, Chapter 343) and the EIS Rules (Administrative Rules, Title 11, Chapter 200).

By letter Governor Cayetano and Mayor Apana delegated to the Board of Water Supply the authority to accept or reject the FSEIS for the EMPLAN.

The Board of Water Supply noticed the FSEIS for the EMPLAN for discussion/acceptance/rejection on September 19th, September 26th, October 8th, and October 15th, 2002.

Pursuant to procedures contained in Chapter 200, this Acceptance Notice should be published in The Environmental Notice.

If you have any questions, please contact David R. Craddick, Director at (808) 270-7816.

Sincerely,

Peter Rice, Chairperson
Board of Water Supply
County of Maui

WKT
Enc: Acceptance Report

ACCEPTANCE REPORT

FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE EAST MAUI WATER DEVELOPMENT PLAN MAUI, HAWAII TAX MAP KEYS: (2) 2-5-004; (2) 2-5-005; (2) 3-8-001

I. PROPOSED ACTION

The East Maui Water Development Plan (EMPLAN) proposes the development of new sources of water in East Maui for the Central Maui area. The EMPLAN provides for 10 wells in the Paia and Haiku aquifers. Two of the wells, Hamakuapoko Well 1 and Hamakuapoko Well 2, have been completed and is available to the Department of Water supply during drought emergencies. The EMPLAN also provides for control tanks and 86,000 feet of 36-inch transmission mains and 24,000 feet of connecting pipes from the East Maui sources to the existing Central Maui Water System.

II. ACCEPTING AUTHORITY

Governor Cayetano and Mayor Apana delegated to the Board of Water Supply the authority to accept or reject the Final Supplemental Environmental Impact Statement (SEIS) for the EMPLAN.

III. PROCEDURE

A. The Board of Water Supply accepted the Final EIS for the proposed action on July 19, 1993.

B. Notice of the Final EIS was published in the OEQC Bulletin on August 8, 1993.

C. A complaint was filed by The Coalition to Protect East Maui Water and Hui Alanui O Makena against the Final EIS in the Second Judicial Circuit, Maui (Case # 2CC93-0-000734) on September 3, 1993.

D. On August 23, 1994, the Court determined that the Final EIS is inadequate and the Board was ordered to prepare a Supplemental Environmental Impact Statement (SEIS) in compliance with Hawaii Revised Statues, Chapter 343, "to address serious concerns raised by the Plaintiffs regarding water contamination, impact upon stream flow and other issues raised by Plaintiffs."

E. A SEIS Preparation Notice was published in The Environmental Notice on May 8, 2001. The Preparation Notice was distributed to Federal, State and County agencies, private organizations and individuals.

F. The 30-day early consultation period for the Preparation Notice ended on June 7, 2001. Seventeen (17) consultation letters were received and the Department of Water Supply responded to comments. Comments and responses are included in the Final SEIS.

G. Notice of the Draft SEIS was published in The Environmental Notice on June 23, 2002. The 45-day comment period ended on August 7, 2002. Twenty-four (24) consultation letters were received and the Department of Water Supply responded to comments. Comments and responses are included in the Final SEIS.

H. The Department of Water Supply submitted the Final SEIS to the Board of Water Supply on September 19, 2002. The Board of Water Supply noticed and held meetings on the discussion/acceptance/rejection of the Final SEIS on September 19th, September 26, October 8, and October 15, 2002.

I. The Board of Water Supply accepted the Final SEIS on October 15, 2002.

J. Notice of availability of the Final SEIS will be published in The Environmental Notice on November 8, 2002.

IV. EIS CONTENT

The Final Supplemental Environmental Impact Statement complies with the content requirements of the EIS law (Hawaii Revised Statues, Chapter 343) and the EIS Rules (Administrative Rules, Title 11, Chapter 200) of the State Department of Health.

V. RESPONSES TO COMMENTS

The Department of Water Supply responded to comments that were raised during the SEIS Preparation Notice and the Draft SEIS public review periods. These comments and responses are included in the Final SEIS.

VI. DETERMINATION

The Board of Water Supply of the County of Maui has determined that the Final Supplemental Environmental Impact Statement for the proposed East Maui Water Development Plan to be ACCEPTABLE under the procedures and requirements of the EIS law (Hawaii Revised Statues, Chapter 343) and the EIS Rules (Administrative Rules, Title 11, Chapter 200).

FINAL

SUPPLEMENTAL ENVIRONMENTAL

IMPACT STATEMENT

FOR THE

EAST MAUI WATER DEVELOPMENT PLAN

PREPARED FOR THE

MAUI COUNTY DEPARTMENT OF WATER SUPPLY

PREPARED BY

MINK & YUEN, INC.

HONOLULU, HAWAII

OCTOBER, 2002

Final
Supplemental Environmental Impact Statement

for the

East Maui Water Development Plan

Maui, Hawaii

Prepared For: Department of Water Supply
County of Maui

Responsible Official: *This supplemental environmental impact statement and all ancillary documents were prepared under the signatory's direction or supervision and that the information submitted, to the best of the signatory's knowledge, fully address EIS content requirements as set forth in sections 11-200-17 and 11-200-18, Hawaii Revised Statutes.*

David R. Craddick
Director, Department of Water Supply

10/15/02
Date

Prepared By: Mink & Yuen, Inc.

PARTIES INVOLVED IN THE PREPARATION OF THE SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

- MINK & YUEN, INC.
  George A.L. Yuen
  John F. Mink
  John Y.C. Chang
  Eugenia B. Yuen
  Laura Yuen
  Eugene Dashiell
  Georgia Yamashita
  Scott Yamashita

- C. TAKUMI ENGINEERING, INC.
  Carl Takumi

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EXECUTIVE SUMMARY

History and Litigation

The East Maui Water Development Plan (EMWDP), hereinafter referred to as the EMPLAN, was prepared in 1992 by Norman Saito Engineering Consultants, Inc. It provides for well fields, transmission mains and pipelines, and pumps to furnish an average of ten million gallons (mgd) of water per day to the Central Maui Water System. Installed pump capacity would be 16 mgd.

The Final Environmental Impact Statement (FEIS) was accepted by the Maui County Board of Water Supply (board) in July 1993. In September 1993, the Coalition to Protect East Maui's Water Resources, Hui Ala Hui O Makena, Mary Evanson, and Marc Hodges, Plaintiffs, filed a complaint against the Board of Water Supply challenging the adequacy of the FEIS.

In August 1994, the Circuit Court, Second District, ordered the Board to prepare a supplemental EIS to address the concerns raised by the Plaintiffs. In September 2000, the Court authorized the Board to construct a monitoring well to gather data for use in the SEIS. This SEIS addresses the issues described in both court orders.

The purpose of the EMPLAN is to develop water in the water-rich region of East Maui for use in Central Maui without depriving the people of East Maui of their water needs. The EMPLAN is compatible with the Hawaii State Plan, Maui County General Plan, State Land Use Law, and Community Plans.

Plaintiffs' Concerns

The principal concerns in the 1994 court order were the impact of pumping of the wells on stream flow and the need for a broader discussion of water contamination. Although not mentioned in the court order, other concerns mentioned in correspondence and in formal meetings included items such as water rights, impact on coastal waters, relocation of wells to preclude contamination, water for upcountry Maui, and alternative water sources. Some of the other concerns deal with the procedural matters involved in processing of the FEIS.

Mitigation of Plaintiffs' Concerns

In compliance with the September 2000 court order, a monitor well was constructed for the purpose of gathering data and information for use in environmental evaluations. Well drilling data and test results, and other research data on the subject indicate that pumping form the proposed wells would not affect stream flow. In view of these findings, the question of riparian and appurtenant water rights and instream flow standards are irrelevant. Laboratory analyses also show that water contamination with agricultural chemicals is not a problem.

Results of research and studies on the possible negative impacts on coastal waters due to pumping indicate that such a possibility is negligible. Relocation of the wells to preclude contamination and to increase yield is an option that may be considered later. Studies to provide water for upcountry Maui are being planned by the Maui Department of Water Supply.

Consideration is directed toward the development of alternative water sources, such as desalination, impoundment of surface water, recycling of wastewater, and the development of various groundwater and surface water sources. Water conservation is also emphasized. The adoption of an alternative water source for development will be dependent upon its availability, practicability, and the economics involved.

Various procedural matters relating to the processing of documents and handling of departmental matters will be conducted within the bounds of legality and propriety.

Executive Summary of Other Concerns and Mitigation

In addition to the concerns raised on the possible effects of pumping from the proposed wells on stream flow, there were assertions that the Honomanu aquifer and other existing wells in the Haiku aquifer system would be adversely affected. It was also pointed out that dust, noise, and problems relating to the destruction of scenic values may arise. All of these and others are discussed in detail in Chapters 10 and 11 of this document.

Alternatives

Various alternatives are discussed and evaluated. Among them are desalination, recycling of wastewater, impoundment of surface water, other groundwater and surface sources, and the practice of conservation. These are discussed further in Chapter 12.

Permits and Approvals Required

A number of permits and approvals are required of the Federal, State, and County governments. These range from well drilling to grading permits, and are listed in Chapter 3 of the SEIS.

Unresolved Issues

1. Need for Water in Upcountry Maui. The Maui County Water Department is addressing this matter independent of the EMPLAN.
2. Relocation of Well Sites. This is an option that will be considered by the Maui County Board of Water Supply when implementation of the EMPLAN is finally adopted.
3. Environmental and Cultural Resources Study In Project Area. These studies will be done when the proposal to relocate the wells is finally adopted by the Maui Board of Water Supply. At the present time, the location and size of the well fields are indefinite. Upon final approval of the proposal, a full environmental and cultural resources study of the

entire project area will be done. This will include an archaeological and historic sites survey, flora, fauna, air quality and other studies, and a cultural resources assessment. It is noted that no cultural assessment was made of the original project area because this assessment was not required when the EIS was prepared. However, if the Maui Board of Water Supply finally decides to proceed with the original project, a cultural assessment must be conducted before project implementation.

4. Visual Impact of Water Tanks. Based on the preliminary locations of the well field and water tanks, they are not expected to be visible from state highways or county roads. The high elevation of the project area and natural forestation constitute barriers to negative visual impacts. However, final siting of the tanks will consider visual impacts. In addition, architects will employ appropriate architectural treatment and discrete painting and landscaping schemes during the planning and design phases of the project.

5. Changes in Climate and Their Effect on Water Resources. This is a necessary and continual study long-term study of climatic and hydrologic conditions to give us information on the quantities and reliability of our water resources.

The above issues are further discussed in the text of the SEIS.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

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The above issues are further discussed in the text of the SEIS.

CHAPTER 1. AUTHORIZATION, PROPOSING AND APPROVING AGENCY

1.1 Authorization

This Draft Supplemental Environmental Impact Statement (DSEIS) has been prepared in accordance with the requirements of Chapter 343, Hawaii Revised Statutes (HRS).

1.2 Proposing Agency

Department of Water Supply (DWS)

County of Maui

Wailuku, Maui, Hawaii

1.3 Approving Agency

Board of Water Supply

County of Maui

Wailuku, Maui, Hawaii

CHAPTER 2. INTRODUCTION

2.1 History of the East Maui Water Development Plan (EMPLAN)

The EMPLAN dated September, 1992 was prepared by Norman Saito Engineering Consultants, Inc. The EMPLAN provides for well fields with a planned pump capacity of 16 mgd and an average of 10 mgd. The wells would eventually be connected by means of a 36-inch diameter pipeline, 86,000 feet long, to the Central Maui transmission system. Total cost of the project was estimated at $ 48.5 million and was intended to meet the needs of the Central Maui Water District for the next 20 years.

2.2 Litigation and Court Action

The Board of Water Supply of the County of Maui ("Board") accepted the Final Environmental Impact Statement (FEIS) for the EMPLAN on July 19, 1993. The FEIS was prepared by Norman Saito Engineering, Inc. and subsequently published in the Office of Environmental Quality Control (OEQC) Bulletin on August 8, 1993.

On September 3, 1993, the Plaintiffs submitted to the Courts a complaint challenging the adequacy of the FEIS.

It was determined by the Court on August 23, 1994 (1994 Court Order) that the FEIS is inadequate and fails to fully address important environmental issues such as water contamination, impact upon stream flow and other issues raised by the Plaintiffs. The Board was ordered by the Court to prepare a SEIS for the EMPLAN to address the concerns raised by the Plaintiffs.

By a Court Order dated September 6, 2000, the Board was authorized to construct a single-monitoring well at one of the locations identified by William Meyer of the United States Geological Survey (USGS) in his letter dated September 9, 1998. The monitoring well is for the purpose of gathering data and information for use in the SEIS. In addition to this monitoring well, the Board may drill an additional well based on certain conditions listed in the Court Order. The Court Order is included in the Appendix of this SEIS.

This SEIS addresses the issues described in the Court Order of 1994 and 2000. The FEIS accepted by the Maui Board of Water Supply in July, 1993 remains a viable document.

CHAPTER 3. DESCRIPTION OF THE EMPLAN

3.1 Project Location

The EMPLAN project begins with well fields in Haiku and Paia and, through 86,000 feet of transmission mains and 24,000 feet of connecting pipelines, proposes to deliver water to the Central Maui Water System, near Kuihelani Highway. The wells are to be located in the north flank of Haleakala in the Paia and Haiku aquifer systems. The Paia Aquifer System lies to the west of the Maliko Gulch and the Haiku Aquifer System to the east. A total of 10 new wells and a number of storage reservoirs and chlorine contact tanks are included in the system. Between Hamakuapoko and the Central Maui Water Transmissions main, three connections to the Central Maui System will be made at Puunene, Haleakala Highway and Paia.

3.2 Climate

The Paia Aquifer System, in which Hamakuapoko Wells 1 and 2 have been drilled, has a semi-arid climate with annual rainfall averaging 20 to 40 inches. The Haiku Aquifer System, where the remainder of the EMPLAN wells are to be located, is moderately wet with the annual rainfall averaging between 50 and 100 inches. The chief sources of rainfall in the Paia Aquifer System are Kona storms (tropical depressions) and northerly cold fronts, both of which occur almost exclusively in the winter months. In addition to rainfall from these sources, tradewind showers add a significant component of rain in the Haiku Aquifer System.

The normal dry season extends from May through September, and the wet season from November through March. October and April are transitional months. The driest months are June and September, the wettest are December and January.

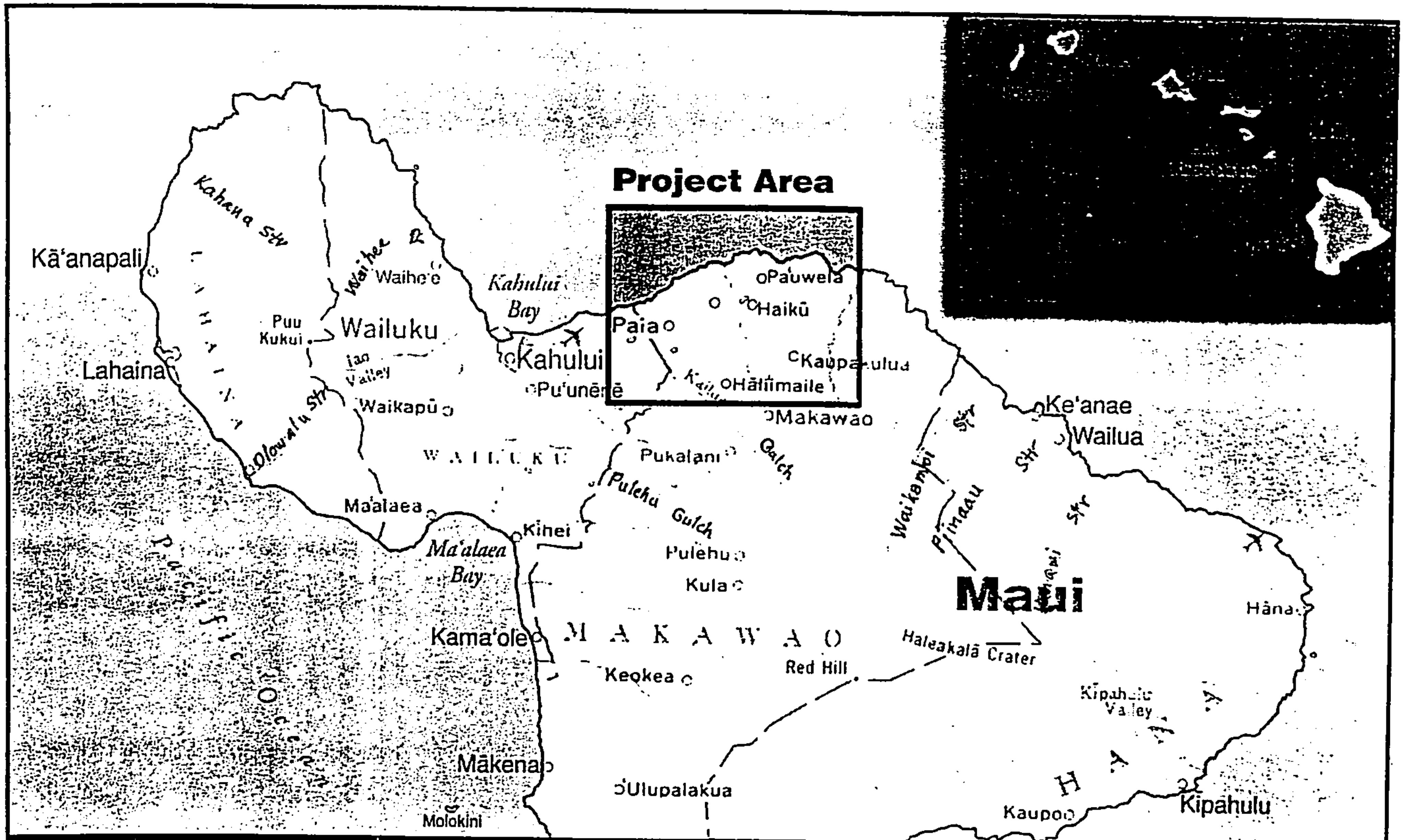

FIGURE 1:
Location Map

Supplemental EIS: East Maui Water Development Plan

SOURCE:
U.S. Geological Survey
Reston, Virginia, 1978

Temperatures at sea level averages 75 degrees F. The winter months are about 10 degrees F cooler than the summer months. Temperature decreases with elevation at the approximate rate of 3.5 degrees F per 1000 feet.

3.3 Implementation Phases

The implementation of the EMPLAN was to be achieved in six phases based on the development of 10 new wells. Two of the wells (Hamakuapoko 1 and 2) are in the Paia Aquifer System and have already been drilled. The remaining eight wells will be in the Haiku Aquifer System. Average yield of the completed project was computed at 10 mgd, two-thirds of the installed capacity, which is based on the DWS's standard operation of 16 hours per day of pumping. The installation of the transmission mains will begin at the well field and proceed in a westerly direction until they connect with the existing Central Maui Transmission main. The phased development of the project is expected to be completed in about 15 years. Total cost of the EMPLAN is estimated at $ 48.5 million for the year 2004.

The implementation phases proposed are as follows (see Figure 1):

Phase 1: Two new wells in the Hamakuapoko region of the Paia Aquifer System; 1 mgd per well; total installed capacity 2 mgd; transmission line extended to Paia. The wells are completed (Hamakuapoko 1, 5420-02; Hamakuapoko 2, 5320-01) but are pumped only during drought emergencies. The water is treated to remove DBCP. Construction of the transmission line to Paia has not been started.

Phase 2: Two new wells in the Haiku area of the Haiku Aquifer System; 1.5 mgd per well; total installed capacity 3 mgd; transmission extended to Kahului.

Phase 3: Another two new wells in the Haiku area of the Haiku Aquifer System; 1.5 mgd per well; total installed capacity 3 mgd; transmission line to Puunene.

Phase 4: Another two wells in the Haiku area of the Haiku Aquifer System; 2 mgd per well; total capacity 4 mgd. As stipulated in Court Order dated September 6, 2000, "The West Kuiaha Tank is not a component of the East Maui Development plan...The West Kuiaha Tank Project is not required to be discussed in the Supplemental Environmental Impact Statement for the East Maui Development Plan." The Court Order is included in the Appendix of this SEIS.

Phase 5: Extend the 36-inch diameter main to the Central Maui Transmission Main.

Phase 6: Another two mgd wells in the Haiku Aquifer System; 2 mgd per well; total installed capacity 4 mgd.

3.4 List of Permits and Approvals Required

AUTHORITY	PERMIT /APPROVAL
Federal	
U.S. Army Corps of Engineers	404 Permit
State of Hawaii	
Department of Land and Natural Resources- Commission on Water Resources Management	Well Drilling, Pump Installation, Water Use and Stream Alteration Permits
Department of Health	New Water Source/System, 401 Clean Water Act
Department of Transportation	Construction Plan Approval
County of Maui	
Planning Department	Community Development Plan Compliance
Department of Public Works	Billing/Grading Permits

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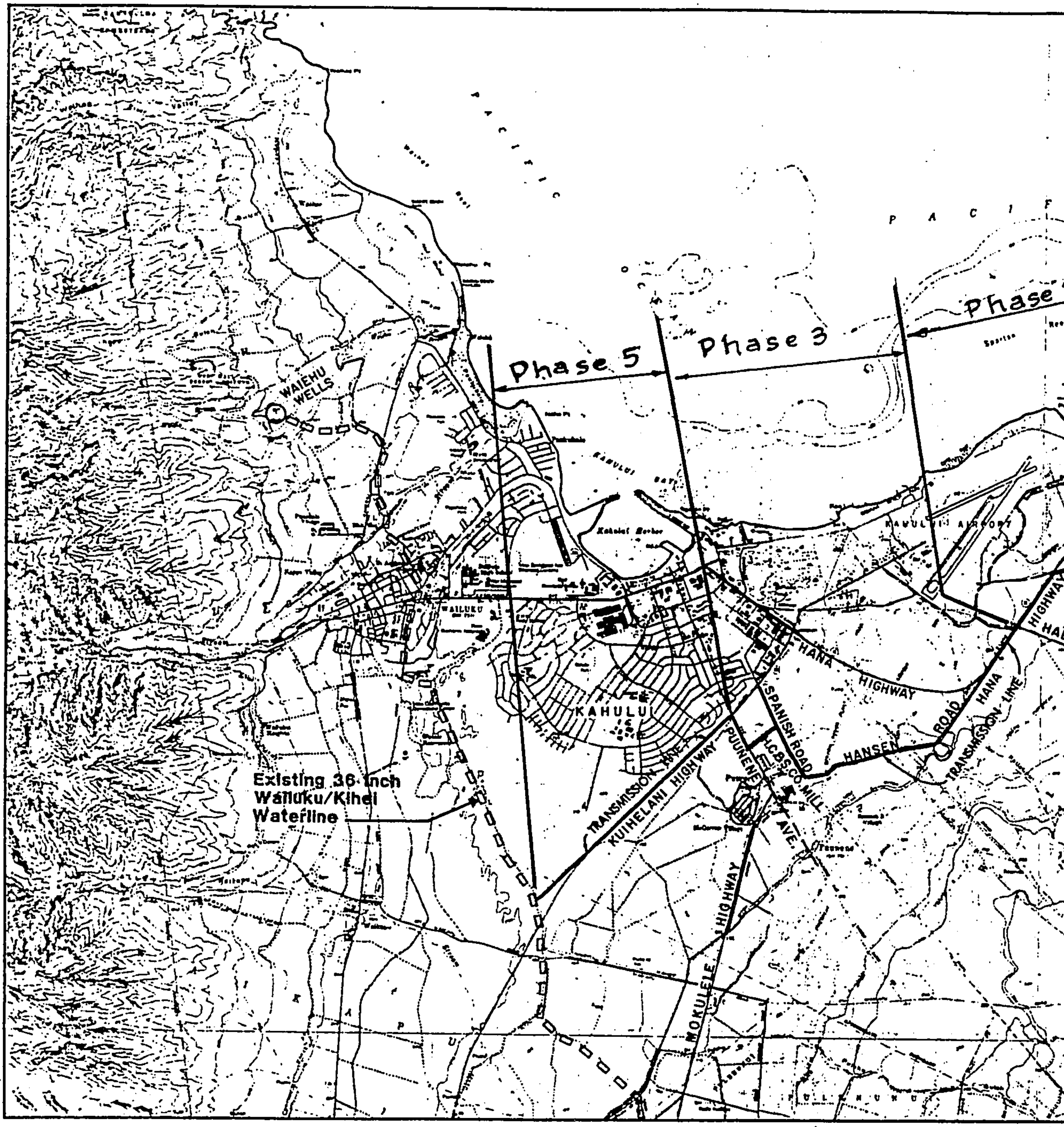
Phase 5
Phase 3
Phase
WAIEHU WELLS
Existing 36 Inch
Wailuku/Kihei
Waterline
WAILUKU
KAHULUI
KAHULUI BAY
KAHULUI AIRPORT
HANA HIGHWAY
SPANISH ROAD
HANSEN
ROAD
HANA
TRANSMISSION LINE
PUUNENE AVE.
H.C.&S.CO. MILL
KUIHELANI HIGHWAY
TRANSMISSION LINE
MOKULELE HIGHWAY
P A C I F I C

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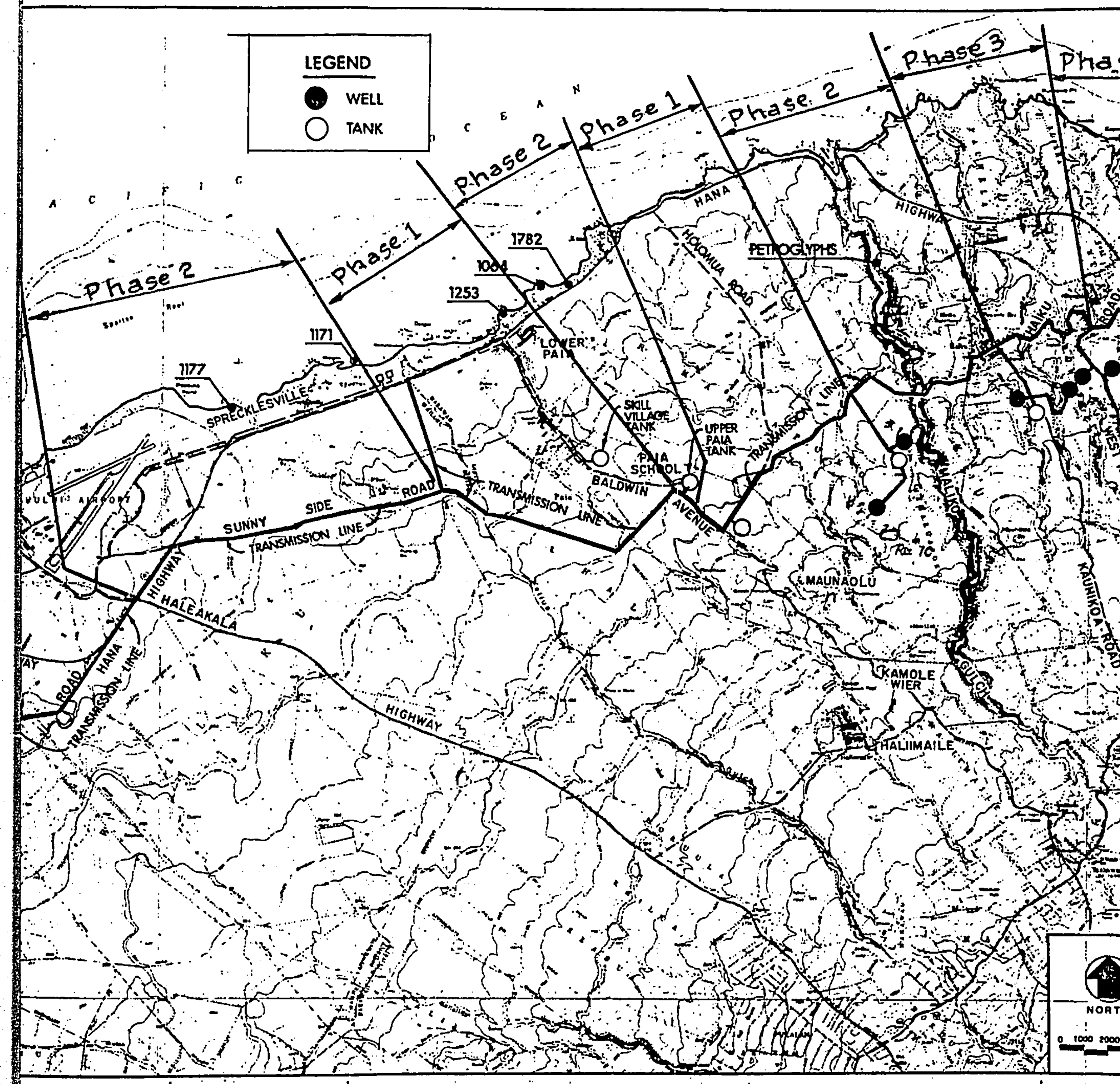

LEGEND
WELL
TANK
Phase 2
Phase 1
Phase 2
Phase 1
Phase 2
Phase 3
1782
1064
1253
1171
1177
SPRECKLESVILLE
LOWER PAIA
SKILL VILLAGE TANK
UPPER PAIA TANK
PAIA SCHOOL
BALDWIN
AVENUE
PETROGLYPHS
HANA
HOLOMUA ROAD
HIGHWAY
HAIKU
ROAD
TRANSMISSION LINE
SUNNY SIDE ROAD
TRANSMISSION LINE
HALEAKALA
HIGHWAY
HANA
ROAD
MAUNAOLU
KAMOLE WIER
HALIIMAILE
GULCH
KAUNIKOA ROAD
MALIKO
NORT

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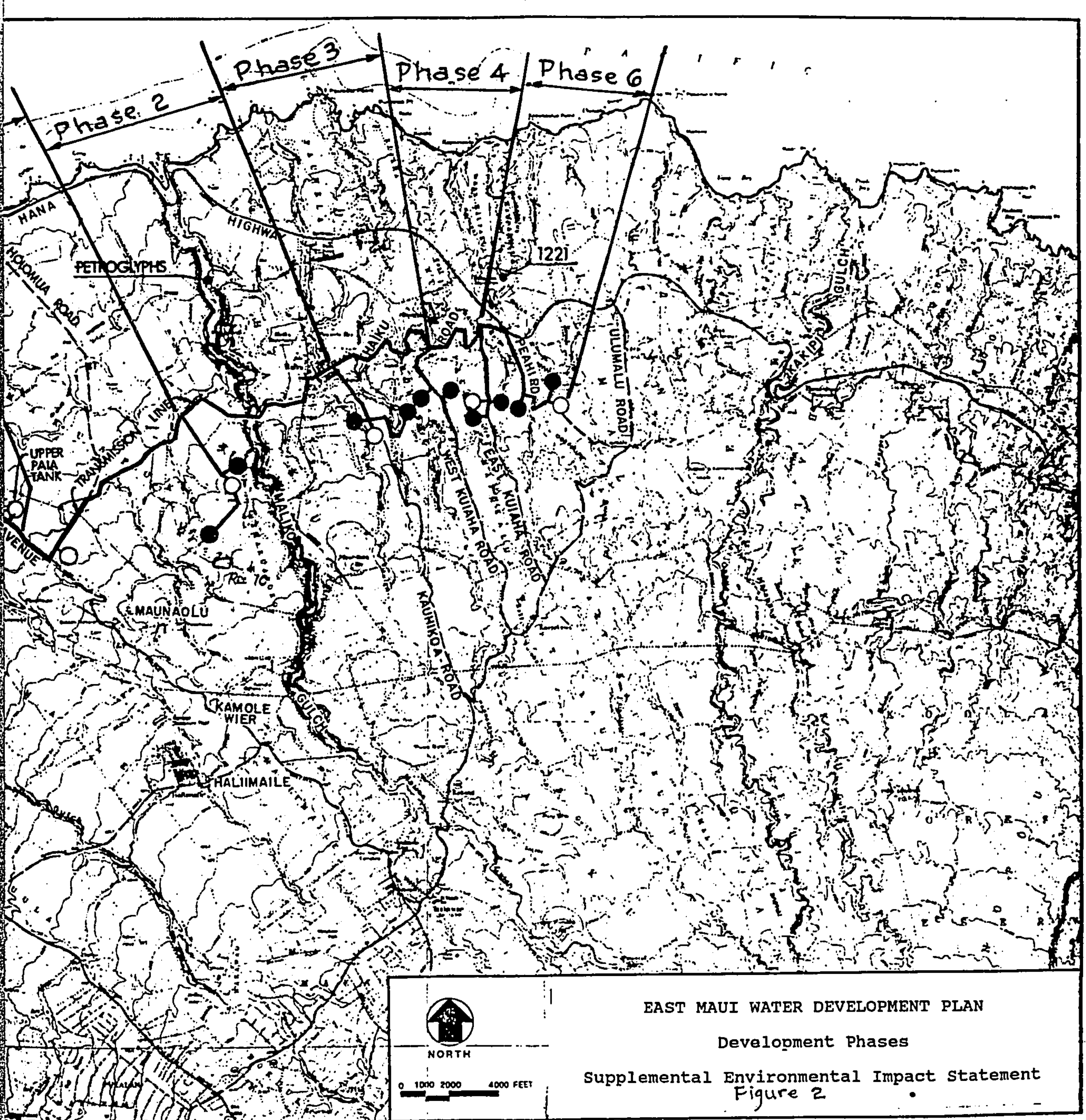


EAST MAUI WATER DEVELOPMENT PLAN

Development Phases

Supplemental Environmental Impact Statement

Figure 2

CHAPTER 4. PROPOSED ACTION

4.1 Project Need

Maui County's General Plan and the community plans for the Wailuku-Kahului, Kihei-Makena, and Haiku-Paia areas have described the projected planned growth in these areas in the next 20 years. This growth will result in increased water needs which are planned to be met by the implementation of the EMPLAN. This increase in water demand is prompted by the growth in agriculture, especially diversified agriculture, and expansion of the visitor industry, and the utilization of the undeveloped lands.

The "Draft Water Use and Development Plan for the Island of Maui-1992", prepared by M&E Pacific, Inc. indicated that water use within the area served by the Central Maui Water System would nearly double between 1990 and 2010. The EMPLAN was designed to meet this need. An evaluation of the alternatives listed on pages lends credence to the validity of the EMPLAN at this time. Of special note is the fact that the Iao aquifer is being utilized to its sustainable yield and no additional pumpage should be permitted.

4.2 Relocation of Well Sites

The original EMPLAN envisioned a total of 10 wells, two (Hamakuapoko 1 and 2) located west of Maliko Gulch in the Paia Aquifer System, and eight located from Maliko Gulch eastward to Kaupakulua Reservoir in the Haiku Aquifer System. Total installed capacity was to be 16 mgd, and average draft 10 mgd. The two Hamakuapoko wells have already been drilled and fitted with pumps but they still are considered integral to the EMPLAN. They serve as supplementary sources for Upcountry Maui with production limited to periods of drought. The initial expectation was that the two wells would have a capacity of 1 mgd (700 gpm) each for a total installed capacity of 2 mgd, but they have been fitted with 500 gpm (0.72 mgd) each. Without these wells, the remaining expected installed capacity in the EMPLAN is 14 mgd.

The wells sited east of Maliko Gulch were to be fitted with pumps having capacities of either 1.5 mgd (1042 gpm) or 2.0 mgd (1400 gpm). The first four wells located between East Kuiaha Road and Maliko Gulch were to have 1.5 mgd pumps, and the remaining four to the east, 2 mgd pumps. These pump sizes were selected without the benefit of a supporting data base. Even now the data base is sparse but strong enough to suggest that the anticipated pump capacities are too great for the state of the aquifer at the proposed locations. Additionally, the original sites are down gradient of former pineapple fields from which residual contamination by the nematocides EDB and DBCP may still be a threat. For these primal reasons--pump capacities and the threat of residual contamination--an alternative to the original plan is to relocate the wells to a line about one mile further inland just below East Maui Irrigation Company's Kauhikoa Ditch at an elevation of about 1,000 feet (see Fig. 3). Four well fields, each containing two wells rated at 1.5 to 2 mgd each, will be sited over a reach of approximately two miles between Lilikoi Gulch and Opaepilau Gulch.

In the relocation alternative, the western well fields, Lilikoi and Ohia, will be rated at 1.5 mgd per well, allowing for total capacity of the four wells of 6 mgd and an average daily yield of 4 mgd. The two easterly well fields, Kuiaha and Opaepilau, will be rated at 2 mgd per well for a total installed capacity of 8 mgd and average daily yield of 5.4 mgd. When all four well fields are in place, total installed capacity will be 14 mgd, and average daily yield will be 9.3 mgd.

The static water table elevation at the monitor well is 4.7 feet, which at a groundwater gradient of about 2 feet per mile implies that it will be about 7 feet at the Lilkoi-Ohia site lying one mile further inland. A water table elevation (or head under static conditions) of 7 feet above sea level will allow a pump capacity of 1.5 mgd. At the

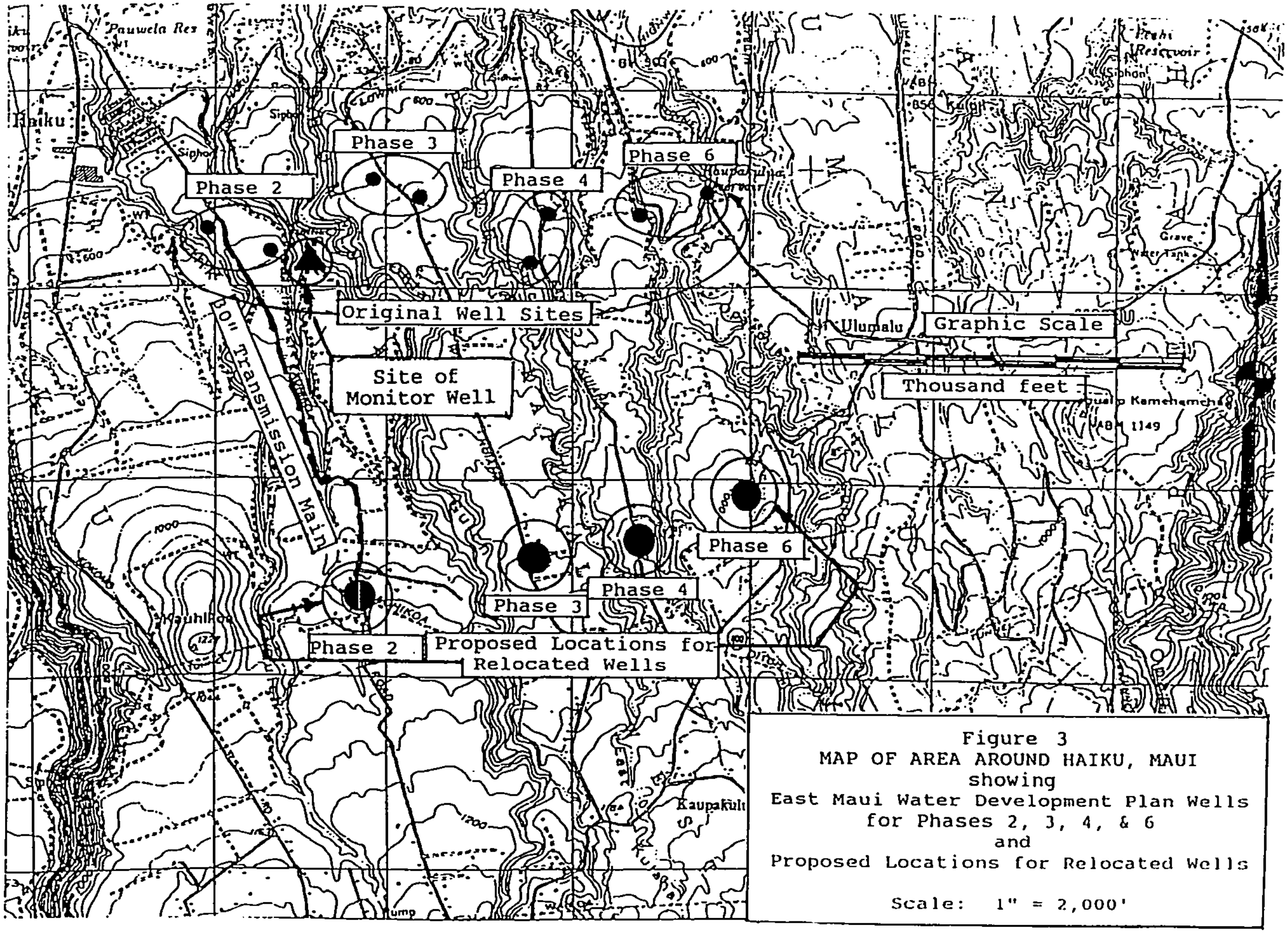


Figure 3
MAP OF AREA AROUND HAIKU, MAUI
showing
East Maui Water Development Plan Wells
for Phases 2, 3, 4, & 6
and
Proposed Locations for Relocated Wells

Scale: 1" = 2,000'

proposed Kuiaha and Opaepilau well fields, the expected static head will be about 8 feet, sufficiently high to sustain pump capacities of 2 mgd.

4.3 Hydraulics and Economics of the Proposed Relocated Wells

The EMPLAN prepared by Norman Saito Engineering Consultants (9/92) proposes developing 10 basal wells, two in the Paia aquifer west of Maliko Gulch and eight along the 650-feet elevation in the Haiku aquifer between Lilikoi Gulch and Opaepilau Gulch. The wells are to extend from the ground surface to below sea level. Chapter 4.2 discusses the proposal to relocate the eight wells in the Haiku aquifer system to an elevation of about 1,000 feet.

In the Saito Engineering Plan, the eight Haiku wells are to be constructed in four phases. Each phase comprises two wells pumping from the basal aquifer. The 700 gpm, 150 hp pumps would discharge into a piping system leading to small stabilizing reservoirs, each serving two wells. Water from the stabilizing reservoirs flows into a 36-inch transmission main to the Baldwin 560-foot reservoir which serves as the control reservoir.

The proposed installed pumping capacity of 700 gpm (1 mgd) at each of the eight wells as originally located are too high to sustain production at acceptable salinity levels.

Basal heads increase farther inland. At the 1,000-foot elevation, heads will be seven to eight feet and this is more likely to sustain production levels in the range of 1.5 to 1.75 mgd without long-term deterioration of salinity levels.

Figure 3 shows the locations of the eight Haiku wells of the EMPLAN and the proposed locations for the relocated wells about 5,000 feet inland of the original well sites.

The relocation of well sites to higher elevations involves deeper wells, deeper pump settings, and increased lift requiring more power for the pumps. The well depths at the original sites are around 700 feet. At the proposed relocated elevation of 1,000 feet above mean sea level, well depths increase by 350 feet. Pumping lift is increased by 54%.

The EMPLAN provides for a 36-inch diameter transmission system from the east of Haiku along Haiku Road extending westward to Kahului with a controlling elevation of 560 feet. If well sites are relocated to the 1,000-foot elevation, a transmission main must reach from the relocated sites down to the planned transmission system.

Figure 3 shows a likely alignment for this transmission main along Kauhikoa Road. This would connect the Phase 2 relocated well sites. Later phases at the relocated sites extending eastward would connect to the Kauhikoa Road transmission main.

The transmission main from the relocated sites to Haiku Road is 7,000 feet long. For this study, the installed capacity of each well is 1,200 gpm (1.71 mgd). For the eight wells, the total installed capacity is 13.71 mgd. For this flow rate, velocity in the 30-inch diameter pipeline is 4.4 feet per second. Flow velocity in a 24-inch diameter pipe exceeds six feet per second, the economic limit.

The EMPLAN provides for the 36-inch transmission main through Phase 6. For this study, the 36-inch transmission main along Haiku Road for phases 3, 4, and 6 is replaced by equivalent lengths of 16-inch, 20-inch, and 24-inch mains. The Phase 2, 36-inch main between Kauhikoa Road and the west end of the Phase 2 development is retained because it is required for either development scheme.

The two existing wells in the Paia aquifer (Hamakuapoko Wells 1 and 2) included in the EMPLAN are contaminated with Volatile Organic Compounds (VOC) to a level that requires treatment. This may also be the case in the adjacent Haiku aquifer. For that reason, this study includes costs of granular activated carbon (GAC) adsorption facilities in separate tables.

The component costs for each development phase are taken from the EMPLAN. These were modified by replacing the 36-inch transmission main components along Haiku Road by water mains appropriately sized for that phase. The cost of the transmission west of Phase 2 was included in both development schemes.

Table I summarizes the phase-by-phase capital costs for the two development schemes and Table I-A shows the costs including GAC facilities.

TABLE I
CAPITAL COSTS FOR EACH DEVELOPMENT PHASE
(THOUSAND DOLLARS)

DEVELOPMENT PHASE	ORIGINAL SITE (650' ELEV)	RELOCATED SITE (1000' ELEV)
2	5,470	7,050
3	3,515	4,240
4	3,690	4,260
6	3,355	4,155
TOTALS	$ 16,030	$ 19,705

TABLE 1-A
CAPITAL COSTS FOR EACH DEVELOPMENT
INCLUDING GAC ADSORPTION FACILITIES
(THOUSAND DOLLARS)

DEVELOPMENT PHASE	ORIGINAL SITE (650' ELEV)	RELOCATED SITE (1000' ELEV)
2	9,470	11,050
3	7,515	8,240
4	7,690	8,260
6	7,355	8,155
TOTALS	$ 32,030	$ 35,705

Capital costs for the relocated sites are higher due to increased well depths. Increased drilling costs, deeper pump settings and more powerful pumps are big factors. There is also the additional 7,000 feet of transmission main. Not included is the need for a pressure regulating scheme.

The annual costs for the two development schemes were developed for two operational availability levels. Table 2 and Table 2-A show costs for 90-percent operational level. Table 2 does not include GAC operations. Table 2-A includes GAC operations. Table 3 and Table 3-A show the costs for two-thirds operational level.

The following assumptions were used to develop the annual costs:

1. Twenty-year life for all capital cost facilities.
2. Six percent annual interest rate.
3. Electric power at $ 0.15 per kwhr.
4. Operating cost includes annual power plus 10 percent for maintenance and repair.
5. Annual cost of GAC operations at 90-percent availability is $ 120,000.00 per well at the original sites and $ 130,000.00 per well at the inland sites. At 67-percent availability, the GAC cost of operations is $ 100,000.00 per well at the original sites and $ 120,000.00 per well at the inland sites.

TABLE 2
SUMMARY OF ANNUAL COSTS
90 PERCENT OPERATIONAL AVAILABILITY

ITEM	ORIGINAL SITE (650' ELEV)	RELOCATED SITE (1000' ELEV)
Operating Cost	$ 935,000	$ 2,718,000
Amortization	1,400,000	1,720,000
Annual Cost	2,335,000	4,438,000
Annual Production (million gal)	2,253	4,505
Cost/Million Gal	1,036	985

TABLE 2-A
SUMMARY OF ANNUAL COSTS
90 PERCENT OPERATIONAL AVAILABILITY
GAC ADSORPTION OPERATION INCLUDED

ITEM	ORIGINAL SITE (650' ELEV)	RELOCATED SITE (1000' ELEV)
Operating Cost	$ 1,210,000	$ 2,718,000
GAC Operating Cost	960,000	1,040,000
Amortization	2,800,000	3,112,000
Annual Cost	4,970,000	6,870,000
Annual Production (million gal)	2,253	4,505
Cost/Million Gal	2,205	1,525

TABLE 3
SUMMARY OF ANNUAL COSTS
67 PERCENT OPERATIONAL AVAILABILITY

ITEM	ORIGINAL SITE (650' ELEV)	RELOCATED SITE (1000' ELEV)
Operating Cost	$ 697,000	$ 2,024,000
Amortization	1,400,000	1,720,000
Annual Cost	2,097,000	3,744,000
Annual Production (million gal)	1,677	3,354
Cost/Million Gal	1,250	1,116

TABLE 3-A
SUMMARY OF ANNUAL COSTS
67 PERCENT OPERATIONAL AVAILABILITY
GAC ADSORPTION OPERATION INCLUDED

ITEM	ORIGINAL SITE (650' ELEV)	RELOCATED SITE (1000' ELEV)
Operating Cost	$ 864,000	$ 2,024,000
GAC Operating Cost	800,000	960,000
Amortization	2,800,000	3,115,000
Annual Cost	4,464,000	6,099,000
Annual Production (million/gal)	1,677	3,354
Cost/Million Gal	2,662	1,818

Future Planning Considerations for the Relocated Well Sites

The movement inland of the line of wells will result in higher pressures in the transmission main along Kauhikoa Road. Assuming the ground elevation of the relocated stabilizing tanks to be 1,050 feet, the difference of elevation to the Baldwin Tank is 490 feet. Pressure will exceed 200 psi at the lower end of the pipeline. This can be alleviated by a pressure-regulating valve or pressure-breaking tank at a suitable elevation. This can be done by the design engineer when engineering plans are prepared. Planning can also be directed toward creating another pressure zone.

The inland location poses the need to connect the four phases to the 30-inch transmission main in an area with a sparse road network. The stabilizing tank for Phase 2 can connect directly to the transmission main. Connecting phases 3, 4, and 6 will involve crossing the intervening gulches. These engineering problems can best be addressed when the various phases come up for development.

CHAPTER 5. PUBLIC LAWS, REGULATIONS, PLANS AND POLICIES RELATED TO PROPOSED PROJECT

5.1 Federal Laws

Normally, most Federal laws and regulations applicable to the proposed project are administered by the State Department of Health (DOH).

Of the applicable Federal laws, the most important are the Clean Water and Safe Drinking Water acts. The NPDES requirements under the Clean Water Act may apply to the proposed project but whether they would or not will depend on interpretation of the law. The Safe Drinking Water Act will involve EPA water quality requirements and the need for the DOH to approve new drinking water sources. Approval is based on an engineering report describing measures taken to protect the water source and the infrastructure to store and distribute the water.

5.2 Hawaii State Plan

The objectives and policies of the proposed project must rely on the Hawaii State Plan to serve as a guide for future long-term development of the State. To be considered are what support services and facilities are necessary to accommodate future growth and distribution of population throughout the State, what must be done to stabilize and enhance our economy, and how the environment can be protected in the face of economic and population growth.

5.3 State Functional Plans

The State has developed 12 Functional Plans to help implement the Hawaii State Plan in coordination with County General Plans and Community Development Plans. Of the 12 plans, those with direct bearing on the proposed project are the Housing, Agricultural, and Water Resources plans.

The applicability of two other State laws, the boundary amendment application for uses that are non-conforming with land use designation under the State Land Use Law, and whether permits are required under the Coastal Zone Management Act do not appear to be necessary.

5.4 State Land Use Law

For uses that are non-conforming to the land use designation, State Land Use Commission Rules require a boundary amendment application. However, this rule does not apply to this project since it was intended for public use (Rule 205-5).

5.5 Coastal Zone Management Act

Permits under the Coastal Zone Management Act are not required since the EMPLAN is not located within the special management area or coastal zone management areas.

5.6 Environmental Impact Statements

The State law requiring EISs appears to apply to the proposed project because of its long-range implications and the possibility of the emergence of negative impacts. The preparation of an EIS is administered by the OEQC.

5.7 Maui County General Plan

With respect to water development and management, the proposed project will be consistent with a number of the objectives and policies of the Maui County General Plan. The general objective of the Plan to provide an adequate supply of potable and irrigation water to meet the needs of the residents of Maui County includes the improvement of water transmission systems, provisions of better fire protection, development of new sources for new developments, maintaining the right to manage the County's water sources and transmission systems, and the development of a method of water allocation to the community. Pertinent sections of the Maui County General Plan are listed in the Appendix.

5.8 Community Plans

Community plans were adopted by ordinance as a means to spell out in detail the objectives and policies of the General Plan. Community plans must be updated at least every 10 years to reflect latest charges in population, economic conditions, changes in land use and other parameters. A review of the community plans of the Kahului-Wailuku, Haiku-Paia, and Kihei-Makena areas indicated continued consistency with the objectives and policies of the Maui County General Plan. The sections dealing with water in the Haiku-Paia, Kihei-Makena and Wailuku-Kahului Community Plans may be found in the Appendix.

CHAPTER 6. THE HYDROGEOLOGICAL ENVIRONMENT

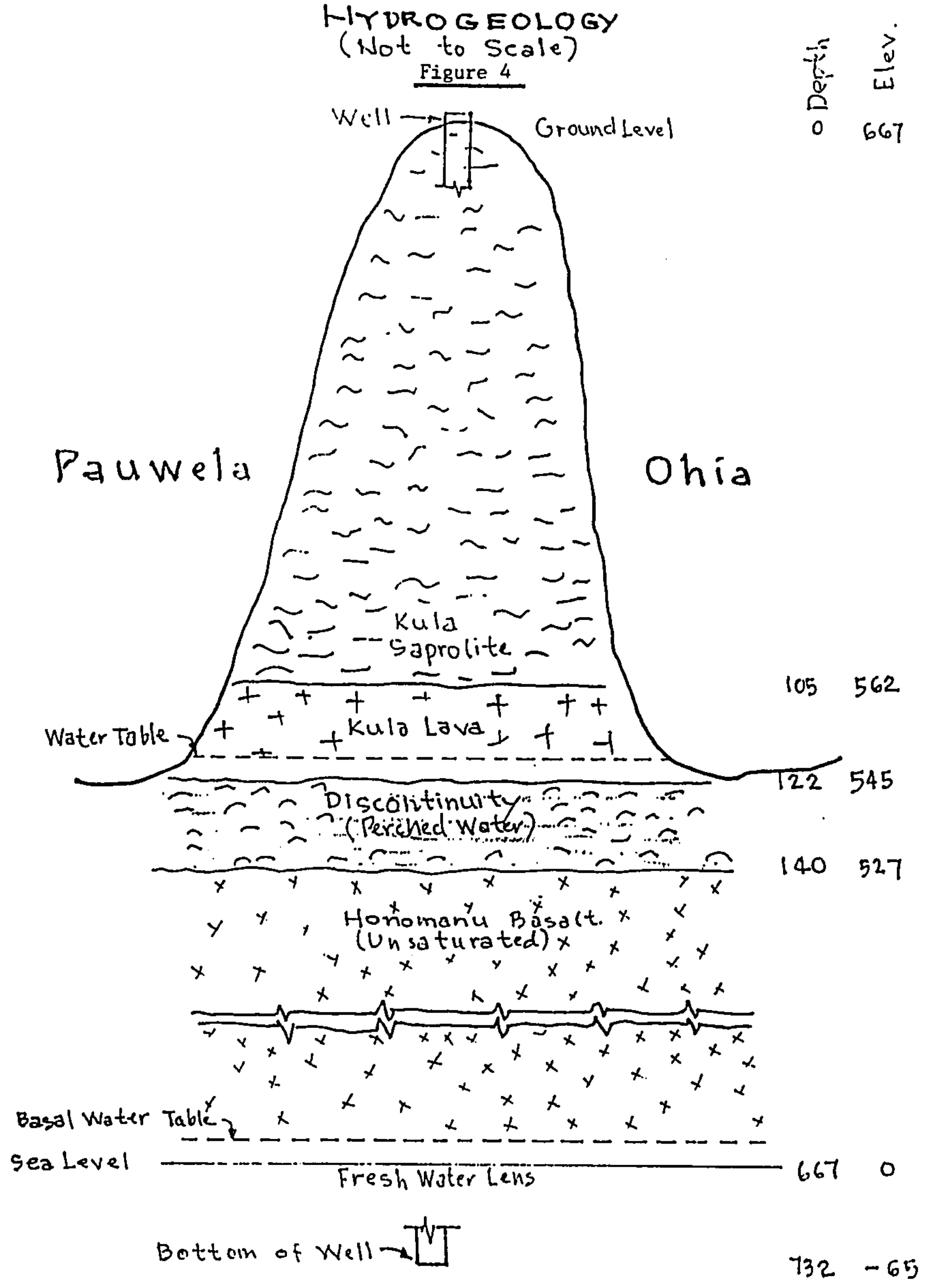
6.1 Geological Environment of the Haiku Aquifer System

The fundamental geological environment in the Haiku Aquifer System was first described by Stearns and Macdonald of the USGS (1942) and has been validated in detail by scientists of the Survey and others. The region is underlain with two basic geological formations, the Kula Volcanics and the Honomanu Basalt. The Honomanu Basalt is the basement rock and constitutes the greatest portion of the East Maui shield volcano. The Kula Volcanics was emplaced late in the history of volcanic eruptions and forms a blanket up to several hundred feet thick on the Honomanu. The transition from Honomanu to Kula is characterized by ash, soil and volcanic debris that are typical of unconformities in volcanic sequences but are considered local discontinuities in East Maui because the Kula lavas are assumed to have been a prolongation of the original volcanic activity rather than separate series of eruptions.

In addition to the eruptive rock geology, a third phenomenon characterizes the region. The northwest rift zone of the Haleakala volcano strikes through the Haiku Aquifer System. On the west the rift boundary runs through Puu Ehu, Kauhikoa and Puu Umi to Maliko Bay; on the east through Kapua o Kamehameha and Kuioii to Kapukaulua Point. Each Puu was created by lava and pyroclastics rising to the surface in passageways that later solidified into dikes and other low permeability intrusive rocks. The region between the boundaries of the rift is where the wells proposed in the EMPLAN are located. Figure 4 summarizes geological conditions in the region.

HAIKU S.E.I.S. MONITOR WELL
HYDROGEOLOGY
(Not to Scale)

Figure 4



6.1.1 The Honomanu Formation

The Honomanu formation, like all of the basaltic formations constituting the bulk of Hawaiian shield volcanoes, is highly permeable and moderately porous and, as a consequence, comprises premier aquifer lithology. The Kula formation, on the other hand, is transitional from basaltic to andesitic and therefore is much less permeable than the Honomanu. Throughout the Haiku region the Honomanu formation contains the most voluminous aquifers, which are basal. In a basal aquifer fresh water overlies seawater in approximate balance with the Ghyben-Herzberg ratio of 40 feet of fresh water extending below sea level for every foot above sea level. It is the basal aquifer in the Honomanu formation, which the EMPLAN wells will exploit.

6.1.2 The Kula Formation

The Kula formation contains no aquifers of a size useful for municipal water development. Groundwater occurs sporadically, perched on low permeability layers of soil-saprolite, ash and erosional debris between layers of massive lava flows and in the transition zone where the primary basalt of the Honomanu alters to andesitic basalt of the Kula. Groundwater in the Kula is important as a source of seepages and springs that drain to streams, as a source of water derived by way of small diameter shallow wells for individual households, and as a temporary reservoir for contaminants that may accompany infiltration below agricultural fields. The EMPLAN wells will be designed to avoid incorporating Kula groundwater in their pumpage.

6.1.3 Transition from the Honomanu to the Kula Formation

Gingerich (1999) points out that over the entire coastline between Maliko and Kakipi the Honomanu is exposed. Mink and Yuen, Inc. fieldwork corroborates this observation. The transition from Honomanu to Kula is clearly visible on both the west and east sides of Maliko Bay. On the west side starting at sea level about 25 feet of Honomanu in the form of oceanite basalt are overlain by rubbly debris grading into the Kula. Weak seepages drain at the interface. A similar condition occurs on the east side of the Bay, and then eastward along the coast to Kakipi. Gingerich also notes that the floor of Maliko Gulch is eroded into the Honomanu to a channel elevation of about 600 feet, approximately 3.4 miles from the coast. At higher channel elevations the floor of the Gulch is in the Kula formation. These are important observations that contradict the opinion that the Honomanu is saturated to hundreds of feet above sea level and therefore is the source of perennial flow in streams. Flow in Maliko Gulch is sporadic, and none has been observed to originate as drainage from the Honomanu except near the coast below the elevation of the basal water table at about 3 feet above sea level.

Because the Honomanu is exposed along the coastline in the Haiku region, the basal aquifer is assumed to discharge at the coast. This is an important and simplifying boundary condition for use in both analytical and numerical modeling.

6.1.4 The Rift Zone

The third geological condition, besides the occurrence and position of the Honomanu and Kula formations, inherent to the Haiku region is the location of the rift zone. The distance between the east and west boundaries of the rift is about 3 miles, and it is within this width that the proposed EMPLAN wells are to be drilled. Water level measurements taken within and to the west of the rift suggest that the rift boundaries impede groundwater flow. Groundwater levels in the Honomanu basal aquifer within the rift boundaries are 1 to 2 feet higher at the same distance from the coast as heads to the west of the west rift boundary. To the east of the east boundary there are no wells in the Honomanu for comparison. Figure 5 is a groundwater potential map based on reasonably reliable head measurements. The Gingerich report also includes an isopotential map.

6.2 Aquifer Characteristics

Of the two geological formations that carry groundwater, only the Honomanu is of interest in adding supply to the Central Maui water network. The Kula contains perched water that is neither voluminous nor extensive, but underlying the entire Haiku region is a basal aquifer in the Honomanu that promises to be highly productive.

The successful development of an aquifer depends on several aquifer parameters, the volume of groundwater in the rock mass, and the relationship between recharge and outflow. The essential aquifer parameters are hydraulic conductivity (k, in ft/day), which is a measure of the ease of flow of water through the formation, and effective porosity (S, dimensionless), which relates to the water in pore spaces that can move to discharge. The volume of water in exploitable storage is a function of static head (elevation of the water table above sea level) and effective porosity. In a basal lens the depth of fresh water extending below sea level is approximated by the Ghyben-Herzberg ratio, which states that for every foot of fresh water above sea level, 40 feet reaches below sea level. Although the ratio is restricted to hydrostatic conditions, seawater density of 1.025 and fresh water density of 1.000, it is a very good

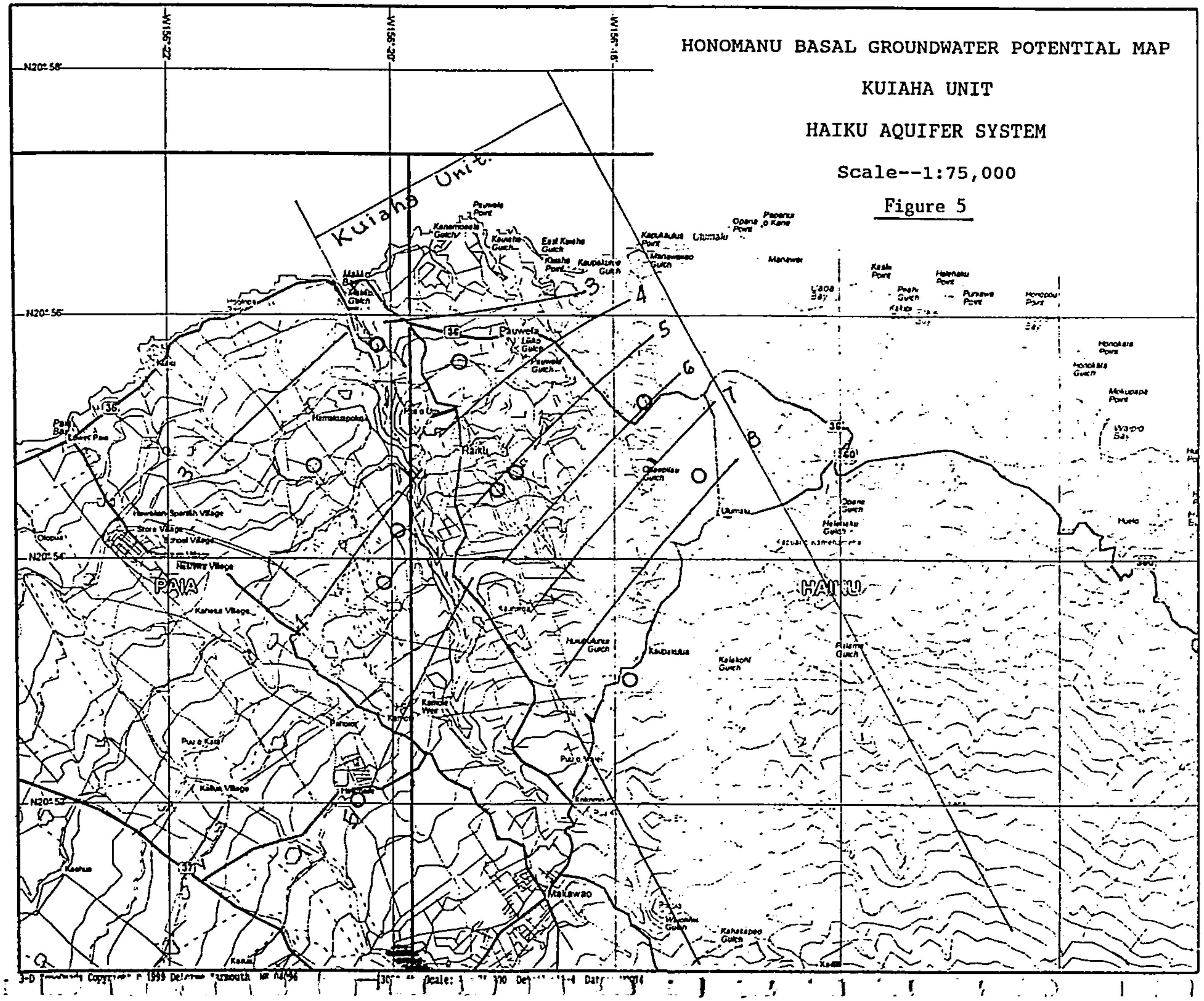
HONOMANU BASAL GROUNDWATER POTENTIAL MAP

KUIAHA UNIT

HAIKU AQUIFER SYSTEM

Scale--1:75,000

Figure 5



approximation for a thick lens at some distance inland of the discharge front, as is the situation in the Haiku region.

The shape of the water table is determined by the rate of recharge to and the corresponding outflow, in the form of natural discharge and forced extraction, from the lens. Because groundwater travels toward the coast, or beyond where caprock occurs, to discharge, head rises with distance inland. The rate of rise with distance perpendicular to the outflow front, which is the near coastal region in the Haiku region, is referred to as the gradient.

The rate of outflow per foot of coastline is expressed by Darcy's Law, which amended for a basal lens having a Ghyben-Herzberg ratio of 40:1, is,

$$q = 41kh\, dh/dx$$

which on solution by integration yields the result,

$$q = 41kh^2/2x$$

This is an approximation because it assumes, along with the normal assumptions of homogeneity and isotropism, that flow is uniform throughout the inland reach of the lens and not influenced by local recharge. Nevertheless, it provides a sound estimate of rate of flow from which the sustainable yield of the aquifer can be deduced.

Aquifer parameters are calculated from pump tests during which water levels are measured. Pump test data allows for the determination of transmissivity (T, in ft^2/day), from which hydraulic conductivity is calculated as transmissivity divided by the depth of flow of water moving to the well bore. Effective porosity is also calculated from pump test data, but only if drawdown is measured in a boring (observation well) other than the pumping well. Nowhere in the Haiku region has a pump test been conducted during which drawdown was measured in an observation well. The Maui County Water Department will be using the monitor well drilled for the SEIS as an observation well in the Haiku region. The instances where water levels at distant wells were measured during pumping at a separate well (Hamukuapoko 1, 5420-02; Hamakuapoko 2, 5320-01; and Upper Haiku, 5419-01) failed to detect drawdown caused by pumping.

Only the data from step drawdown tests, during which a variety of pump rates are controlled for periods of one to two hours until a stable drawdown in the well is achieved, are available for estimating transmissivity and hydraulic conductivity. Effective porosity is undeterminable from these tests, but by analogy with similar basal aquifers in primitive shield-building basalts, such as the Koolau Basalt of Oahu and the Wailuku Basalt of West Maui, it is known to normally fall in the range .05 to .10.

Appendix 16.2 describes the method by which transmissivity (T) and hydraulic conductivity (k) are determined from step drawdown test results. Although the method is approximate, the parameter values calculated are consistent with those determined in other similar basaltic aquifers.

Data from a step drawdown test of Hamakuapoko 1 (5420-02) yields a transmissivity of 116,438 sq.ft./day, which divided by depth of penetration of the well below the water table of the Honomanu (40 feet), results in hydraulic conductivity of 2911 ft/day. The appendix explains how the value of transmissivity was determined. In calculating hydraulic conductivity the underlying assumption is that the depth of penetration is equal to the depth of flow. At Hamakuapoko 2 (5320-01) a hydraulic conductivity of 5940 ft/day was calculated by Water Resources Associates. Hunt of the USGS calculated a hydraulic conductivity of 3500 ft/day for the Upper Haiku well (5419-01), and for the same well the Mink and Yuen, Inc. calculation is 3600 ft/day. For the Kulamalu well (5317-01) the step drawdown test yielded much lower estimates of hydraulic conductivity: 248 ft/day by WRA; 913 ft/day by Bauer of CWRM; and 410 ft/day by Mink and Yuen, Inc. Data from the pump test of the monitor well (5418-01) results in a hydraulic conductivity of 7,000 to 10,000 ft./day (see Chapter 8 for full discussion).

Employing an inverse interpretation of the basic Darcy relationship for a basal lens, Gingerich (1999) calculated the Honomanu hydraulic conductivity in the Haiku region to average 3300 ft/day. He assigned a value to groundwater flow based on a hydrologic budget, considered the head at the Kulamalu well (5317-01) and the distance between it and the coast, then solved for hydraulic conductivity.

Although the diversity among the above calculated values of hydraulic conductivity appear substantial, in fact the magnitude of even the lowest value (Kulamalu) is sufficiently large to permit installation of high capacity pumps, say 1 to 2 mgd. The differences among the values, however, combined with estimating effective porosity, are a challenge to effective modeling, whether analytical or numerical.

6.3 Groundwater Flow and Sustainable Yield

Estimates of recharge to the Honomanu aquifer in the Haiku region have been made by Gingerich (1999), Shade (1999) and Mink and Yuen, Inc. The budget of Gingerich includes infiltration from both rainfall and fog drip over an area of 42 square miles and a coastal length of 5 miles; that of Shade used for comparison here is for rainfall over an area of 29.2 square miles, although separately she included fog drip over a larger area; and the Mink and Yuen, Inc. budget, which also excludes fog drip, covers an area of 35.71 square miles. The Gingerich recharge value is 97.5 mgd (2.32 mgd/sq.mi.); the Shade value is 54 mgd (1.85 mgd/sq.mi.); and the Mink and Yuen, Inc. value is 61 mgd (1.71 mgd/sq.mi.). Although the high Gingerich value has a strong claim to validity, the conclusions that follow are keyed to the more conservative values of Shade, and Mink and Yuen, Inc.

The significant differences in head between the wells west of the trace of the rift zone drawn through the cinder cones adjacent to Maliko Gulch and those to the east suggest that hydraulic continuity between the sets of wells is impeded. The Hamakuapoko wells have heads between 4 and 4.5 feet at a distance about 2 to 3 miles from the coast, and the Upper Haiku well has a head of about 4.5 feet at about 3 miles from the coast, whereas the Haiku School well at just over a mile from the coast has a head of 3.4 feet and the new Ulumalu well (5417-01) about 2 miles from the coast has a head of 8 feet. Static head at the recently drilled monitor well (5418-01) is 4.7 feet at approximately 2 miles from the coast. At about comparable distances from the coast, which is assumed to be the discharge front of the lens, the wells west of the rift zone boundary are 1 to 2 feet lower than the wells to the east. We interpret this phenomenon to mean that an aquifer unit between the two rift zone traces exists within the Haiku Aquifer System and hereafter refer to it as the Kuiaha Unit. .

Proportionately re-casting the hydrologic budgets discussed above to reflect the narrower compass of the aquifer, which extends for approximately 3 miles between the west and east boundaries of the rift zone, the recharge values are as follows: Gingerich, 55 mgd; Shade, 30 mgd: and Mink and Yuen, Inc. 34 mgd. These are recharge values, not allowable extraction (sustainable yield).

The sustainable yield equation (Mink, 1980) is,

$$SY = I\{1-(h_e/h_o)^2\}$$

in which SY is sustainable yield, I is recharge, h_o is initial head in the aquifer, and h_e is the steady state head to which the original head will descend for the value of SY. Assuming an initial average head of 7.5 feet, which is the situation in the mid portion of the aquifer, that will be allowed to decrease to a steady state head of 5 feet, the SY for the Shade recharge value is 14.7 mgd; for the Mink and Yuen, Inc. recharge it is 16.7 mgd; and for the Gingerich value it is 26.9 mgd. Even the lowest of these values exceeds the EMPLAN estimated average pumpage of 10 mgd.

For an average draft of 10 mgd, the steady state head for each of the recharge estimates will be: Shade, 5.7 feet; Mink and Yuen, Inc. 5.9 feet; and Gingerich, 6.3 feet. A basal aquifer with a head of 5 to 6 feet in its mid portion can accommodate well capacities of 1.0 to 1.5 mgd.

An inventory of Honomanu formation wells located in the Kuiaha Unit and also in the Paia Aquifer System within a half-mile of Maliko Gulch is tabulated below.

Well	State no.	Head, Ft.	Data Source	Reliability
Haiku School	5519-01	3.4	DOWALD	Original meas. Good
Ulumalu	5417-01	7.9	CWRM	Very good
Kulamalu	5317-01	12	CWRM	Good
Baldwin Man.	5519-03	5.5	J.F. Mink	Poor
W. Kuiaha	5518-04	5.2	CWRM	Very good
Hea'a'ulu	5616-02	5.8	Driller record	Fair
Joachim	5517-01	5	Driller record	Fair
Manawai	5517-02	6.2	Driller record	Fair
Haiku monitor	5418-01	4.7	Driller	Good
Water levels west of the rift zone within half mile of Maliko Gulch.				
H'Poko 1	5420-02	4.3	WRA; TNWRE	Very good
H'Poko 2	5320-01	4.6	WRA; TNWRE	Very good

Upper Haiku	5419-01	4.5	TNWRE	Very good
Maui H.S.	5420-01	3.4	USGS	Very good
HC&S Pump 11	5520-01	3.5	USGS	Good
Haliimaile	5220-01	5	CWRM; TNWRE	Good

Table abbreviations:

TNWRE ... Tom Nance Water Resources Engineering

WRA ... Water Resources Associates

USGS ... U.S. Geological Survey

CWRM ... State Commission on Water Resources Management

DOWALD ... State Department of Water and Land Development

The head measurement in the recently drilled Maui Pine well at Haliimaile (5520-01) gave a value of 4.95 feet. At the end of drilling the reported initial head was 6.32 feet (Nance, WRE). The difference may be due to confusion in elevation of the measuring point. Most significant, however, is the fact that this well has a head substantially lower than that of the Dowling well (12 feet) lying to the east of the rift zone trace at about the same distance from the coast.

The water level measurements within the Kuiaha Unit useful for composing a water level map (piezometric map) are limited to 5519-01, 5417-01, 5318-01, 5616-02, 5517-01, 5517-02 and 5418-01. For the aquifer west of the rift zone boundary all of the listed wells are considered reliable for a water level map and determination of gradients.

CHAPTER 7. AQUIFER CONTAMINATION

Contamination of the groundwater in the Haiku Aquifer System may originate from two principal sources, agricultural chemicals and septic tank – cesspool effluent. Of greatest concern is the potential from agricultural chemicals used in the past or currently applied. Septic tank – cesspool effluent has not been identified as a detectable pollutant.

7.1 Agricultural Chemicals and Toxicity

Until the mid 1980s the nematocides EDB (ethylene dibromide) and DBCP (dibromochloropropane) were injected into the soils of pineapple fields in East Maui. The registration of DBCP was suspended by the U.S. Environmental Protection Agency (USEPA) in 1979, but use of the Maui Land and Pineapple Company inventory of the chemical was permitted in Maui until December 31, 1986. The USEPA registration of EDB was cancelled in 1983, from which time its use was prohibited. Both EDB and DBCP were suspected to be carcinogenic. Often accompanying these primary nematocides is another organochlorine, TCP (trichloropropane).

In 1979 most of the pineapple fields lay west of Maliko Gulch above an elevation of about 400 feet. Starting in about 1979 – 1980 the lower fields below the Haliimaile Highway were replaced with sugar cane. Now the greatest pineapple acreage lies in the region west of Maliko Gulch and inland of Haliimaile Highway.

To the east of Maliko in the 1970s a few fields were located in the Haiku Town – Pauwela region, and seven fields lay between Hana Highway and the coast. Figure 6 is a Maui land and Pineapple Co. map dated 1970 showing the locations of its pineapple fields. A field on the slopes of Kauhikoa continues to be cultivated. The Upper Haiku well, 5419-01, was drilled in the vicinity of the Kauhikoa field. At one time individual private growers grew pineapple below EMI's

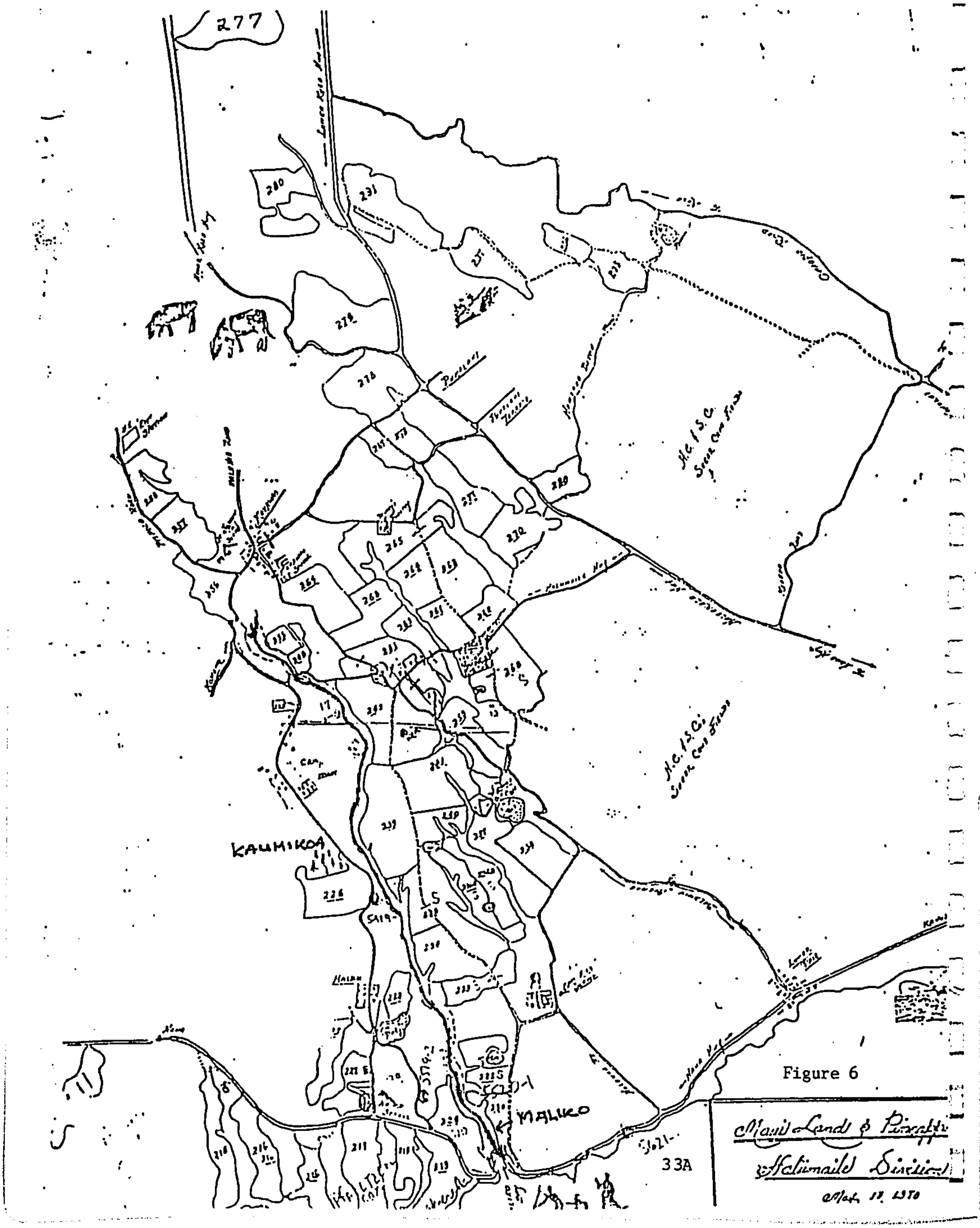


Figure 6

Kauhikoa Ditch, and presumably they used nematocides, although no records of the type of nematocides have been found. The proposed wells will be located in the same general area.

7.2 History of the Detection of Contamination

Groundwater sampling began in East Maui in 1979 after USEPA became concerned with organochlorine pesticides, particularly EDB and DBCP, and later, TCP. EDB and DBCP were the primary chemicals employed to control nematodes in pineapple fields; TCP originated as an impurity in Shell DD, also used as a nematocide.

Between June and April 1979, groundwater at four sites in East Maui was found to be contaminated with DBCP at greater than 200 ppt (parts per trillion), the detection limit at that time. A well at the old Maui High School in Hamakuapoko pumped water having 200 to 300 ppt, but the highest concentration, 2230 ppt, was found in a spring at the base of the Kula formation at the coast in Pfaeltzer Cove, immediately down gradient of active pineapple fields. Sampling the same spring a year later (4/16/80) gave no presence of DBCP. Evidently the contaminants were flushed away. In a sample collected from seepages from the Kula/Honomanu contact in the highway cut on the west side of lower Maliko Gulch 1740 ppt DBCP was detected. At the Arakaki watercress farm on the east side of Maliko down gradient of pineapple fields DBCP was absent at the prevailing detection limit of 200 ppt. Later when the detection limit was reduced to 10 ppt, the Arakaki spring showed concentrations of 90 ppt DBCP, 97 ppt EDB and 1290 ppt TCP (3/4/85). EDB was not analyzed for in the 1979 sampling.

The State Department of Health (DOH) subsequently set the allowable maximum concentration level (MCL) for EDB and DBCP at 40 ppt , each, and for TCP at 800 ppt. The detection limits had been dramatically reduced to 10 ppt for DBCP and 20 ppt for EDB, and 400 ppt for TCP.

The next sampling program took place in 1980. Kula formation perched water from Tunnel 16 (this short tunnel, though numbered 16 in the sampling record, is probably Tunnel 23 in Stearns and Macdonald) in lower Maliko Gulch had 48, then 70 ppt DBCP. The Maliko highway seepage had decayed to 600 ppt DBCP in April, 1982, then further to 310 ppt. The pineapple fields upslope of the seepages had been replaced with sugar cane. The April concentration of DBCP was accompanied by 100 ppt of EDB, but by June the EDB was not detectable. At other seepage sites in lower Maliko DBCP decreased from 600 ppt in February 1980, to 33 ppt in December 1980, while at another it remained at 2700 ppt. All of the Maliko samples drained from perched water in the Kula formation. One sample from the Honomanu basal aquifer taken at HC&S Pump 11 (5520-01; Shaft 32) had no detectable DBCP.

Sporadic samples were collected from the Kula formation seepages and at the Maui High School well (5420-01) between 1980 and 1986. The MHS well penetrates into the Honomanu aquifer, but because its annulus is cemented only to a depth above the Kula perched water, the contamination likely originated by way of vertical drainage to the Honomanu along the unsealed annulus. The last DBCP record for this well (3/4/85) showed 91 ppt DBCP, 67 ppt EDB and 430 ppt TCP. By 1983 the lower Maliko tunnel had no detectable contamination, while the highway seeps showed concentrations ranging from a low of 50 ppt DBCP (1984) to a high of 311 ppt DBCP (1982). HC&S Pump 11 continued to show no detectable contamination. The Baldwin Manor well (5519-03), drilled in 1986, had no detectable DBCP and EDB (detection limits 25 ppt), and no TCP (detection limit 400 ppt).

Two private wells, each terminating in the Kula formation, were sampled in 1984. The Feehan well (5516-01), located between the Hana Highway and the coast near pineapple fields, had a DBCP concentration of 40 ppt, and the Behnke well (5519-02), on the east side of Maliko Gulch, had no detectable contamination. Pauwela Spring (Pfaeltzer Cove) showed a concentration of 1200 ppt DBCP in 1986, about half the concentration (2230 ppt) detected in 1979. In 1981 the Haiku School well (5519-01), driven into the Honomanu aquifer, showed DBCP at the detection limit of 10 ppt.

In the Paia Aquifer System down gradient of pineapple fields several HC&S pumping stations exhibited contamination in 1985 and 1986. Puunene Pump 7A (5227-04) had 40 ppt EDB; Paia Pump 17 (5422-02) had 28 ppt EDB in 1985 and 47 ppt DBCP in 1986; Kuau Pump 12 (5522-01) had 430 ppt TCP; Puunene Pump 8 (5226-02) had 47 ppt EDB; and Kaheka (5321-01) 18 ppt DBCP, 50 ppt EDB and 130 ppt TCP. These stations are located generally down gradient of former and existing pineapple fields. The irrigation water pumped is brackish and unfit for drinking.

7.3 Contamination of the DWS H'Poko Wells, the Upper Haiku Well, the Kulamalu Well, and the Haiku Monitor Well

The DWS Hamakuapoko wells (H'Poko 1, 5420-02, and H'Poko 2, 5320-01) lie just west of Maliko Gulch in the Paia Aquifer System at elevations of 702 and 780 feet, respectively. H'poko 1 was drilled in 1991 and H'Poko 2 in 1992. Both wells penetrate into the Honomanu basal aquifer where the water table is 4 to 5 feet above sea level. The wells were included in the original East Maui Water Development Plan but now serve as back-up sources during drought emergencies. When H'Poko 1 was drilled the pumped water showed no DBCP and EDB at detection limits of 40 ppt, or TCP at detection limit 500 ppt. These analyses were made by a local laboratory that was not recognized by USEPA. In 1997 the results of analyses by Montgomery-Watson Laboratory, which is certified by USEPA, yielded 50 ppt DBCP (detection limit 10 ppt), no EDB (detection limit 20 ppt), and 900 ppt TCP (detection limit 500 ppt). A follow-up analysis showed 46 ppt DBCP, no EDB, and 700 ppt TCP. An analysis by Montgomery Watson in 1998 gave 40 ppt DBCP and 970 ppt TCP. The DBCP is at the DOH MCL of 40 ppt, but TCP exceeds the MCL of 800 ppt. H'Poko 1 is located where pineapple fields were abandoned about 20 years ago.

The concentrations of the nematocides in H'Poko 2 are considerably higher than in H'Poko 1. In 1992 upon completion of drilling the DBCP levels in two samples were 230 and 360 ppt, for EDB 210 and 230 ppt, but TCP was not detected. In 1997 for two samples DBCP was 320 and 200 ppt, and for EDB, 160 and 310 ppt. The most recent sampling in 1998 gave 240 ppt DBCP and 390 ppt TCP. Like H'Poko 1, H'Poko 2 is located in the vicinity of former pineapple fields. Before distribution to consumers, the water from each well undergoes treatment that reduces contamination to below the MCLs.

The DWS upper Haiku well (5419-01) was drilled in 1979 but was not put on stream until 20 years later. Water samples analyzed in 1991 showed no contamination with DBCP. An analysis in 1993 gave 50 ppt DBCP (detection limit10 ppt), but in 1995 and 1996 only 10 ppt. EDB was undetected in the 1993, 1995 and 1996 samples. The well is adjacent to a pineapple field near Kauhikoa.

The Kulamalu well (5317-01) was drilled in 1998 from a ground elevation of 1234 feet. Neither DBCP nor EDB were detected in the pumped water. The well lies up-gradient of former pineapple areas and is not likely tributary to contamination by agricultural chemicals.

A sample of perched water in the Kula formation from the recently drilled Haiku Monitor Well (5418-01, drilling completed January 2002) showed slight contamination with EDB at 13 ppt but no indication of either DBCP or TCP. Samples from the Honomanu basal water contained no EDB, DBCP and TCP.

Litigation Involving Existing and Future Wells: On May 3, 1996, the Board of Water Supply of the County of Maui (plaintiff) filed a complaint against Shell Oil Company, et al (defendants) alleging that certain agricultural chemicals produced by defendant were contaminating a number of Board of Water Supply wells with various chemicals, principally DBCP (dibromochloropropane), a suspected carcinogen. These wells were the Hamakuapoho 1 and 2, Honokahua A, and Haiku well.

In September 1999, an agreement was reached between the plaintiff and defendants whereby the defendants agreed to pay tort damages in the amount of $3,000,000 to the plaintiff in settlement of the actions involving capital and operations and maintenance costs and for certain past DBCP related costs. These remedies are to assist the plaintiff in complying with the Maximum Contaminant Level (MCL) for DBCP on the island of Maui until September1, 2039.

Another part of the agreement provides for payment of capital and operating costs of other existing and future wells with DBCP concentrations exceeding the Maximum Containment Level (MCL). In general, the defendants will reimburse the plaintiff during the terms of agreement for 90% of all capital and operating and maintenance costs under conditions described in the agreement. This obligation ends on September 1, 2039. A copy of the agreement may be found in the Appendix.

The number of wells for which the defendants will be obligated to pay for the capital and operating and maintenance costs for Granulated Activated Carbon (GAC) treatment is limited to fifty (50) wells. Not withstanding this agreement, the plaintiff retains its right to file future DBCP claims for the islands of Molokai and Lanai.

A copy of the agreement may be found in the Appendix of this document.

7.4 Treatment for EDB, DBCP, and TCP Contamination

There are five principle methods of treating the water to eliminate or reduce the concentrations of EDB, DBCP, and TCP. They are as follows:

1. Granular Activated Carbon (GAC)
2. Powdered Activated Carbon (PAC)
3. Air stripping (packed tower aeration)
4. Adsorbent Exchange Resins
5. Membrane Technology

The following is a brief discussion of the features of each:

1. GAC - Very high adsorptive capacity for most organic and synthetic chemicals. Contaminated water flows downward from the top of a pressurized vessel through a bed of activated carbon. The water is treated when it flows through the bed of activated carbon and is collected in an underdrain system. Some advantages of the GAC system include no hazardous air emissions, system reliability, enclosed treatment, and ease of operation. Principal disadvantages are the high capitol costs and cost of disposal of the spent carbon.
2. PAC - The primary difference between the GAC and PAC systems is the particle size of the activated carbon. The powder is added to a stream of contaminated water, allowed enough time for adsorption to occur, and the carbon is removed by filtration. The PAC method is used typically for taste and odor control, and is not as effective as GAC in

removing synthetic chemicals. Its principal disadvantage is the added requirement for filtration.

3. Air Stripping - The liquid is introduced into an air stripping tower and flows downward through a packing consisting of ceramic, stainless steel, plastic, or other inert materials. Simultaneously, air is forced upward from the bottom of the tower and is discharged into the atmosphere at the top of the tower. Performance is inconsistent because of the variations in the concentrations of inlet contaminants. To maintain an effluent of consistent quality, the facility needs to be enlarged or modified, depending upon the quality of the inlet contaminants. In addition, the packed tower process can create an air quality problem that may require emission controls and/or monitoring. For DBCP removal, the tower would have to be very large because the relatively low volatility of DBCP would require a higher contact time between air and water. A larger tower would result in higher capital and operating costs.

4. Adsorbent Resins - Certain adsorbent resins have been used to treat water contaminated with organic compounds, but its use is not widespread. Information about the method is sparse, but a study was done in England comparing adsorbent resins with activated carbon. It was shown that activated carbon was more effective in removing certain contaminants such as pesticides than adsorbent resins.

5. Membrane Technology - This method involves the pressurized flow of contaminated water through a membrane. The effectiveness of this method depends on the size of the membrane pores. More information and testing is needed to determine the suitability of both the membrane and adsorbent resin methods for removal of EDB and DBCP.

The GAC method is usually preferred over the other methods because of proven performance, system reliability, enclosed operations, ease of operation, and the fact that it has no hazardous air emissions. Its primary disadvantages are it high capital and disposal costs. Oahu now has at least four GAC plants in operation and the Honolulu Board of Water Supply has found their operations satisfactory.

7.5 Septic-Tank and Cesspool Impacts

The effluent from septic tanks and cesspools carries the same suite of pollutants as is found in raw sewage. The principal potential contaminants consist of biological components, surfactants and nutrients.

No tests have been made to determine the effects, if any, of septic tank – cesspool infiltrate on groundwater in either the Kula perched aquifers or the deep Honomanu basal aquifer in the Haiku region. As a general rule the biologicals undergo biodegradation by microbial action, oxidation and other chemical transformations and sorption before they travel very far. Surfactants may withstand longer travel times and distances but also are subject to biodegradation. Only inorganic nutrients, in particular nitrogen (N), survive to accompany recharge to the aquifer.

Pristine groundwater contains less than about 1 mg/l N.. The USEPA and State DOH MCL for N is 10 mg/l. Groundwater in heavily fertilized and irrigated sugar cane areas where the application of N is on the order of 300 lbs./acre per year has a concentration of about 2 to 4 mg/l. Perhaps as much as 20 percent of the N in fertilizer is entrained in water that percolates below the root zone. This yields a much greater mass of N than infiltrates from septic tanks and cesspools. The Kula formation perched water at the monitor well was analyzed at 1.9 mg/l N, suggesting a contribution from anthropomorphic sources. The concentration in the Honomanu basal groundwater in the Haiku Aquifer System is less than 1.0 mg/l, while the MCL is 10 mg/l. In H'Poko wells 1 and 2, which are down gradient of irrigated sugar cane fields, the N content of the basal groundwater is about 1.4 mg/l. The DWS Upper Haiku well, which is on the margin of the reach of infiltration from sugar cane fields, pumps water with only 0.6 mg/l N, and the Kulamalu well has 0.8 mg/l. Groundwater pumped from the basal aquifer at the monitor well contains 0.89 mg/l (analyses by Montgomery Watson Laboratory).

A State DOH regulation discourages the drilling of wells within 1,000 feet of existing cesspools, and the construction of cesspools within 1,000 feet of existing wells. The proposed wells will be located to meet DOH requirements.

7.6 Summary and Conclusions

Groundwater in both the Kula formation high level perched aquifers and the Honomanu basal aquifer has or had been contaminated where the sources are located in or down gradient of former and existing pineapple fields where EDB, DBCP and Shell DD were used as nematocides. These chemicals are no longer applied. EDB was discontinued in 1983 and DBCP by the end of 1986. Sampling in the early 1980s before the chemicals were proscribed yielded high levels of contamination in the Kula formation, especially at sites in lower Maliko Gulch and down gradient of fields lying between Hana Highway and the coast.

The level of contamination in the Honomanu basal aquifer has been less than in the Kula, but nevertheless significant. The highest concentrations have been detected in wells (H'Poko 1, H'Poko 2, and Maui High School) west of Maliko Gulch in the Paia Aquifer System. To the east of Maliko in the Haiku Aquifer System, but inland of the Hana Highway, the few samples analyzed suggest that the contaminant level is considerably less than in the Paia Aquifer System and is less than the State DOH MCL. .

Potential contamination of groundwater in the Haiku Aquifer System by septic tank and cesspool seepage should be kept under surveillance. Every effort will be made to comply with the State DOH requirements regarding the minimum distance between wells and the sites of septic tanks, cesspools, landfills, and other possible sources of contamination.

CHAPTER 8. THE MONITOR WELL

8.1 General Description and Purpose

The monitor well required by the Court Order of September 2000 (see Appendix) has been drilled at one of the sites shown in Exhibit 2 of the Court Order. The selected site lies at an elevation of approximately 667 feet between Pauwela and Ohia Gulches. The well is designed for data collection only, but a step drawdown test and a 4-day continuous test was conducted using a temporary pump.

The well was designed to probe for the following general conditions: 1) the occurrence of perched water in the Kula formation within a depth of about 100 to 150 feet from the ground surface; 2) whether full or sporadic saturation occurs in the Honomanu formation beneath the Kula formation; 3) to what height above sea level does basal water in the Honomanu reach, and 4) how contaminated with agricultural chemicals are the perched and basal waters.

Drilling was performed in two phases. Phase 1 drilling reached to the base of the Kula formation. Water samples were collected and analyzed, then the bottom of the boring was sealed with several feet of cement and a casing installed with the annulus cemented to prevent seepage of Kula water into the Honomanu aquifer. In Phase 2, the boring was drilled through the cement seal and extended to 65 feet below sea level. During the drilling process measurements were made to determine whether the Honomanu is saturated in the interval from the base of the Kula to the basal water table. Casing, screen, grout and gravel lengths depended on the occurrence of water in the Kula and Honomanu. Figure 4 illustrates the arrangement of the completed well.

The monitor well includes a 1 and 1/4" diameter PVC tube extending 132' from the ground surface into the 17'thick gravel packed section. The bottom 10" of the tube is perforated to monitor water level in the Kula formation.

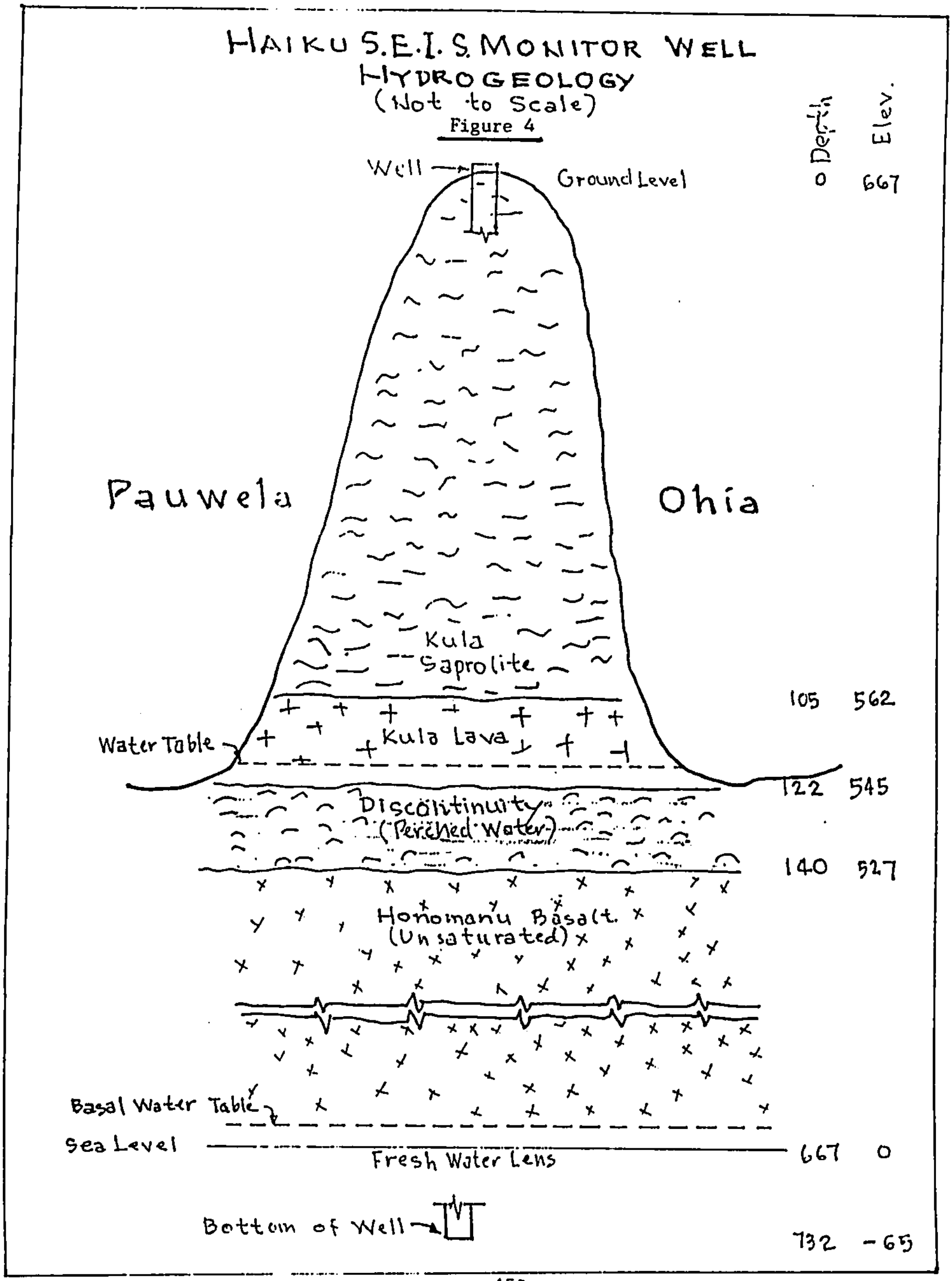
8.2 Drilling Protocol

Phase 1:

1. Drill a 30 inch diameter boring to the base of the Kula, expected depth 100 to 200 feet. The Engineer will determine the final depth.
2. Measure water level in perched aquifer, collect samples for analysis.
3. Emplace a cement plug at the bottom of the boring.
4. Emplace 24 inch diameter casing from surface to cement plug.
5. Cement and gravel annulus.

Phase 2:

1. Drill 20 inch diameter boring through cement plug and through underlying Honomanu formation to 65 feet below sea level (total depth approximately 735 feet).
2. Cease drilling at intervals of 100 feet to allow formation water, if any, to accumulate in boring. Allow about one hour for water to accumulate. Measure depth to water.
3. On completion of drilling emplace 14 inch diameter casing to sea level (approximately (550 feet of casing) with 25 feet of screen from sea level to 25 feet below sea level. Allow 40 feet of open hole below screen.
4. Emplace gravel in annulus from 10 feet above sea level to bottom of screen.
5. Cement-grout remaining annulus.
6. Install temporary pump, capacity at least 500 gpm, to purge and clean well.
7. Measure water level before and after cleaning.
8. Conduct step drawdown test at 450, 550, 650 and 750 gpm.



HAIKU S.E.I.S. MONITOR WELL
HYDROGEOLOGY
(Not to Scale)
Depth
Elev.
Well
Ground Level
0
667
Pauwela
Ohia
Kula
Saprolite
105
562
Water Table
Kula Lava
122
545
Discontinuity
(Perched Water)
140
527
Honomanu Basalt
(Unsaturated)
Basal Water Table
Sea Level
Fresh Water Lens
667
0
Bottom of Well
732
-65

Figure 4

9. Collect basal water samples toward end of test period. Samples to be tested for contamination with agricultural chemicals of interest.

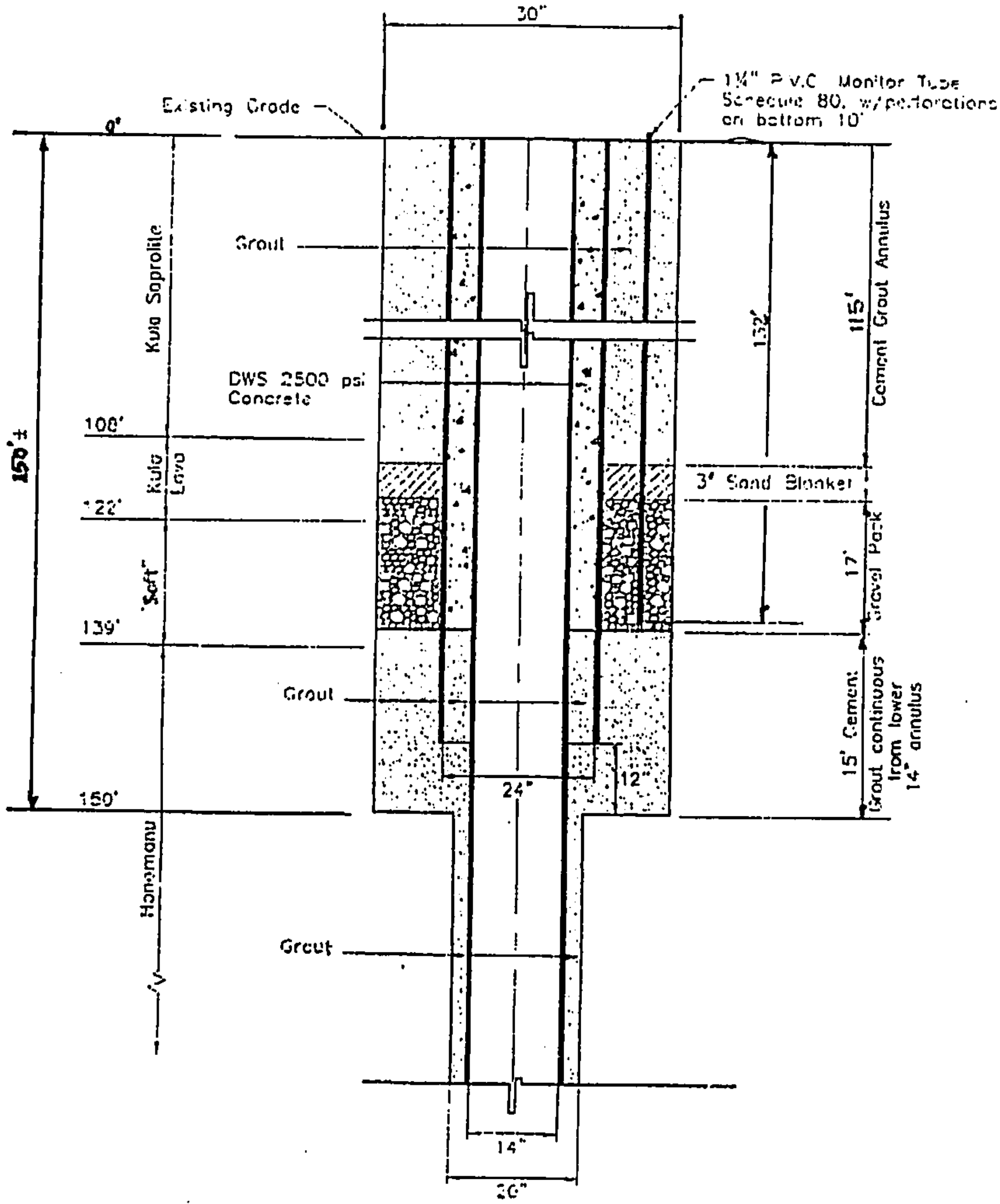
8.3 Drilling Results and Interpretation

In the Phase 1 drilling saprolite was penetrated to a depth of 100 feet, at which depth it quickly transitioned into a solid ledge of Kula lava approximately 15 feet thick. Beneath the lava ledge 15 to 20 feet of 'soft material' separates the Kula lava from the top of the unweathered Honomanu basalt.

The bore diameter was reduced from 30 to 20 inches for the Phase 2 drilling through the Honomanu basalt to the bottom of the boring. The upper boring was fitted with a 24 inch diameter casing and the lower boring with a 14 inch diameter casing. The well section is depicted in Figure 7.

Perched water in the Kula formation rose to a depth of approximately 113 feet where samples were collected for EDB (ethylene dibromide), DBCP (dibromochloropropane) and TCP (trichloropropane) analysis. The perched water occurs on and in the 'soft' layer, which likely consists of erosional debris and soil beds overlying a thin weathered zone on the Honomanu basalt. The flow of the perched water was very weak.

The Phase 2 drilling penetrated unweathered lavas of Honomanu basalt from a depth of approximately 140 feet to the bottom of the boring. From the top of the Honomanu to about 5 feet above sea level the formation is unsaturated, that is, it does not contain a continuum of water. Below 5 feet above sea level the formation is filled with fresh water to the depth of the well.



S.E.I.S. MONITOR WELL
WELL SECTION-UPPER 150'
Not To Scale

Figure 7

TABLE 4
HAIKU S.E.I.S. MONITOR WELL
State No. 5418-01
Video Log

Video of fully reamed upper boring to depth 150 feet.
Video of 12 inch diameter pilot hole below depth 150 feet.

Depth (ft.) Below Elevation ~ 675 ft.	Description and Comments
0 – 70	Smooth soft walls of saprolite.
70 – 95	Saprolite with fragments of fractured rock.
95 – 99	Change from saprolite to Kula lava.
105 – 122	Kula lava; moist walls.
122 – 135	Soft formation, smooth moist walls.
139	Entering Honomanu basalt.
149	In driller fluid (foam); bottom upper boring 150 ft.
156	In 12 inch pilot hole; Honomanu basalt. Unsaturated.
156 – 200	Moist walls.
203	Cavities in Honomanu basalt.
207 – 210	Clinkery, moist.
275	Clinker, about 1 ft.
321	Clinker.
334	Very large cavity.
336 – 339	Cavities (lost circulation during drilling).
343 – 387	Mostly smooth Honomanu basalt walls, some drips.
410	Rubbly.
473	Clinker.
520	Smooth, moist.
550	Clinker.
559	Large voids, clinker.
559 – 576	Smooth.
576 – 623	Mostly clinker.
642	Clinker, approx. 5 ft.
669	Large voids.
670.4	Enter water table. Full saturation.
670.4 – 712	Cloudy water.
712 – 718	Water clearing.
720 – 736	Clear water. Smooth bottom at approx. 745 ft.

A video log was made of the full depth of the uncased borings. Observed conditions in the borings are summarized in Table 4. A video camera unequivocally recognizes a water level due to formation saturation. It is clearly evident when the camera enters the water table. Not until a depth of 670 feet did the camera contact the water table.

The video log shows the presence of cavities and clinker in the Honomanu basalt, which implies a high degree of permeability. In the saprolite and Kula lava the walls of the boring are smooth, which typically indicates low permeability formations.

Cuttings from the rotary drilling were examined with a hand lens (maximum 10x power). Characteristically the Honomanu basalt cuttings contained olivine crystals while the Kula lava did not. The saprolite and 'soft' layer yielded only mud. A summary description of the examination is given in Table 5.

8.4 Contamination

The Kula perched water is slightly contaminated with EDB at 13 ppt (parts per trillion), which is about one third of the State Department of Health MCL (allowable maximum concentration level) of 40 ppt. Neither DBCP nor TCP were detected. The detection limit for EDB and DBCP was 10 ppt, and for TCP, 50 ppt. For the basal water, no EDB, DBCP, or TCP were detected. Results of the analyses are given in Table 6.

Analyses were also made for chloride (Cl), nitrate-nitrogen (NO_3-N) and silica (SiO_2). The chloride concentration was 21 mg/l (milligrams per liter) in the Kula perched water, a typical value for fresh recharge water. The chloride content of the basal groundwater was 51 mg/l. The nitrate-nitrogen content at 1.9 mg/l for the Kula Water is high for natural water (background 0.2 to 0.5 N) and probably reflects residual effects of dissolved fertilizer infiltration and perhaps drainage from septic tanks. The basal water contains only 0.89 mg/l N. Silica at 26

TABLE 5

HAIKU S.E.I.S. MONITOR WELL
State No. 5418-01
Lithology of Drill Cuttings

Depth (ft.) Below Elevation ~ 675 ft.	Description and Comments
55 – 65	Mud with rock fragments.
100 – 110	Gray aphanitic fragments mixed with mud. Kula lava
110 – 120	Angular coarse gray aphanitic chips, few pyroxene crystals. Kula lava.
120 – 130	Angular chips mixed with mud.
130 – 140	Mostly mud, few small angular chips. Disconformity.
140 – 150	Fine black-gray and brown-red fragments, numerous discrete olivine crystals. Honomanu basalt.
160 – 170	Fine black-gray fragments, numerous olivine crystals. Honomanu basalt.
270 – 280	Black-gray fragments, olivine crystals. Honomanu.
280 – 745	Basalt fragments, often with olivine crystals. Honomanu basalt.

Notes:
1. Saprolite to a depth of approximately 100 feet, then quick change to Kula lava.
2. An approximately 15 feet thick ledge of Kula lava.
3. Approximately 15 feet thick disconformity of "soft material".
4. Honomanu basalt from depth 140 to bottom of boring.

MONTGOMERY WATSON LABORATORIES
a Division of Montgomery Watson Americas, Inc.
555 East Walnut Street
Pasadena, California 91101
Tel: 626 568 6400 Fax: 626 568 6324
1 800 566 LABS (1 800 566 5227)

Laboratory
Data Report
#86661

Maui, County of, Department of
Water Supply
Cari Cerizo
614 Palapala Dr
Kahului , HI 96732

Samples Received

10/10/01

Prepared	Analyzed	QC Ref#	Method	Analyte	Result	Units	MRL	Dilution
EAST MAUI HAIKU SEIS (2110100170) Sampled on 10/09/01 12:50								
	10/10/01 00:00	154614	(ML/EPA 300	) Chloride	21	mg/l	2.0	2
	10/10/01 00:00	154616	(ML/EPA 300.0	) Nitrate as Nitrogen by IC	1.9	mg/l	0.20	2
	10/31/01 00:00	155880	(EPA/ML 200.7	) Silica	26	mg/l	1.0	1
EPA Method 504.1								
10/11/01	10/12/01 00:00	154724	(ML/EPA 504	) 1,2-Dibromo-3-chloropropane	ND	ug/l	0.010	1
10/11/01	10/12/01 00:00	154724	(ML/EPA 504	) 1,2-Dibromoethane	0.013	ug/l	0.010	1
10/11/01	10/12/01 00:00	154724	(ML/EPA 504	) 1,2,3-Trichloropropane	ND	ug/l	0.050	1
			(Surrogate	) 1,2-dibromopropane	103	% Rec		

TABLE 6

Kula Perched Water

MONTGOMERY WATSON LABORATORIES
a Division of Montgomery Watson Americas, Inc.
555 East Walnut Street
Pasadena, California 91101
Tel: 626 568 6400 Fax: 626 568 6324
1 800 568 LABS (1 800 566 5227)

Laboratory
QC Report
#91167

Maui, County of, Department of
Water Supply
(continued)

QC Ref #163425 EPA Method 504.1

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
LCS1	1,2-Dibromo-3-chloropropane	0.02	0.017	85.0	(60.00 - 140.00)	
LCS2	1,2-Dibromo-3-chloropropane	0.20	0.20	100.0	(60.00 - 140.00)	
MBLK	1,2-Dibromo-3-chloropropane	ND				
MS	1,2-Dibromo-3-chloropropane	0.20	0.19	95.0	(60.00 - 140.00)	
MSD	1,2-Dibromo-3-chloropropane	0.20	0.19	95.0	(60.00 - 140.00)	0.00
LCS1	1,2-Dibromoethane	0.02	0.018	90.0	(60.00 - 140.00)	
LCS2	1,2-Dibromoethane	0.20	0.20	100.0	(60.00 - 140.00)	
MBLK	1,2-Dibromoethane	ND				
MS	1,2-Dibromoethane	0.20	0.21	105.0	(60.00 - 140.00)	
MSD	1,2-Dibromoethane	0.20	0.20	100.0	(60.00 - 140.00)	4.9
LCS1	1,2,3-Trichloropropane	0.20	0.18	90.0	(60.00 - 140.00)	
LCS2	1,2,3-Trichloropropane	2.00	2.00	100.0	(60.00 - 140.00)	
MBLK	1,2,3-Trichloropropane	ND				
MS	1,2,3-Trichloropropane	2.00	2.06	103.0	(60.00 - 140.00)	
MSD	1,2,3-Trichloropropane	2.00	2.02	101.0	(60.00 - 140.00)	2.0
MS	Spiked sample	Lab # 22	01230097		(0.00 - 0.00)	
LCS1	1,2-dibromopropane (surr)	100	93	93.0	(60.00 - 140.00)	
LCS2	1,2-dibromopropane (surr)	100	92	92.0	(60.00 - 140.00)	1.1
MBLK	1,2-dibromopropane (surr)	100	92	92.0		
MS	1,2-dibromopropane (surr)	100	100	100.0	(60.00 - 140.00)	
MSD	1,2-dibromopropane (surr)	100	ND		(60.00 - 140.00)	0.00

Spikes which exceed Limits and Method Blanks with positive results are highlighted by Underlining.
Criteria for MS and DUP are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

TABLE 7

Honomanu Basal Water

MONTGOMERY WATSON LABORATORIES
a Division of Montgomery Watson Americas, Inc.
555 East Walnut Street
Pasadena, California 91101
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Laboratory
Hits Report
#91167

Maui, County of, Department of
Water Supply
Cari Cerizo
614 Palapala Dr
Kahului , HI 96732

Samples Received

24-jan-2002 17:12:16

nalyzed	Sample#	Sample ID	Result	UNITS	MRL
	2201240302	**EMWDP SEIS MONITOR WELL**			
01/24/02		Chloride	51	mg/l	1.000
)1/24/02		Nitrate as Nitrogen by IC	0.89	mg/l	.100
)1/30/02		Silica	51	mg/l	1.000

TABLE 7 (con'd)
Honomanu Basal Water

mg/l in the Kula water and 51mg/l in the Honomanu basal water is of a magnitude characteristic of Hawaiian groundwaters.

Laboratory analyses of the Honomanu basal water are shown in Table 7. It is noted that test results for DBCP, EDB, and TCP were non-detectable.

8.5 Pump Test Results

Two pump tests of the basal groundwater in the Honomanu basalt were conducted, the first a step drawdown test at rates of 440, 550, 650 and 760 gpm, and the second a continuous 96 hour test at 760 gpm. The pump lifted water from a depth of approximately 660 feet to the surface. The Honomanu basalt is not saturated with groundwater at elevations greater than the basal water table at about 5 feet above sea level.

Figure 4 illustrates hydrogeological conditions at the site of the well. The nearest streams, Pauwela and Ohia, are about 350 feet each from the well and are cut into the Kula lava and the disconformity above the Honomanu basalt. The stream channels do not penetrate to the Honomanu and therefore whatever groundwater seepages they receive originate in the horizons associated with the Kula formation. The Kula is sealed off from the monitor well and therefore did not contribute water to the pumpage.

Because the stream inverts lie at least 540 feet above the Honomanu basal aquifer, no possibility exists that pumpage from the monitor well could affect stream flow. For the same reason, no stream in the Haiku region could be influenced by pumping from the Honomanu basal aquifer except very near the coast below an elevation of about 5 feet where the stream channels may intersect the Honomanu. But no wells are planned this close to the coast. The monitor well lies 2.3 miles inland, and the proposed development wells may be placed a further mile up-slope.

Results of the step drawdown test were employed to estimate transmissivity, and by inference, the hydraulic conductivity of the Honomanu. The method and computations for determining these parameters are given in the appendix. Maximum drawdown at the well after 96 hours of pumping at 760 gpm was only 1.6 feet.

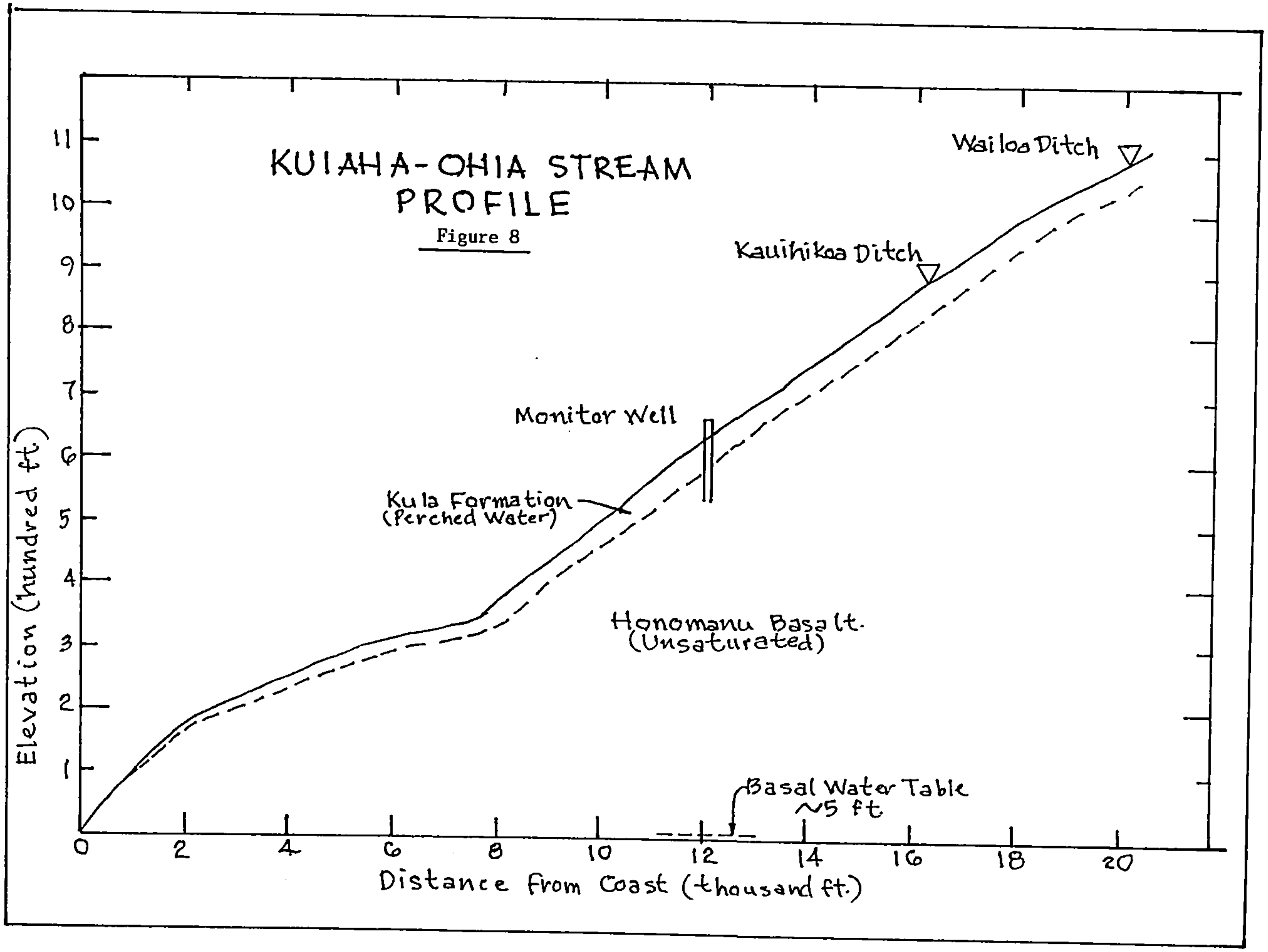
Computed transmissivity (T) is on the order of 700,000 sq.ft./day and inferred hydraulic conductivity about 7,000 to 10,000 ft./day (see appendix). Both values are in the higher range of values for Hawaiian basaltic basal aquifers. Where the static head is sufficiently high, say 5 to 8 feet as anticipated at the sites proposed for the development wells, pump capacities of 1 mgd to 2 mgd can be safely used. Aquifer effective porosity can not be determined from step drawdown tests, but it is likely to be between .05 and .10 as at other similar aquifers.

CHAPTER 9. SURFACE WATER

9.1 Hydrologic Relationship Between the Honomanu Aquifer and Stream Flow

One of the primary reasons for rejecting the original EIS as inadequate was the controversy over the possible connection between stream flow and groundwater in the Honomanu basal aquifer. Over the years since submittal of the original EIS and its rejection by the Court, several investigations, in particular a study by the U.S. Geological Survey (1999), have demonstrated that the intermittent streams are not sustained by discharge into stream channels from the Honomanu aquifer except very near the coast below an elevation of about 3 feet where the Honomanu water table is exposed. The reach of this occurrence is less than a few hundred feet upstream from the coast. Further inland the inverts of stream channels rise above the Honomanu water table and, additionally, rest on the Kula formation. Whatever flow occurs in the streams originates from rainfall and seepage from the perched high level groundwater in the Kula formation. Figure 8 illustrates the relationships among channel flow, high-level groundwater seepage and the deep Honomanu aquifer.

The contention that pumping from the Honomanu aquifer would affect stream flow was speculative, and it is unfortunate that the actual hydrogeological conditions were not elaborated upon in the original EIS. Sufficient data had already been collected to eliminate the possibility of a connection between the Honomanu aquifer and the streams. Since then as a result of investigations by the U.S. Geological Survey, Tom Nance Water Resources Engineering, and Mink and Yuen, Inc., the lack of connection has been verified. To sustain the argument that pumping from the Honomanu basal lens will affect stream flow, it must be shown that the Honomanu water table is intersected by stream channels. This cannot be done.



KUIAHA-OHIA STREAM PROFILE

Figure 8

9.2 <u>Streams and Stream Flow</u>

Streams that enter the sea between Maliko Gulch and Makawaiiao Gulch, the approximate boundaries of the area proposed for groundwater development, include from east to west Maliko, Kanemoeala, West Kuiaha, East Kuiaha, Kaupakulua and Manawaiiao. The main drainages are Maliko, West and East Kuiaha, and Kaupakulua. Maliko has no substantial tributaries below an elevation of approximately 1400 feet; West Kuiaha at approximately 200 to 250 feet branches into Lilikoi, Pauwela and Ohia; East Kuiaha has no significant tributaries; and Kaupakulua becomes Opaepilau and an unnamed branch above an elevation of about 700 feet, and Opaepilau bifurcates into Awalau and Kalakohi at about 850 feet elevation.

All of these streams are intermittent in flow but are perennial at low rates over limited distances under prevailing conditions of diversion to the EMI ditches. As part of the U.S. Geological Survey investigation (Gingerich, 1999), 53 stream flow measurements were made during dry weather, 31 in the Kuiaha drainages and 22 in the Kaupakulua drainage. The Kuiaha measurements were made on October 28 and 29, 1997, and the Kaupakulua ones between November 12 and 18, 1997. The location of the measurement sites and tabulation of the flow values, both copied from the Gingerich report, are attached as an Appendix. Figures 9 and 10 are diagrams of the locations and flow values for each drainage. Some of the flows are intercepted by the Kauhikoa, Lowrie and Haiku Ditches of East Maui Irrigation Co. (EMI). During dry weather the total diversion, based on the U.S. Geological Survey measurements, totals approximately 2.4 mgd, with the largest single contribution of 1.34 mgd from Ohia to Kauhikoa Ditch. On Awalau at an elevation of approximately 1780 feet about 1.9 mgd of dry weather flow is diverted by the Department of Water Supply (see Appendix 16.4 for stream flow measurements and location of gaging stations in the Haiku area).

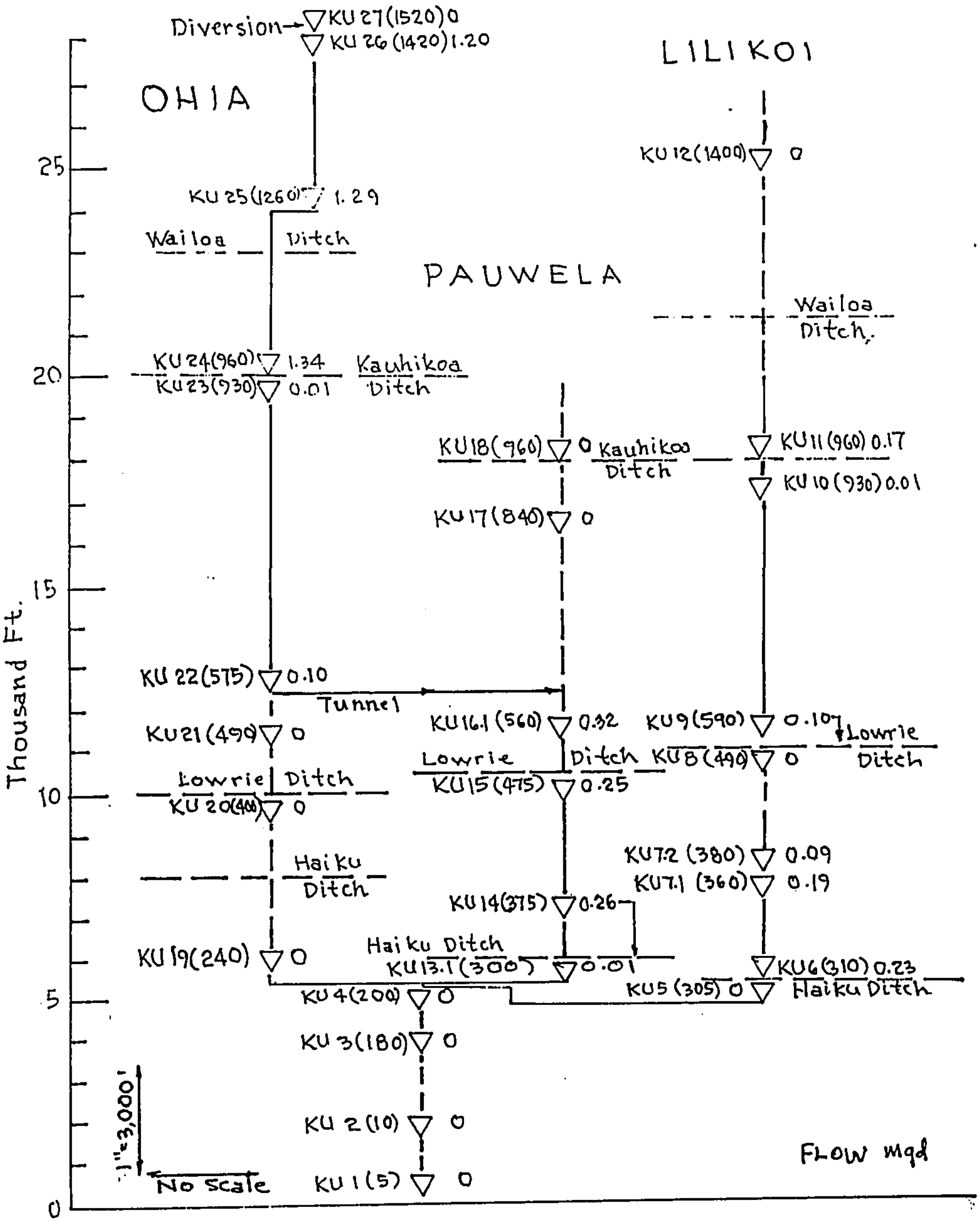
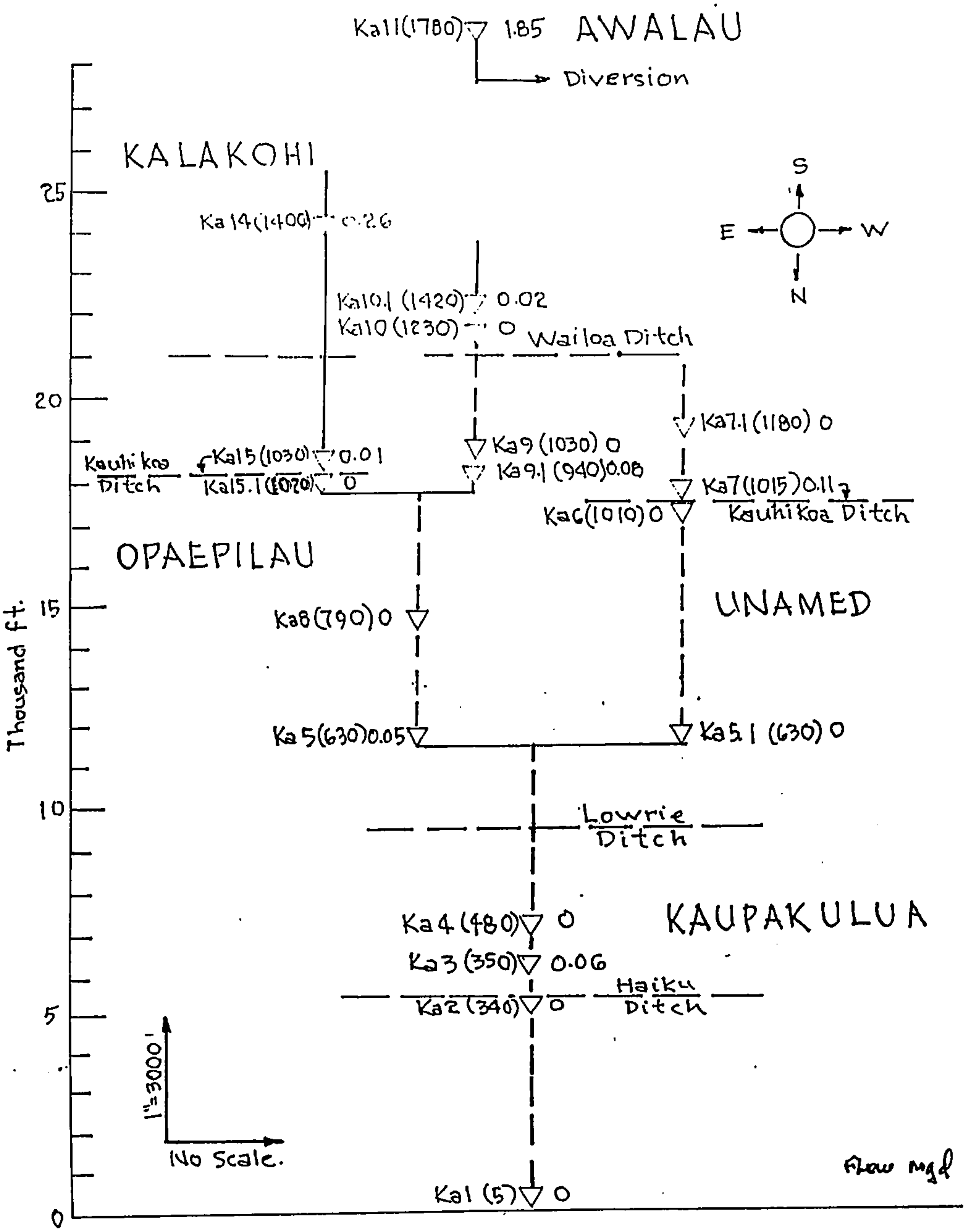

Diversion
KU 27 (1520) 0
KU 26 (1420) 1.20
OHIA
LILIKOI
KU 12 (1400) 0
KU 25 (1260) 1.29
Wailoa Ditch
PAUWELA
Wailoa Ditch
KU 24 (960) 1.34
KU 23 (930) 0.01
Kauhikoa Ditch
KU 18 (960) 0
Kauhikoa Ditch
KU 11 (960) 0.17
KU 10 (930) 0.01
KU 17 (840) 0
KU 22 (575) 0.10
Tunnel
KU 16.1 (560) 0.32
KU 9 (590) 0.10
Lowrie Ditch
KU 21 (499) 0
Lowrie Ditch
KU 15 (475) 0.25
KU 8 (490) 0
Lowrie Ditch
KU 20 (400) 0
Haiku Ditch
KU 7.2 (380) 0.09
KU 7.1 (360) 0.19
KU 14 (375) 0.26
KU 19 (240) 0
Haiku Ditch
KU 13.1 (300) 0.01
KU 6 (310) 0.23
KU 5 (305) 0
Haiku Ditch
KU 4 (200) 0
KU 3 (180) 0
KU 2 (10) 0
KU 1 (5) 0
1" = 3,000'
No scale
FLOW mgd
Thousand Ft.
25
20
15
10
5
0

Figure 9



Ka11(1780) 1.85
AWALAU
Diversion
KALAKOHI
Ka14(1400) 0.26
Ka10.1 (1420) 0.02
Ka10 (1230) 0
Wailoa Ditch
Kauhikoa Ditch
Ka15 (1030) 0.01
Ka15.1 (1020) 0
Ka9 (1030) 0
Ka9.1 (940) 0.08
Ka7.1 (1180) 0
Ka7 (1015) 0.11
Ka6 (1010) 0
Kauhikoa Ditch
OPAEPILAU
UNAMED
Ka8 (790) 0
Ka5 (630) 0.05
Ka5.1 (630) 0
Lowrie Ditch
Ka4 (480) 0
KAUPAKULUA
Ka3 (350) 0.06
Haiku Ditch
Ka2 (340) 0
Ka1 (5) 0
S
E
W
N
Thousand ft.
25
20
15
10
5
0
1"=3000'
No Scale.
Flow mgd

Figure 10

During dry weather all of the stream flow is derived from high level perched water in the Kula Volcanics. The high level groundwater is perched on low permeability lenses and layers of eroded material, pyroclastics and weathered volcanic rock at the disconformity where the permeable basalts of the Honomanu transform into the lower permeability andesitic basalts of the Kula. The wells proposed in the EMPLAN will be sealed from contact with the perched groundwater in the Kula formation. The perched water will not be included in the pumpage.

9.3 Effect of Pumping on Stream Flow

Results from drilling and testing the Haiku SEIS monitor well support the observation of very high hydraulic conductivity and the absence of continuous saturation below the Kula/Honomanu contact until the water table in the Honomanu is reached at approximately 5 feet above sea level about 2.5 miles inland of the coast. Drilling and testing of the monitor well and the accompanying data are fully described in Chapter 8.

The U.S. Geological Survey report on Haiku notes that the Kuiaha and Kaupakulua gulch systems are usually dry to altitude 350 feet, gain flow from 350 to 900 feet, then alternately gain and lose flow to altitude 2400 feet. Gingerich concludes that, "Fresh groundwater occurs in two main forms: (1) as high level water held up by relatively low permeability geologic layers, and (2) as a fresh water lens floating on denser, underlying salt water. The rocks at the contact between the Kula Volcanics and the underlying Honomanu Basalt and above the fresh water lens appears to be unsaturated on the basis of several observations: (1) streams are dry or losing water where they are incised into the Honomanu Basalt, (2) the hydraulic conductivity of the Honomanu Basalt is too high to support a thick groundwater lens given the estimated recharge to the study area, and (3) wells that penetrate through the contact have encountered conditions of cascading water from above the contact and dry lava tubes in the Honomanu Basalt."

Another U.S. Geological Survey investigator (Eyre, 1996) concluded from data he had analyzed that, "These data do not suggest that stream flow is sustained by discharge from a fully saturated aquifer that extends to a stream's headwaters thousands of feet above sea level".

Aside from surface observations and stream measurements, pump tests have been proposed as a possible means of determining whether stream flow could be influenced by withdrawal of water from the Honomanu basal aquifer. However, this approach is burdened with many uncertainties. W. Meyer, former district chief of the U.S. Geological Survey Water Resource Division Pacific Region, noted in a letter dated September 9, 1998 to Tim Johns, then director of the Department of Land and Natural Resources, State of Hawaii, that it is unnecessary to monitor stream flow during a pump test because the results can be extremely misleading. This is a point raised in other groundwater-stream controversies. The preferred method proposed by Meyer is to measure drawdown in the monitor (observation) well until it stabilizes, then attribute the stability to the drawdown cone reaching a source of water in a stream, assuming continuity of stream flow with the aquifer being pumped. This method is also beset with great uncertainties. It is based on the assumption that the stream intersects the groundwater table, and when its flow is touched by the drawdown cone water will be diverted down the gradient to the pumping well. Only for high-level dike aquifers and streams crossing the coastal plains at low elevations does this scenario apply in Hawaii.

9.4 Ditch and Tunnel Systems and Flow

Four major ditch-tunnel systems controlled by EMI traverse the Haiku Aquifer System to provide an average of 164 mgd, collected mainly from the area east of Haiku, for irrigation of sugar cane in central Maui. The Upper and Lower Kula water systems divert water from streams also to the east of Haiku (Honomanu, Haipuaena, three branches of Puohokamoa, and two branches of Waikamoi).

The ditch-tunnel systems collect stream flow resulting from direct rainfall runoff and drainage from high level aquifers. The highest EMI ditch is Wailoa at elevation approximately 1200 feet. Over its period of U.S. Geological Survey record (1924-1987) it had an average flow of 110 mgd, but during the last three decades of record (1960-1987) the average decreased to 106 mgd. The 90-percentile flow (flow equal to or greater than the listed flow 90 percent of the time) is just 45 mgd. Wailoa collects virtually its entire flow from streams to the east of the Haiku Aquifer System.

At elevation approximately 1000 feet Kauhikoa also collects most of its flow from streams east of Haiku. The two lower systems, Lowrie at about 550 feet elevation and Haiku at about 400 feet, share the remaining average 50 mgd with Kauhikoa of the water not captured by Wailoa. Like Kauhikoa and Wailoa, most of the water in the Lowrie and Haiku ditches originates to the east of Haiku.

The EMI ditch systems will be unaffected by pumping from the Honomanu Aquifer and their flow will not affect the volume of recharge reaching the basal aquifer in the Haiku Aquifer System. They derive most of their water from direct runoff and drainage from high level aquifers in the Kula and Hana formations. The Hana formation does not occur in the Haiku Aquifer System.

At higher elevations than the Wailoa Ditch are intakes and pipelines that capture and transmit water to the Kula region from sources east of Haiku. These systems will be unaffected by the proposed groundwater development plan.

9.5 Conclusions

The data obtained from stream flow measurements, existing wells and the recently drilled monitor well, when analyzed in the context of existing hydrological and geological knowledge, unequivocally indicate that the Honomanu basal aquifer lies too far below stream channels, except very near the coast, to provide water for intermittent flow in the streams. The flow that does occur originates as drainage from high level perched water in the Kula Volcanics. The wells proposed in the EMPLAN will be sealed from Kula and will extract pumpage only from the basal lens in the Honomanu Basalt.

9.6 Water Rights, Instream Flow Values, and Interbasin Transfer of Groundwater

In the litigation involving the EMPLAN, concern was expressed on the asserted violation of water rights and the upsetting of stream ecological balances due to the proposed pumping of the wells and the resulting reduction in stream flows. These are valid concerns if pumping of the proposed wells will in fact affect stream flows. In Chapter 9.3 of the SEIS, it is explained that the pumping of wells from the basal aquifer will not diminish stream flow. Consequently, there would be no valid claims by parties who may be affected that their riparian and appurtenant rights would be violated. Similarly, pumping of the wells would not have a negative impact on instream flow values.

The EMPLAN is intended to develop water for reasonable use by all the people in the county. Under certain conditions, landowners still have the right to develop their own supplies under the law of correlative rights. The rule of correlative rights provides that all of the owners of lands under which lies an artesian basin have rights to the water of that basin; that each may use water there from as long as he or she does not injure thereby the rights of others and that in times when there is not sufficient water for all, each well will be limited to a reasonable share of the water. The rule grants overlying landowners a right only to such water as necessary for reasonable use. Until overlying landowners develop an actual need to use groundwater, nonoverlying parties may use any available "surplus".

A question had been raised as to what impact the Waiahole case on Oahu has on the transfer of water from one groundwater area to another. Our research indicates that neither any State law nor the Water Code prohibits such transfers. In the Waiahole case, confusion arises because Waiahole is in a designated area which, under the Water Code, is allowed such transfers. Although Maui is undesignated, the Code is silent regarding such transfers, thereby lending credence to the view that such transfers are valid because of the absence of explicit prohibition. Furthermore, the transfer of groundwater from an undesignated area does not require a permit from the State Water Commission.

CHAPTER 10. IMPACTS ON THE PHYSICAL ENVIRONMENT

10.1 Surface Water

The potential effects of pumpage on stream flow will be limited to the mouths of streams within a few hundred feet of the coast where the basal water table is exposed. The probable effects will be so small as to be unmeasureable. The courses of streams further inland are either dry during dry weather or over short intervals display sporadic flow derived from high-level springs. None of the streams from Maliko to Kapiki drains a continuous aquifer and none are perennial throughout their lengths under current conditions of diversions to EMI ditches. These operations, which are based on measurements and observations of the USGS, have been confirmed by studies as discussed in Chapter 8.

10.2 Groundwater

The sustainable yield of the Haiku Aquifer System was estimated at 31 mgd in the State Groundwater Protection Plan, about 50 percent of the estimated average recharge rate of 62 mgd, equivalent to approximately 11 mgd per mile of coastline. Subsequently, average recharge to the system was estimated at 97 mgd by the USGS (S.B. Gingerich, 1999). Because groundwater withdrawals will be restricted to the Honomanu Aquifer in which the water table is exposed only in deep valleys near the coast, the effects of pumpage will be limited to diminution of groundwater flow to the sea. Groundwater discharge adds nutrients to seawater along a narrow band of shoreline. Water data along the coast have been collected and analyzed and the results indicate that the anticipated decrease of groundwater flow to the sea would not have any deleterious effect on shoreline biology. The coastline along the Haiku Aquifer System consists mainly of cliffs against which waves crash and the sea is normally turbulent. Where the Kula formation covers the Honomanu at the coast, it behaves as a weak caprock that impedes discharge from the basal aquifer, but along most of the coast the Honomanu formation is exposed.

10.3 Existing Water Developments

Hamakuapoko Wells 1 and 2 are in the Paia Aquifer System upgradient of the Maui High School Well (5420-01) and HC&S infiltration galleries Shaft 27 (5321-01), Shaft 29 (5422-01), Shaft 28 (5422-02), Shaft 31 (5522-01), Shaft 25 (5323-01), Shaft 24 (5424-01), and Shaft 22 (5224-01). Another HC&S gallery, Shaft 32 (5520-01), lies in Maliko Gulch, the boundary between the Paia and Haiku Aquifer Systems. All of the HC&S stations produce water for irrigation that is too brackish for domestic use. The Maui High School Well is contaminated with EDB and DBCP and is restricted to irrigation use but is rarely pumped and is scheduled to be abandoned and sealed. The anticipated total average production of 0.75 mgd from the two Hamakuapoho wells is not expected to affect either the yield or quality of groundwater developed at the HC&S shafts.

In the Haiku Aquifer System, numerous wells have been drilled, of which six are known to be used and three are scheduled for future use. Two of the six extract water from the Kula formation and four from the Honomanu basal aquifer. The upper Haiku Well (5419-01) is now in service for DWS. The Haiku School Well (5519-01) is occasionally pumped by Maui Pineapple for irrigation. The Baldwin Manor Well (5519-03) is private and used as a potable and irrigation source. As noted above, HC&S Maliko Shaft 32 (5520-01) is in Maliko Gulch, which is the boundary between the two aquifer systems.

A summary of the wells in the Haiku Aquifer System and their status follows:

WELL	STATE #	AQUIFER	PUMP (GPM)	STATUS
Upper Haiku	5419-01	Honomanu	350	DWS Use
Pauwela	5518-03	Honomanu		Not in use
Haiku School	5519-01	Honomanu		Sporadic irrigation
Baldwin Manor	5519-03	Honomanu	350	Domestic
Kulamalu	5317-01	Honomanu	1050	Future use
Pauwela TH	5518-02	Kula		Not in use
Melia Park	5518-01	Kula		Irrigation
Behnke	5519-02	Kula	<50	Domestic
HC&S SH32	5520-01	Honomanu	5250	Irrigation
Ullumalu	5417-01	Honomanu		Future use
Smith Kuiaha	5418-04	Honomanu	80	Future use

The implementation of the EMPLAN at average production rate of 10 mgd is not expected to affect the yield or quality of other wells exploiting the Honomanu basal aquifer in the Haiku Aquifer System. Wells extracting water from the Kula formation will not be impacted in any way.

10.4 Air Quality

At present, air quality in the project area is considered good, with cane fires and harvesting operations creating temporary degradation. In the construction phase of the proposed project, fugitive dust will be generated by trenching equipment for pipeline installation. In addition, construction equipment using unimproved roads will add to the dust problem, however, the problem will be temporary and can be mitigated by observation of dust control regulations administered by the Department of Health (DOH). The general contractor will be required to conform to the dust control standards of the DOH.

10.5 Flora

The major portion of the EMPLAN water systems will be installed in existing State and County roadways and agricultural service roads. Vegetation along these roadways is predominantly weedy species. In the gulches, flora consists mainly of eucalyptus, silk oak, guava, java plum, ohia, and koa. According to a survey conducted by Evangeline J. Funk, Ph.D., the project area has no "proposed or listed threatened or endangered plant species as set forth by the U.S. Department of the Interior Fish and Wildlife Service" (see Reference No. 22).

10.6 Fauna

Bird life in the project area includes the Indian mynah, common gray dove, the barred or spotted dove, Kentucky cardinal, the English sparrow, and the red-vented bulbul. Mammal seen or likely to be present are the roofrat and Indian mongoose.

In 1993, the Director of the Museum of Natural History at Brigham Young University-Hawaii, Dr. Phillip L. Bruner, conducted a survey of the project area to determine the presence or likely occurrence of any native fauna, particularly that which may be considered "endangered" or "threatened." In regard to feral mammals, Bruner concluded, "no unusually large concentrations were noted. No endangered species were recorded." He further observed that "the proposed project should have little or no long-term measurable effect on the populations of exotic birds on Maui" (see Reference No. 23).

10.7 Noise

Traffic noise along the Hana Highway and Kuiaha, Kauhikoa, Kokomo, and Kaupakulua Roads appears to be the most significant vehicular noise. Harvesting and trucking of cane to Puunene Mill could produce troublesome noise levels, but the proximity of urban areas to cane fields and the acceptance by the people of noise generated by a common industrial practice seem to dampen the seriousness of noise problems generated by plantation operations.

Non-traffic noise will be confined to short-term construction-related noise that will cease upon completion of the project. Moreover, the general contractor must comply with noise regulations of the DOH.

10.8 Aquatic Resources

According to studies done by the USGS and Consultant Tom Nance, no perennial streams throughout their channel lengths are flowing through the project area. True perennial flows are restricted to a narrow zone near the coast where the basal water table in the Honomanu formation is exposed. In these estuaries, a few species of opae and oopu may be found.

The proposed wells in the project will tap the basal aquifer. Each well will be about 700 feet deep and will be sealed off from the Kula formation to prevent contamination of the aquifer via the open well bore annulus. The seal is of cement mortar and is applied throughout the depth of the well. Pumping from the basal aquifer in the Honomanu formation will not affect existing stream flow patterns. The foregoing discussion holds true under the proposal to relocate the wells as described in Chapter 4.

10.9 Effects of Pumping on Coastal Waters

10.9.1 Chemical Composition of the Groundwater

The number of standard chemical analyses of groundwater in the Haiku Aquifer System are few, but those that are in the record indicate that the concentrations of constituents differ significantly from groundwater in the Paia Aquifer System to the west of Maliko Gulch. East of the rift zone trace just to the east of Maliko Gulch the groundwater is not affected by mixing with return irrigation water as happens west of the rift. In particular, $NO_3 - N$ (nitrate nitrogen) concentrations are lower. No groundwater analyses report the presence of the nutrient phosphorus because the forms in which it may occur are quickly fixed in Hawaiian soils. The principal nutrient of concern, therefore, is $NO_3 - N$, while SiO_2 (reported as elemental Si in marine chemistry) is an indicator, though not a definitive one, of biological activity.

Standard analyses for groundwater east of the western trace of the rift zone are in the record for the Baldwin Manor well (5519-03), the Haiku School well (5519-01), and the Kulamalu well (5317-01) and the Haiku Monitor well (5418-01). Analyses of groundwater sources west of the rift trace are more common because commercial agriculture dominates the Paia Aquifer System. A comparison of groundwater composition in each system follows (concentrations in mg/l, TDS = total dissolved solids).

Source	$NO_3 - N$	SiO_2	TDS	Laboratory
Paia Aquifer System				
Kuau Pump 12	3.6	55	575	USGS
Kuau Pump 12	3.4	58	656	USGS
Kuau Pump 12	3.9	52	710	USGS

Pukalani	4.3	43	552	USGS
Maui High School	2.3	44	437	USGS av. 4 anal.
Maliko to West Trace Rift				
Upper Haiku	2.0			Montgomery av. 4 anal.
Upper Haiku		44	276	USGS
Haiku Aquifer System				
Haiku School	.63	28	320	USGS
Baldwin Manor	.19		387	AECOS
Dowling	.83			AECOS
Dowling	.75			Montgomery
Monitor Well	.89	51		Montgomery

Groundwater in the Paia Aquifer System which has been influenced by return irrigation water has a $NO_3 - N$ concentration averaging between 3 and 4 mg/l while the more pristine groundwater in the Haiku Aquifer System east of the rift trace averages less than 1 mg/l $NO_3 - N$. In the narrow strip between Maliko Gulch and the west trace of the rift zone the groundwater resembles the Paia Aquifer System groundwater more than it does the groundwater further eastward.

In the region in which the proposed wells will be drilled nearly pristine groundwater will be withdrawn. The $NO_3 - N$ content will be less than 1 mg/l (see discussion in Section 8.4 - Contamination). Groundwater of this composition now discharges in the coastal zone. Reducing outflow will proportionately reduce the mass of nutrients added to the coastal marine water.

10.9.2 Effects of the Reduction of Groundwater Discharge on Marine Coastal Waters

Groundwater discharges may affect coastal waters in two ways, first by adding nutrients so that the concentrations in coastal waters exceed the State Department of Health (DOH) standards, and second by providing nutrients that enhance biological activity. Where groundwater outflow influenced by irrigation return water occurs, the DOH standards may be exceeded. In the Haiku area of concern, however, the effect of nutrient addition to coastal waters is the matter of interest.

The coastal reach between the eastern interfluve of Maliko Gulch and Kapukaulua Point, the limits of the region potentially affected by reduced groundwater outflow, is characterized by cliffs and steep slopes with the Honomanu Basalt exposed at and somewhat above sea level. The basalt is mantled with 50 to 100 feet of the Kula Volcanics. The basal aquifer in the Honomanu discharges into the sea within a narrow zone along the coastline. The sea is normally turbulent, causing rapid mixing of the groundwater with the seawater and dispersing the concentrations of nutrients. Along the open coast the cliffs are about 100 feet high, but in the embayments at the mouths of streams the coast is less precipitous.

An investigation of the probable impacts affecting the marine community along the coast by reduction in groundwater outflow due to pumping was conducted by Marine Research Consultants in 1998. Five sites were studied; four to the west of the western trace of the rift zone and the other near the mouth of Kanemoeala Stream. This last site, called Pauwela in the report, is the one of interest to the EM Plan.

Marine Consultants sampled the coastal waters at the Pauwela site during atypical conditions of light variable winds and a gentle north swell of 1 to 2 feet. Normal conditions along the coast are tradewinds and a pounding surf, resulting in very vigorous mixing of groundwater and seawater. They found that the gradient (change in concentration with distance off shore) of $NO_3 - N$ and Si was very small and concluded that, "there is virtually no gradient in groundwater constituents in the near shore zone. Hence, reduction in groundwater discharge would not have any effect in this or similar areas".

Sampling showed that within 1 meter (m) of the shore line the concentration of $NO_3 - N$ was 10.22 µg/l (.010 mg/l), and it remained above .009 mg/l to a distance 50 m off shore. The concentration of Si was 127 µ/l (.127 mg/l Si; .272 mg/l SiO_2) at the shore, falling to .0809 mg/l Si 100 m off shore. Assuming that the $NO_3 - N$ and Si content 250 m off shore represents the concentrations in unmixed ocean water (.001 mg/l N and .075 mg/l Si), the mixing ratio is approximately 1 percent groundwater and 99 percent ocean water. Reducing the outflow of groundwater by one third because of pumping will reduce the near shore concentration of N and Si by one third also, to .007 mg/l N and .085 mg/l Si.

Marine Consultants also assessed the potential effects on near shore biota that might be caused by diminution in concentrations of nutrients resulting from lesser groundwater discharge. They selected corals and benthic algae as the indicator biota. Sparse coral communities develop at a depth of about 3 m but are essentially absent at shallower depths. The input of groundwater may have a negative effect on corals because their best development takes place in oceanic water. The Consultants concluded that "lowering the input of groundwater by pumping from wells, therefore, has no effect on corals".

The other indicator, benthic algae, consumes N and P dissolved in water. Marine Consultants noted that, "In areas of vigorous mixing ... low concentrations of nutrients in oceanic water is often sufficient to supply adequate nutrients to plants for optimal growth". They further noted that along the North Kohala coast, which is similar to the East Maui coast and where they had conducted studies, only a small percentage of N in marine algae originates from terrestrial sources. The Consultants finally concluded that an abundant supply of N is available in oceanic water for benthic algae uptake even if pumping were to take place. Nowhere in Hawaii has it been unequivocally demonstrated that diminution in groundwater outflow along steep open coasts has resulted in deleterious impacts on marine biota. Along the rugged Haiku coast it is not likely that measurable changes will occur.

A copy of the Marine Research Consultants' report may be found in the Appendix.

10.10 Scenic and Aesthetic Values

The DWS is cognizant of the need to maintain scenic and aesthetic values as part of the project. Natural scenic values will be considered during the planning and construction phases. Appropriate landscaping and the judicious use of colors can blend exposed pipelines, tanks, and pumping stations into the natural environment.

CHAPTER 11. IMPACT ON THE SOCIO-ECONOMICAL ENVIRONMENT

11.1 Archaeological and Historical Sites

In 1992, the Archaeological Consultant Aki Sinoto conducted an archaeological inventory survey of the area. He concluded that "no archaeological surface remains or other evidence of any significant cultural activities were encountered during the survey." This was probably due to the fact that most of the project components are located in existing roads or in areas where extensive cane cultivation was practiced for many years. There are no human records of archaeological or historical discoveries in the project area. However, Sinoto recommended that full-time monitoring be done in areas that show potential for sub-surface remains.

11.2 Economy

The community plan areas of Wailuku - Kahului, Kihei - Makena, and Paia - Haiku have been determined to be areas that will experience planned growth in the next twenty years or more. This growth will engender a demand for increased county services such as water, wastewater collection and disposal, police and fire protection services, etc. The EMPLAN was designed to meet the potable water needs of Central Maui as called for in the community plan. Implementation of the EMPLAN itself would have a positive impact on the local economy through its boost to the construction industry and state and county tax revenues.

CHAPTER 12. ALTERNATIVES TO THE PROPOSED ACTION

12.1 Water Source Alternatives

Alternative sources of water to Central Maui exist in both East and West Maui. Some sources are under development; others are being contemplated for development. None, however, has the realistic potential to provide as much additional water as does the EMPLAN. A summary description of each alternative along with constraints on usage by DWS follows:

12.1.1 *Source*: Basal Aquifer In The Paia, Makawao, and Kamaole Aquifer Systems

Status: Groundwater is brackish within four to five miles of the coast and is used for irrigation, mostly by HC&S.

Potential Yield: At distances greater than four to five miles from the coast fresh water may be developable, but the yield per well would be low and the cost high. A well at Pukalani (5021-01), about six miles from the coast, is brackish, but another drilled for Maui Pineapple Company at Haliimaile (5220-01) yields potable water.

Constraints: To prove the utility of these aquifers, numerous exploratory wells would be required. The likelihood that a significant supply of fresh water could be developed at acceptable cost is slim.

12.1.2 *Source*: Additional Withdrawals from Wailoa Ditch at Kamaole Weir.

Status: Wailoa Ditch is controlled by EMI, but DWS is allocated a small amount at this time. HC&S has a need of the ditch flow for irrigation and to generate electricity.

Potential Yield: Although average flow is 106 mgd, frequently flow drops below 50 mgd for long periods. During droughts, irrigation demand increases. In 1984, flow was only 10-12 mgd over a continuous 30-day period, and 11 to 28 mgd for 45 days.

Constraints: Withdrawals for domestic use compete with demand for irrigation during draught periods. Normal flows are also required for irrigation and for electricity generation.

12.1.3 *Source*: North Waihee.

Status: The average allowable yield of 4 mgd is for the region between Waihee Valley and Makamakaole Valley. It should not be exceeded even when the Kupaa well is added to the system. Currently about 4 mgd is sent to the Central Maui system from four North Waihee wells (North Waihee 1 and 2, 5631-01 and 02, Kanoa 1 and 2, 5731-02 and 5731-04). Another well at Kupaa (5731-03) is not yet connected to the network. Total allowable average yield when all wells are on line will be approximately four mgd.

Potential Yield: At an average production of four mgd the North Waihee aquifer between Waihee Stream and Makamakaole Stream will be fully developed.

Constraints: No more than four mgd can be expected from the North Waihee project, although the entire North Waihee aquifer system, which extends from Waihee Valley to Kahakuloa Valley, has a sustainable yield of eight mgd.

12.1.4 *Source*: Waihee-Spreckles Ditch System and North Waiehu Ditch.

Status: Approximately an average of 20 mgd is diverted from Waihee Stream by the ditch systems and three mgd from North Waiehu for irrigation usage by HC&S and Wailuku Agribusiness.

Potential Yield: The minimum flow of Waihee Stream upstream of the ditch intakes is about 14 to 15 mgd. If a portion of the flow were made available to DWS, the water would have to be treated to meet drinking water standards.

Constraints: Both HC&S and Wailuku Agribusiness depend on this water for irrigation.

12.1.5 *Source*: Waikapu Tunnel and Ditch.

Status: the average flow of about three mgd is used by Wailuku Agribusiness for irrigation.

Potential Yield: Minimum flow is about two mgd.

Constraints: Wailuku Agribusiness needs the water. Low flow is unreliable.

12.1.6 *Source*: Iao Aquifer System.

Status: Sustainable yield is 20 mgd while average production sometimes exceeds this value.

Potential Yield: The aquifer is already fully utilized, but redevelopment by drilling new wells to more equitably distribute pumping is being contemplated.

Constraints: The new wells will not add to the sustainable yield.

12.1.7 *Source*: Iao Stream Ditches.

Status: DWS already draws up to approximately two mgd from the Iao Ditch systems but does not have permanent rights to the water. The present agreement with the landowner expires soon.

12.2 Other Alternatives

The other alternatives described in the FEIS of the EMPLAN are still applicable to the SEIS. Briefly, these alternatives and others are as follows:

12.2.1 *No Action* - This alternative would preserve existing conditions in the areas along the proposed alignment route but it would hinder economic growth and community improvement and development.

12.2.2 *Desalination* - During the past decade, desalination of seawater has made significant progress. However, the cost of desalination is still too high to make it competitive with the development of groundwater. Accurate figures from world plants are difficult to obtain because of varying methods of amortizing capital costs and whether the cost of disposal of brine is included. This cost can be substantial. Countries in the Middle East, such as Israel, Kuwait, and Saudi Arabia, have long experience in desalination. Israel is planning to build a 36 mgd plant that is reported to reduce production cost to a little more than $2.00 per thousand gallons. Brine disposal cost is probably not included and may have potential environmental problems. Also, the plant is designed to use cheap newly discovered natural gas for fuel. Fuel is the largest cost factor in desalination.

Trinidad is planning to build a 29 mgd plant with the expectation of producing fresh water at a cost of about $2.50 per thousand gallons. No brine disposal cost or capital cost figures are available.

Honolulu has a pilot desalination plant that produced fresh water at a reported cost of $3.00 - $4.00 per thousand gallons. However, the source water was brackish (about 1440 chloride), compared with seawater chloride of about 19,000 ppm. This cut production cost substantially because much less power was used.

Most desalination plants are located near sea level. Distribution and storage costs including pumpage to higher elevations must be factored into the water rates. Desalination is an option if no feasible alternative is available.

12.2.3 *Impoundment and Treatment of Surface Water* - Locally, the impoundment and treatment of surface water for potable purposes is generally not cost-competitive with the development of groundwater. However, at higher elevations where surface water surfaces are reliable and groundwater development is not feasible, the treatment of impounded water for domestic and irrigation use is a viable alternative. Large storage capacities would provide a safety factor during droughts. In the area of and adjoining the proposed well sites, no perennial streams are present, thereby making impoundment an unreliable alternative. The decision to resort to surface water treatment is largely a matter of availability of a reliable source of raw water and economics. On Maui, steps have already been taken to conduct studies on a large-scale impounding of surface water for irrigation and domestic use.

12.2.4 *Recycling of Wastewater* - The recovery of wastewater for potable purposes has been considered during the past decade but its likelihood remains uncertain. Even the use of treated wastewater for irrigation has been questioned. The major problems confronting the proposal to recycle wastewater are the cost of treatment and overcoming public objections. Advanced treatment involving tertiary and additional processes cost far more that conventional treatment. A few years ago, the city of San Diego, CA, proposed highly sophisticated treatment of wastewater effluent and disposing of it in open drinking water reservoirs. The proposal was voted down by the people. The city of Denver experimented with the mixing of highly treated wastewater with municipal sources for use in public swimming pools. In Europe, irrigation with wastewater affluent has resulted in detection of hormones and various pharmaceuticals in groundwater. This has become an emerging problem throughout the world. The state of California is allowing recharge of the aquifer only with water of potable quality. For the present, the proposal to recycle wastewater for potable use and general irrigation must still undergo rigorous research before it can be accepted as a viable alternative. Where no freshwater aquifers are present, recharge with lower quality water is practiced to form barriers against seawater intrusion along the coast.

12.2.5 *Conservation* - Maui County Department of Water Supply has had a water conservation program in effect for about 10 years. Currently, the estimated savings due to conservation are estimated at 0.5 mgd, or roughly 2% of the total pumpage. However, the department is planning to expand its retrofit program and to effect additional savings by using lower grade water for landscaping, xeriscaping, and through a broader public education program on water conservation. Data on the department's conservation program are available in its planning division. The Department of Water Supply has stated, "If the water conservation program is very successful, then the pace of development under the EMPLAN can slow down or even stop." It is hard to determine accurately whether the program will yield dependable long-term savings or whether retrofits for conservation will remain installed. In addition, the cost of implementing such programs and lost revenues when water use decreases must be considered.

On the other hand, conservation has the advantage of deferring or reducing capital improvements, reducing operating costs, and improving public relations. The general feeling among water purveyors is that voluntary water conservation programs should be integrated into master plans but they would not, in the foreseeable future, replace major water development programs. Other conservation programs of varying degrees of importance include use of reclaimed water, groundwater recharge, a universal metering program and rate setting.

CHAPTER 13. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Time, money, labor and other resources will be committed to the implementation of the EMPLAN on a long-term basis. Once the EMPLAN proceeds with implementation, based on a solid program of observance of sustainable yields and water use, there would be very little likelihood of reversal. It is difficult to visualize any action of the EMPLAN as irreversibly curtailing the potential uses of the environment. Unavoidable impacts during construction may be expected but such impacts can be controlled or ameliorated. Such impacts may be noise, dust, and traffic problems, and the loss of high-level water during drilling operations. Such problems are temporary and controllable.

CHAPTER 14. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

The proposed project is designed to provide water from an area rich in water resources to an area in need in accordance with the policies of State, County and Community Plans. The important criterion to be observed would be to base the water development and use program on sustainable yields. By adhering to this practice, the State's long-term economy or levels of productivity will not suffer adverse impacts. It will not foreclose future options, narrow the range of beneficial uses of the environment, nor pose long-term risks to health and safety. If any serious long-term risks are identified during the planning and constructions phases of the project, the Maui Water Department could stop work on the project until the risks are eliminated or minimized.

CHAPTER 15. PROBABLE UNAVOIDABLE ENVIRONMENTAL IMPACTS

1. Noise - noise generated by construction activities is unavoidable but it would be temporary and controllable. The contractor will be required to comply with DOH noise regulations.

2. Dust - as in the case of noise control, dust problems would be temporary. Observance of dust control regulations of the DOH should minimize any adverse effects.

3. Traffic - traffic problems during the construction and post-construction periods are anticipated. However, they can be dealt with effectively by complying with traffic control plans which would be devised during the design phase of the project.

4. Visual Effects - control stations and water tanks can be blended into the natural environment through appropriate architectural design and landscaping. This is handled in the design phase by architects on the project.

CHAPTER 16. PRE-ASSESSMENT CONSULTATION

Informal conversations and meetings were held with various individuals and groups to discuss the ramifications of the SEIS. It was explained that the SEIS is to address a number of deficiencies in the FEIS as determined by the Court. Some of these are the effects of pumping of the wells on stream flow and coastal waters and the significance of groundwater contamination by pesticides. Listed below are some of the parties contacted. For most of them, several discussions were held within certain approximate time ranges.

State Department of Health - On about March 9, 2000, discussion with Bill Wong of the Safe Drinking Water Branch covering the hazards and maximum contamination levels of various contaminants in water supplies.

State Department of Land and Natural Resources - During the week of March 20, 2000, meeting were held with Glen Bauer, hydrogeologist, to discuss stream flows and testing to determine impact of pumping from wells on the flows.

United States Geological Survey - Between November, 1999 and March, 2000, informal conversations were held with Gordon Tribble to review the work of Bill Meyer regarding the effect of pumping on stream flows. Tribble was told that Mink & Yuen, Inc. was familiar with the work of Meyer.

Maui Electric Company - Discussed with Bill Bonnett in March, 2000 the facilities that would be used to provide power to proposed pumping stations. One of the principal concerns was aesthetics.

Office of Environmental Quality Control - During January and February, 2000 had several meetings with Les Segundo to discuss requirements for the SEIS preparation notice, environmental assessment for the test wells, and the SEIS.

Carl Takumi Engineering, Inc. - Talked with Carl Takumi on many occasions in 1999 and early 2000 to review history of first EMWDP EIS. Also discussed surveying and engineering work relative to the SEIS.

State Historic Site Preservation Division - Between November 1999, and June 2000, discussed existing archaeological studies on the project area with Elaine Jourdaine. Also reviewed the principal requirements in the preparation of additional archaeological studies.

SEY Engineers - During the week of May 8, 2000, had several discussions with Howard Endo on the use of models to assist in determining possible paths contaminants may follow in their travel towards the seacoast.

Tom Nance Water Resource Engineering - June, 2001, discussed his work on coastal water quality and general hydrology.

CHAPTER 17. PARTIES REQUESTED TO REVIEW DSEIS

Federal Agencies

U.S. Corps of Engineers, Pac Div

U.S. Department of the Interior, Fish and Wildlife Service

U.S. Geological Survey, Water Resources Division

State Agencies

Department of Agriculture

Department of Hawaiian Home Lands

Department of Land and Natural Resources

State Historic Preservation Division

Department of Health

Office of Hawaiian Affairs

University of Hawaii Environmental Center

Office of Environmental Quality Control

State Land Use Commission

Maui County

Department of Planning

Department of Public Works

Economic Development Agency

Maui County Council

Alexander & Baldwin, Inc.

Hawaiian Commercial & Sugar Company

Maui Electric Company

Maui Land and Pineapple Company

Sierra Club

Native Hawaiian Advisory Council

Hui Alanui O Makena (c/o Isaac Hall)

Isaac Hall and Clients

Lucienne deNaie

Greg Westcott

David Grantham

Jeffry Parker

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CHAPTER 10. REFERENCES

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APPENDIX

19.1

DERIVATION AND VALIDATION OF GROUNDWATER FLOW AND HEADS HAIKU REGION

DERIVATION AND VALIDATION OF

GROUNDWATER FLOW AND HEADS

HAIKU REGION

Derivation and Validation of Groundwater Flow and Heads, Haiku Region

The relationship between groundwater flow rate and head is expressed in the Darcy formula for flow in porous media, written as,

$$q = kz\, dh/dx$$

for which: q = bulk flow rate, cu.ft./day; k = hydraulic conductivity, ft./day; z = depth of flow, ft.; dh is change in head over distance dx, both in ft.

In a Ghyben-Herzberg lens depth of flow is a function of the differences in density between fresh (or brackish) water and seawater. For a lens having a fresh water density ρ_f overlying seawater of density ρ_s, the Darcy formula is,

$$q = k\ \{(\rho_f/(\rho_s - \rho_f)) + 1\}h\ dh/dx$$

or,

$$q = k\ \{\rho_s/(\rho_s - \rho_f)\}h\ dh/dx.$$

When integrated between the limits h(0,h) and x(0,x), the above is transformed to,

$$q = \{\rho_s/(\rho_s - \rho_f)\}\ k\ h^2/2\ x$$

and in terms of head,

$$h^2 = (2\ q\ x\ /k)\ \{(\rho_s - \rho_f)/\rho_s\}.$$

In a recently published U.S. Geological Survey report (Gingerich, S.B., 1999, Ground Water and Surface Water in the Haiku Area, East Maui, Hawaii: U.S.G.S. Water Resources Investigation Report 98-4142), the head equation is given in a more complicated but exactly equivalent form (for unit width),

$$h^2 = 2\,B\,q\,x/k(1 + B)$$

in which $B = \rho_s - \rho_f$

Assuming a sharp interface between underlying salt water having $\rho_s = 1.025$ and overlying fresh water having $\rho_f = 1.000$, the integrated Darcy relationship is,

$$q = 41\,k\,h^2/2\,x$$

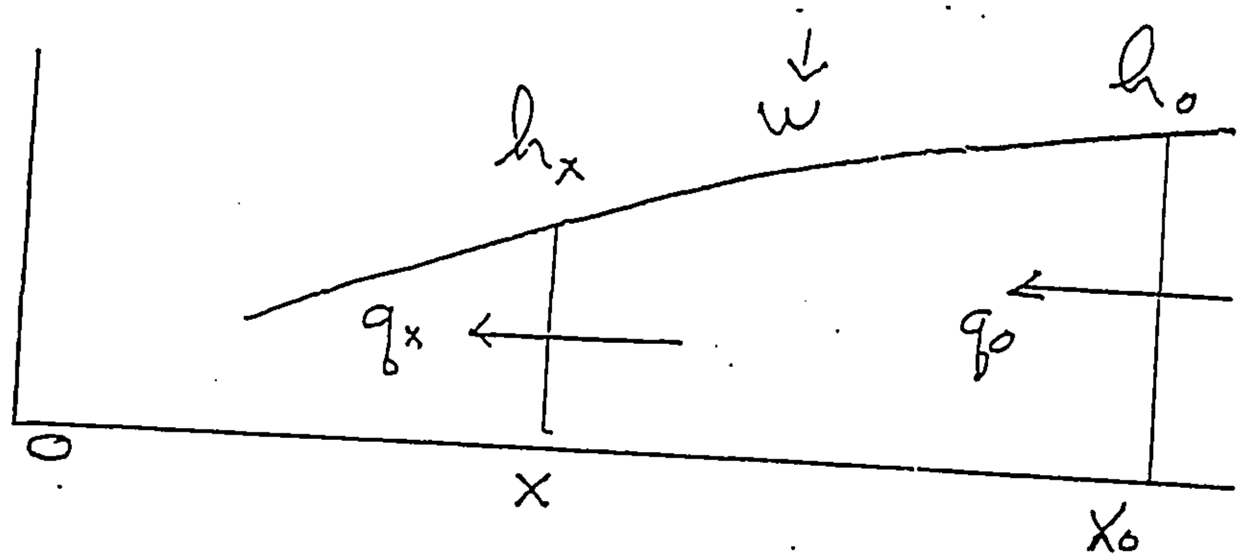
and,

$$h^2 = 2\,q\,x/41\,k.$$

In this analytical model the discharge front of the lens is at x = 0, h = 0, which, in the absence of caprock, is the coastline. Gingerich employed the model to calculate hydraulic conductivity based on unit flow derived from hydrologic budgeting, and head and distance for well 5318-01 (Dowling). The flow rate computed from the hydrologic budget was 19.45 mgd/mile, head at 5318-01 was 12 feet, and distance from the coast was 20,000 feet. The calculated hydraulic conductivity was 3300 ft./day. For the length of coast fronting the Haiku region between Maliko and Kakipi Gulches, about 5 miles, the rate of flow by budget calculations was 97.2 mgd.

This simple approach assumes that a constant flow rate persists from the selected point (h, x) to the coast but neglects the influence of recharge over the same distance. For light recharge, the parabolic model is not significantly distorted, but where recharge is substantial, the simple parabolic relationship between head and distance is replaced by a more complicated parabolic curve.

To take recharge into account, consider the following model,



h_x
w
h_o
q_x
q_o
0
x
x_o

in which w is recharge rate (ft./day, unit strip), h is head (ft.), and x (ft.) is distance from the discharge front. The discharge front need not be restricted to the coastline. The head, h_o, at distance, x_o, is known, and head, h_x at distance, x, is to be determined. The basic relationship is,

$$q_o = q_x - w(x_o - x)$$

from which the following equation in terms of heads, distances and hydraulic conductivity is derived,

$$h_x = x\{h_o^2/x_o + 2w(x_o - x)/41k\}.$$

Employing the Gingerich value for k (3300 ft/day), a recharge (w) value of .007 ft/day (abstracted from the recharge map given in Gingerich), and the Dowling head of 12 feet at a distance of 20,000 feet, the head at a distance x = 10,000 feet from the coast calculates to be 9.1 feet, whereas without recharge it would be 8.5 feet, a difference of 0.6 feet.

The above exercise illustrates the utility and limitations of models, whether analytical or numerical, in describing groundwater conditions. The limitations are the result of numerous assumptions that have to be made, while the utility value relies on quantitative determination of head and flow based on both actual data and the assumptions.

The parameters employed in the models and suggestion of their reliability follows.

Parameter	Source	Reliability
Regional hydraulic conductivity	Pump tests; analogy	Fair
Distance ($x_o - x$)	Map	Very good
Head (h_o, h)	Field measurement	Good to very good
Recharge (w)	Hydrologic budget	Poor to good
Physical boundaries	Geologic interpretation	Good
Flux (q)	Hydrologic budget; Darcy	Good

19.2

METHOD OF CALCULATING TRANSMISSIVITY FROM STEP-DRAWDOWN TEST DATA

Method of Calculating Transmissivity from Step-Drawdown Test Data

Assumptions:

1. Total drawdown is the combination of aquifer drawdown and well loss drawdown.
2. Aquifer drawdown results from laminar flow, well loss drawdown from turbulent flow.
3. Turbulent flow is proportional to the square of the pumping rate.
4. Steady state total drawdown for each pumping rate is achieved by the end of the pumping interval.
5. The equation for total drawdown is,

$$s = aQ + bQ^2$$

in which s = total drawdown, Q is pumping rate, a is the aquifer coefficient and b is the well-loss coefficient.

The above expression can be re-cast as the simple linear equation,

$$s/Q = a + bQ$$

so that a becomes the intercept and b the slope.

The step drawdown data base for the monitor well (5418-01) is,

Q(gpm)	Interval (hr)	s(ft)	s/Q
440	.75	.60	.001364
550	1	.92	.001673
650	1	1.27	.001954
760	97	1.62	.002132

The intercept, a, for this data is .000319. Converted to consistent units (cu.ft., days) it is .000002.

The Thiem equation for steady state drawdown is,

$$s = (Q/2\pi T) \ln(r'/r)$$

in which T is tranmissivity, r' is distance to where s = 0, and r is the point at which drawdown is measured. The value of r' is estimated at 1000 ft., although in one proposed formulation it is taken as 1.6 L, in which L is depth of penetration of the open well below the water table. The value for r is taken as 0.5 ft. at the well.

Substituting the value for a = s/Q in the equation yields T = 730,000 sq.ft./day, which divided by the penetration of the well below the water table (70 ft.) gives a hydraulic conductivity, k, of 10,429 ft./day. For the formulation in which r' = 1.6 L, the computed hydraulic conductivity is 7,425 ft/day. For either case the hydraulic conductivity is extraordinarily high. Normal hydraulic conductivity in Hawaiian basaltic basal aquifers is very high at 1,500 to about 3,000 ft/day. An aquifer having a hydraulic conductivity of 100 ft/day is considered very permeable.

19.3

COURT ORDER OF

SEPTEMBER 6, 2000

Court Order of Sept. 6, 2000

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IN THE CIRCUIT COURT OF THE SECOND CIRCUIT

STATE OF HAWAII

THE COALITION TO PROTECT EAST MAUI WATER RESOURCES, an unincorporated association, et al., Plaintiffs, vs. THE BOARD OF WATER SUPPLY, et al., Defendants.	CIVIL NO. 93-0734(3) (Declaratory Relief) ORDER ON (1) TEST WELLS FOR THE EAST MAUI DEVELOPMENT PLAN SEIS AND (2) THE WEST KUIAHA TANK PROJECT NOT BEING A COMPONENT OF THE EAST MAUI DEVELOPMENT PLAN; EXHIBITS "1" "2" AND "3"

ORDER ON (1) TEST WELLS FOR THE EAST MAUI DEVELOPMENT PLAN SEIS AND (2) THE WEST KUIAHA TANK PROJECT NOT BEING A COMPONENT OF THE EAST MAUI DEVELOPMENT PLAN

This matter was heard before the Honorable Judge Boyd P. Mossman on January 29, 1999, pursuant to agreement of the Parties and the Court on December 23, 1998. Gary W. Zakian, Esq., Deputy Corporation Counsel, appeared in behalf of Defendants David R. Craddick, Director, Department of Water Supply, and the Maui County

Board of Water Supply. Isaac D. Hall, Esq., appeared in behalf of Plaintiffs.

The Court having reviewed the files, the submittals of the Parties, and heard oral argument, and being prepared to rule,

HEREBY ORDERS, ADJUDGES AND DECREES AS FOLLOWS:

I. <u>TEST WELLS FOR THE EAST MAUI DEVELOPMENT PLAN SEIS</u>

A. Defendants are hereby authorized to construct the following wells for the purposes of gathering data and information for use in the Supplemental Environmental Impact Statement ("SEIS") to be prepared for the East Maui Development Plan ("EMDP"):

1. A single monitoring well as described in the USGS letter dated September 9, 1998, attached hereto as Exhibit "1" in one of the locations previously identified by the parties in cooperation with William Meyer, of the USGS, which locations are identified on the map attached hereto as Exhibit "2";

2. If, after the release and distribution to the parties of the test results form the drilling of the monitoring well, for any reason the Department of Water Supply determines the results are not adequate, the Department may drill one additional well, as specified in Section 3, immediately below, without coming back to court for approval;

3. The one additional well ("Well") the Department may drill is subject to the following conditions;

a. The Well may be configured to contain three to four nested piezometers, as shown on Exhibit "3", attached hereto;

b. The Well may be a production size well;

c. The Well may have production size pumps installed;

d. The Well may be used only for test purposes to obtain data or information necessary for the preparation of the SEIS; and

e. The well shall be located within one of the areas as indicated on Exhibit "2".

4. The monitoring well shall be used thereafter to monitor all wells drilled as part of the EMDP.

B. Defendants must seek further Court approval for the drilling of any wells other than the two wells permitted above in Section A.

II. WEST KUIAHA TANK PROJECT

Based on the representations of Defendant David R. Craddick, Director, Maui County Department of Water Supply, the Court specifically finds and hereby orders:

A. The West Kuiaha Tank Project is not a component of the East Maui Development Plan;

B. The West Kuiaha Tank Project will not be utilized as part of the East Maui Development Plan and shall not, directly or indirectly, be attached or connected to any component of the EMDP; and

C. The West Kuiaha Tank Project is not required to be discussed in the Supplemental Environmental Impact Statement for the East Maui Development Plan as part of the EMDP except as a related project.

DATED: Wailuku, Maui, Hawaii SEP 06 2000.

/s/ Joseph E. Cardoza (Seal)

Judge of the above-entitled Court

APPROVED AS TO FORM:

ISAAC D. HALL, ESQ.
Attorney for Plaintiffs

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

September 9, 1998

Mr. Timothy E. Johns
Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Johns:

The issues raised in your letter to me of August 31, 1998, and Mr. Isaac Hall's letter to you of July 31, 1998, are complex but I have tried to respond to them as completely as a letter and my memory will allow. I have always been strongly in favor of drilling a monitor well in the Haiku area of East Maui as a means, and as the only definitive means to resolve the issue of whether pumpage would affect streamflow in this area. For instance, part of the study plan for the East Maui surface-water/ ground-water investigation involved collecting data from the wells to be drilled in the area by the Maui County Department of Water Supply (MDWS). This part of the study did not materialize however, owing to the successful suit brought by the Coalition to Protect East Maui Water Resources (CPEMWR) against the MDWS. As a result we have completed the study without this information, although drilling a monitor well remains the only definitive way to establish the relationship between ground water and surface water in the Haiku area.

I presented this concept at a meeting that was held some months ago in the chambers of Judge Mossman, the Circuit Court Judge that has ruled in favor of the CPEMWR in their suit against the MDWS. This meeting was held in an attempt to resolve the CPEMWR suit against the MDWS and was attended by Mr. Isaac Hall, Mr. David Craddick, representatives of the Maui County Corp. Council, and myself; while Mr. Tom Nance, representing the MDWS, and a hydrologist for Mr. Isaac Hall, were included by telephone. At this meeting it was my suggestion to drill an exploratory or monitor well in the Haiku area at a location that the results of the East Maui surface-water/ground-water study could be used to identify, and to use the results obtained from water levels measured in the well as it was drilled as a means of resolving the legal issues existent between the CPEMWR and the MDWS. I also offered to locate the general area of the monitor well. It was my general understanding that Mr. Isaac Hall, the MDWS, and the Maui County Corp Council accepted both recommendations, which led to acceptance of the approach by Judge Mossman. Some days after this meeting I located a site for the two parties. It would appear

EXHIBIT "1"

from Mr. Hall's letter that the agreement arrived at in the Judge's chambers has now been rejected by the MDWS.

At this meeting I also indicated, and I thought generally accepted, that it would be possible to determine whether or not potential wells in the Haiku area would affect streamflow based only on observations made during drilling of the monitor well. It is not necessary to monitor streamflow and potential pumpage to make this determination since results from such an effort can be extremely misleading. This conclusion was also endorsed by the hydrologist representing Mr. Hall. Finally, as I remember, it was agreed that the monitor well could potentially be used as a pumping well, but the well would be the last well brought on line by the MDWS. The MDWS was adamant that it did not want to drill a well to be used simply as a monitor well. The concept that the Water Department could eventually use the monitor well as a production well was accepted by Mr. Hall and by Judge Mossman after the MDWS agreed that the monitor well would be the last well hooked into the supply system and that this would not occur for many years. This decision was reached after I indicated to the Judge, in response to a question from him, that the continual use of the monitor well was not necessary in order to resolve the main issue between the CPEMWR and the MDWS.

Despite the general agreement between the CPEMWR and the MDWS regarding the method to be used to resolve the question as to whether or not pumpage would affect streamflow in the Haiku area, Mr. Nance felt that more information was needed in order to resolve this issue. As I recall, Mr. Nance wanted to install piezometers at selected depths in the monitor well and drill monitor wells with piezometers at each proposed pumping location. As I also recall, Mr. Nance felt that it would only be possible to determine if pumpage was affecting streamflow by simultaneously monitoring actual pumpage, water levels in the piezometers, and streamflow. This approach was not considered technically defensible by myself and by the hydrologist representing Mr. Hall.

I have not been involved in the East Maui issue since selecting the site for the Monitor well several months ago and have no knowledge of the plans of the MDWS as described in Mr. Hall's letter to you of July 31, 1998. I still believe, however, that it is not necessary to construct more than one monitor well in the Haiku area to resolve the issue between the CPEMWR and the DWS.

In a general sense, although it is potentially possible to determine if pumpage affects streamflow by simultaneously monitoring pumpage and streamflow, this approach only works for field conditions that are rarely met. This approach can also lead to the conclusion that pumpage does not affect streamflow when, in fact, it does or will ultimately do so. This follows from several considerations among which are: 1) streamflow can only be measured within a certain level of accuracy (generally within 5 to 10 percent of the total flow). If the rate of pumpage is within this potential error band, the effect of the pumpage goes undetected, 2) assuming that pumpage will affect a stream, there will still be a time lag between the initiation of pumpage and the time at which the pumpage <u>begins</u> to affect streamflow. After this, the effect of pumpage on the stream increases with time until ultimately the rate of diversion from the stream (reduction in streamflow) equals the rate of pumpage. The time required for streamflow to be diverted as a result of pumpage can minutes to years depending on the field situation, 3) assuming that pumpage affects streamflow, the length the stream over which flow is actually being reduced can be miles. Thus, measurements of streamflow over a relatively small distance of the stream following the initiation of pumpage can be very misleading from this fact alone and 4) streamflow naturally varies with time. Measurements of streamflow that are designed to determine if pumpage affects streamflow would have to take this fact into consideration. In areas where rainfall is frequent, this task can become exceedingly difficult to impossible.

The above conditions or some combination of these conditions are the "normal" circumstances in the field. As a result, statements such as "the effect of pumpage from a given well on streamflow will not be measurable" are often true, at least in the short term, and can be used to develop ground water at the expense of streamflow. Ultimately however, if pumpage continues to increase, it is possible to dry up a stream even though the effect of a single well could never be documented. The best way to know whether or not pumpage will affect streamflow is to establish whether or not there is a hydraulic connection between the stream and the ground-water system, and to determine how far the cone of depression must grow in order to divert an amount of water equal to the pumpage. If the stream is the nearest discharge boundary for the ground-water system, pumpage will affect streamflow.

The status of the East Maui Ground-Water Study is documented in the enclosed table. As shown in the enclosed table there are five reports associated with this study. Three of the reports are approved and are awaiting printing. The remaining two reports are written and going through final approval. Expected dates for approval are shown in the enclosed table. As stated above, the report covering the Haiku area was to be based in part on the results of the drilling program associated with the MDWS East Maui water plan. Because this drilling has yet to occur, the report lacks this information and, although it represents our best analysis of the available data and that collected during the study, there is still a need to drill a monitor well to confirm the conclusions of the report.

I hope the above information is useful and would be pleased to discuss the issues raised in your letter to me of August 31, 1998 further if desired.

Sincerely,

William Meyer
District Chief

Enclosure

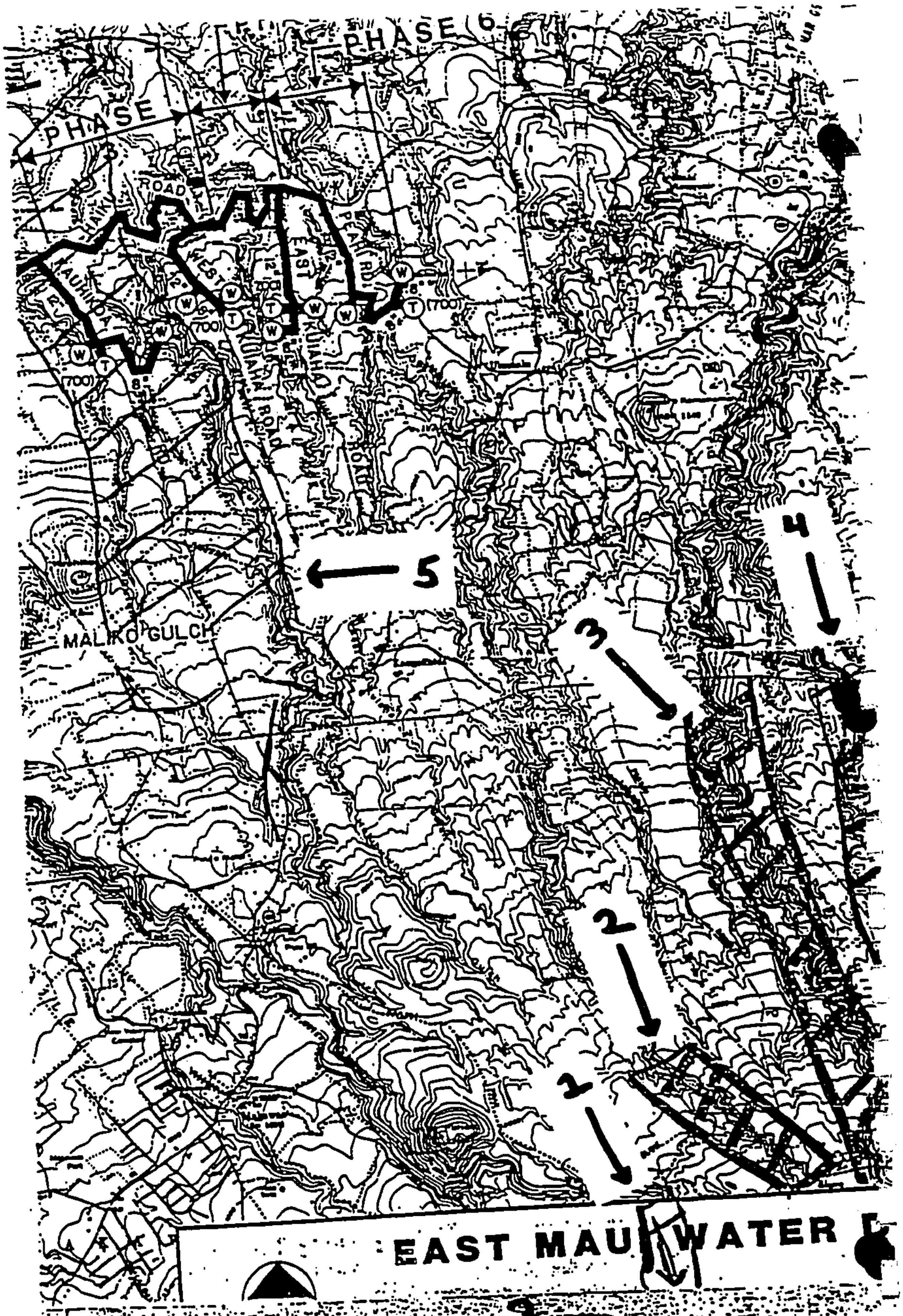


EXHIBIT 2

Proposed Management Wells
for the
East Maui Water Development Plan

This brief narrative and its accompanying exhibits describe the objectives of the proposed management wells and details of their construction. At issue is whether the East Maui production wells, which will be designed to draw water from the deep basal lens, will have an impact on the flow of streams or springs. Based on information from the wells that have been developed to date, at least two groundwater aquifers are likely to be encountered in drilling the East Maui production wells: a shallow aquifer which is known to discharge into springs and streams; and the deep basal lens. In the wells that have been completed to date, the intervening strata between these two aquifers have been found to be unsaturated. This suggests that a well which is sealed off from the upper aquifer and is designed to only draw water from the deep basal aquifer will not impact stream or springflow.

However, it has been suggested that the aquifers are not hydrologically separate and, at least in some locations, the intervening strata between the upper to lower aquifers will be found to be fully saturated. If this is in fact the case, pumping from the basal aquifer would have the potential to draw water from the upper aquifer, thereby reducing stream or springflow. The proposed management wells, which will consist of nested piezometers in a 12-inch diameter borehole, will provide the data to demonstrate the validity of this contention.

Exhibit 1 illustrates the typical section for a management well which, for the purposes of this illustration, consists of three piezometers. In this example, it has been assumed that the upper aquifer is found between 100 and 150 feet b..ow ground (the screened interval for Pipe No. 1 on Exhibit 1) and the nearby production well would draw water from the basal lens from 620 to 700 feet below ground (Pipe No. 3). The intervening strata would be monitored by a pipe open to the strata from 350 to 400 feet below ground (Pipe No. 2). Silica sand would be placed opposite the screened interval of each of these three pipes and the intervening annular space would be sealed with a bentonite-grout slurry. The sand and bentonite-grout slurry would both be carefully placed with a tremie pipe. Exhibit 2 illustrates the annular space available with three, 2-inch Schedule 80 PVC pipes as the piezometers. Exhibit 3 is a similar illustration with four-pipe piezometers. With four pipes, two different zones between the upper and lower aquifers could be monitored.

Each piezometer will allow water quality sampling and water level monitoring from the strata opposite its particular screened interval. If the strata between the upper and lower aquifers is unsaturated, no water will be found in the piezometers with these screened intervals. If the column penetrated by the borehole is fully saturated, then all piezometers would contain water. When the pump test of the nearby production well is undertaken, pressure transducers would be installed in all of the nested piezometers. A response in the piezometer tapping the same interval in the basal lens as the production well would obviously be evident. If no responses during or following the pump test are recorded in the piezometers which tap shallower strata, particularly if there is no response in the piezometer which is open to the shallow aquifer which feeds streams and springs, the hydrologic separation of the deep basal aquifer will have been demonstrated.

In addition to this monitoring during the production well's initial pump testing, the management well would continue to be used after the production well is in continuous use. Water level recorders in the piezometers in the deep and shallow aquifers would continue to provide information to confirm the findings of the initial pump test on a long-term basis. Should a longer term response that was not evident in initial testing occur, the pumpage of the production well could be reduced or even terminated, depending on the extent of the impact.

EXHIBIT " 3 "

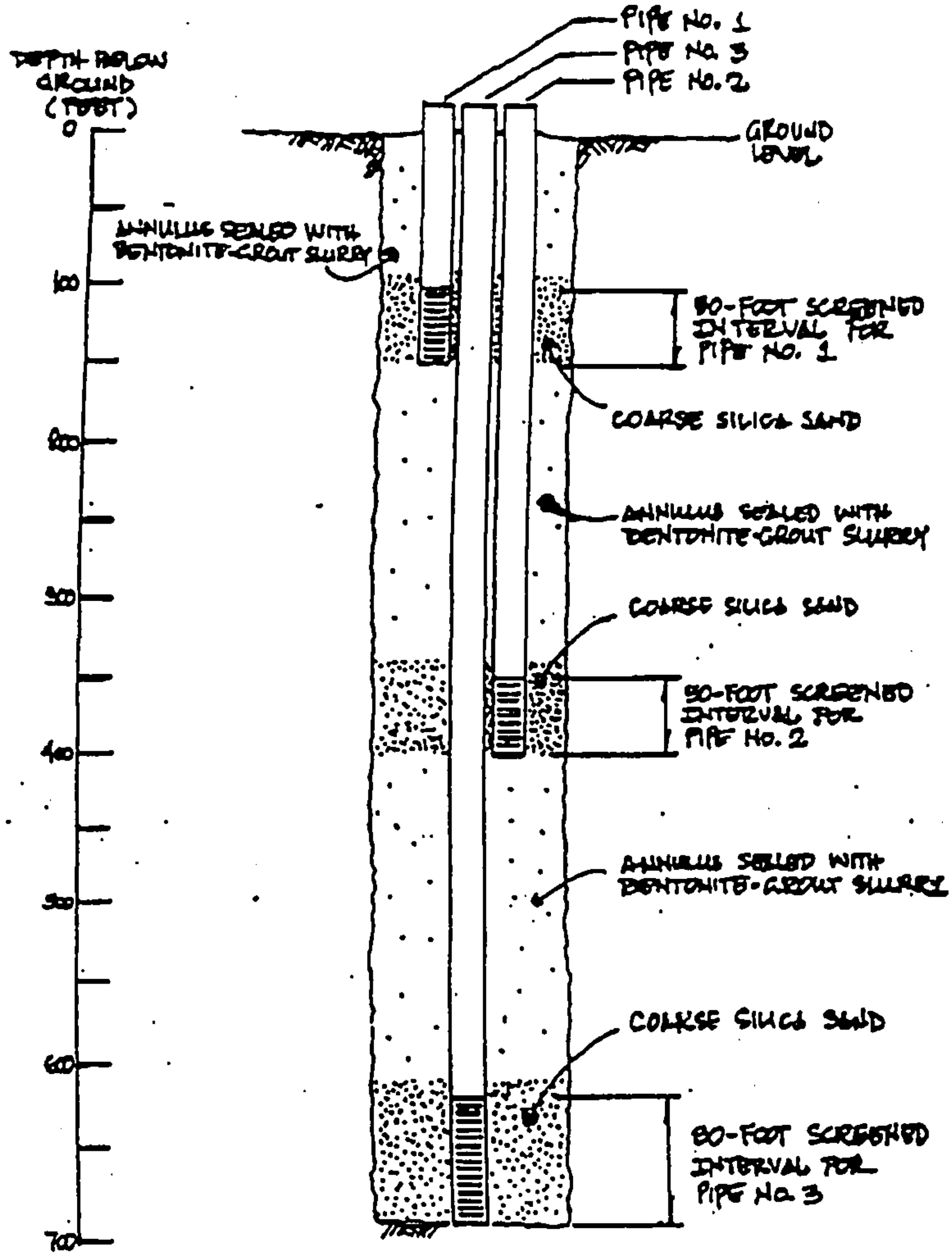


EXHIBIT 1

TYPICAL WELL SECTION

NOT TO SCALE

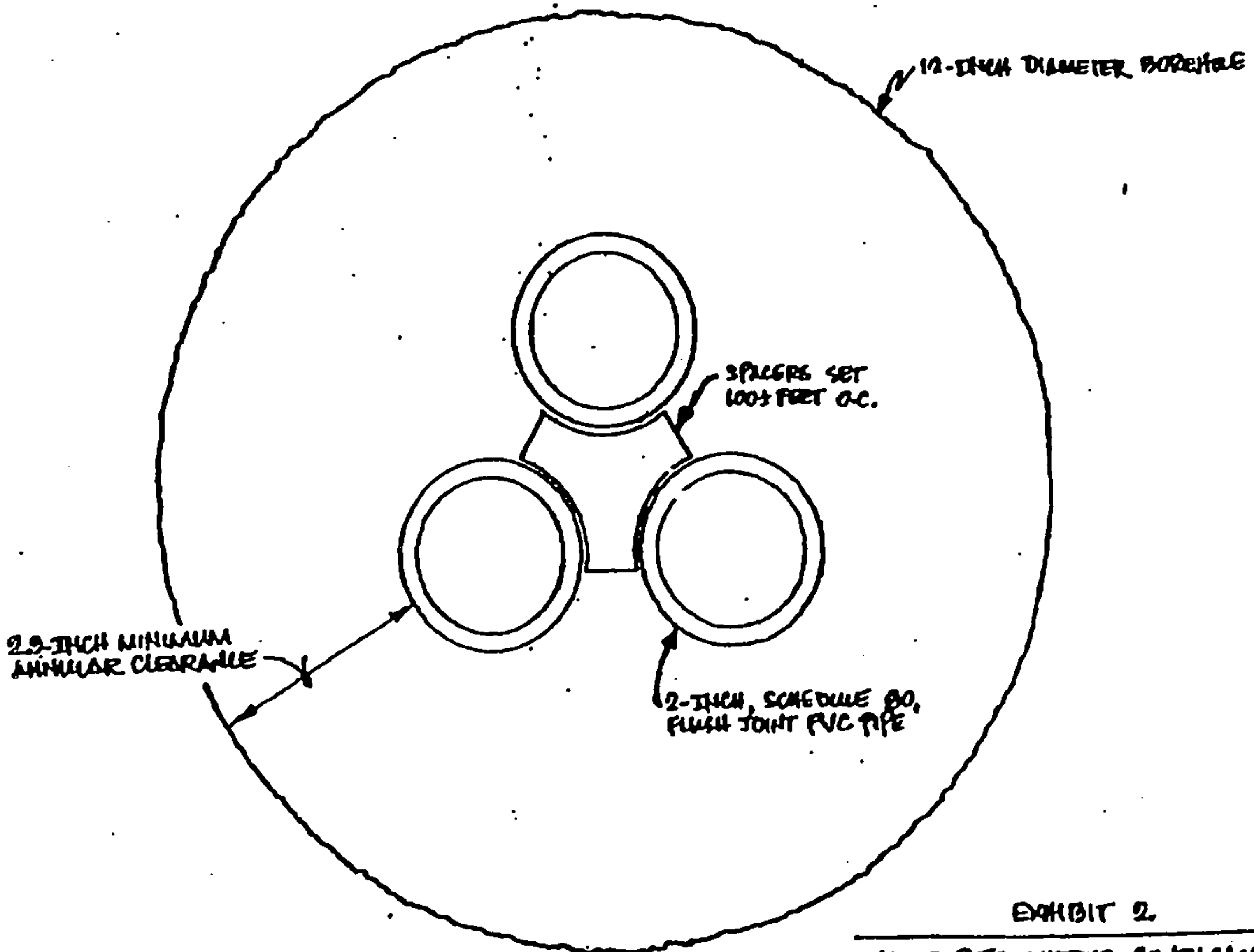


EXHIBIT 2

THREE PIEZOMETER CONFIGURATION

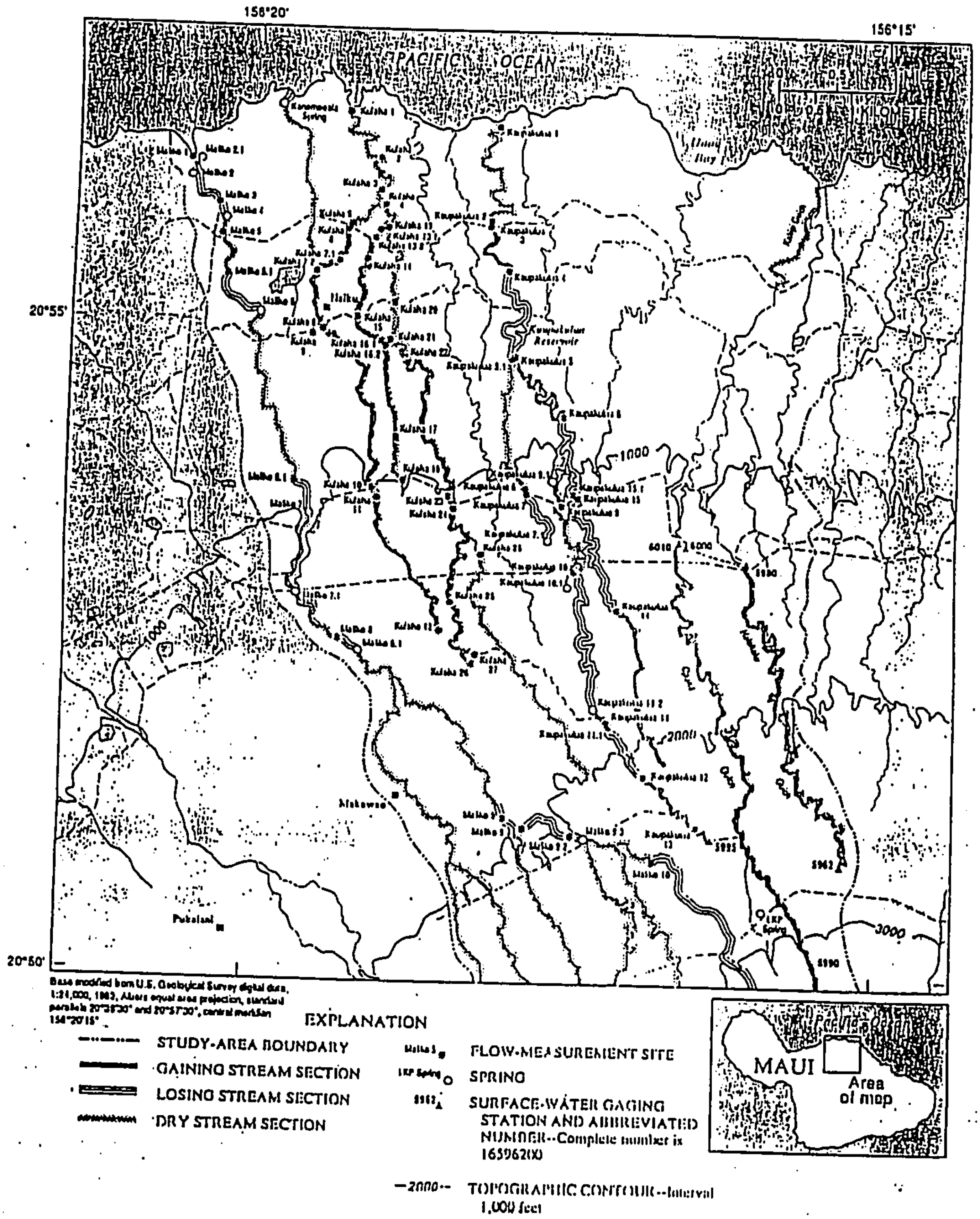
SCALE: 1/2:1

19.4

GAGING STATIONS AND STREAM FLOWS

IN HAIKU AREA

Gaging stations - Stream flows in Haiku area



[ft, feet; Mgal/d, million gallons per day; °C, degrees Celsius; µS/cm, microsiemens per centimeter; mg/L, milligrams per liter; –, not available, not applicable, or no sample; altitudes estimated from 1983 USGS 1:24,000-scale topographic maps (Haiku and Paia quadrangles); datum is mean sea level; <, less than]

Station number	Stream name	Altitude (ft)	Date	Flow (Mgal/d)	Type of streamflow upstream of site	Water temperature (°C)	Water specific conductance (µS/cm)	Chloride concentration (mg/L)	Comments
Maliko 1	Maliko Gulch	3	11/11/93	0.04	losing	22.2	103	–	
Maliko 2	Maliko Gulch	50	9/28/93	0.05	losing	23.3	294	–	Well 5620-01
			11/11/93	0.05		23.1	258	–	
Maliko 2.1	Maliko Gulch	50	10/7/93	<0.01	dry	23.6	605	–	Maliko Spring at 50 ft
Maliko 3	Maliko Gulch	60	9/28/93	0.02	losing	25.5	275	–	
Maliko 4	Maliko Gulch (unnamed tributary)	135	9/28/93	0.04	dry	26.6	278	–	Maliko Spring at 135 ft
			11/11/93	0.06		23.7	277	–	
Maliko 5	Maliko Gulch	140	9/28/93	0.03	dry	24.1	411	–	
Maliko 5.1	Maliko Gulch	170	9/28/93	0	losing	–	–	–	all flow sinks into streambed
Maliko 6	Maliko Gulch	200	9/30/93	0.05	dry	24.6	141	–	Maliko Spring at 200 ft
			11/12/93	0.10		20.9	123	–	
Maliko 6.1	Maliko Gulch	500	9/28/93	0	losing	–	–	–	all flow sinks into streambed
Maliko 7	Maliko Gulch	800	11/15/93	–	dry	19.6	158	–	Maliko Spring at 800 ft
			8/20/97	0.05		–	–	–	
			10/27/97	–		21.4	146	24	
Maliko 7.1	Maliko Gulch	840	10/27/97	–	dry	–	–	–	Pukalani Spring; minor amount of flow was observed on floor of gulch
Maliko 8	Maliko Gulch	1,150	10/5/93	–	dry	24.6	123	–	
Maliko 8.1	Maliko Gulch	1,280	10/5/93	<0.01	losing	22.1	186	–	Maliko Spring at 1,280 ft
Maliko 9	Maliko Gulch	1,680	9/29/93	0.01	losing	23.1	78	–	
Maliko 9.1	Maliko Gulch	1,740	9/29/93	0.01	losing	22.7	71	–	
Maliko 9.2	Maliko Gulch	1,890	9/29/93	0.03	gaining	21.2	80	–	
Maliko 9.3	Maliko Gulch	1,960	9/29/93	–	dry	23.1	58	9[b]	Waiohiwi Spring at 1,960 ft
Maliko 10	Waiohiwi Gulch	2,080	2/6/98	0	losing	–	–	–	all flow sinks into streambed
Kuiaha 1	Kuiaha Gulch	5	10/29/97	0	dry	–	–	–	
Kuiaha 2	Kuiaha Gulch	110	10/29/97	0	dry	–	–	–	
Kuiaha 3	Kuiaha Gulch	180	10/29/97	0	dry	–	–	–	
Kuiaha 4	Kuiaha Gulch	200	10/29/97	0	dry	–	–	–	
Kuiaha 5	Lilikoi Gulch	305	10/29/97	0	diversion	–	–	–	all water diverted by Haiku Ditch
Kuiaha 6	Lilikoi Gulch	310	10/29/97	0.23	gaining	22.1	189	23	
Kuiaha 7.1	Lilikoi Gulch	360	10/29/97	0.19	gaining	24.9	172	22	

Measurements in selected streams in Haiku area (from USGS) [ft, feet; Mgal/d, million gallons per day; °C, degrees Celsius; µS/cm, microsiemens per centimeter; mg/L, milligrams per liter; --, not available, not applicable, or no sample; altitudes estimated from 1983 USGS 1:24,000-scale topographic maps (Haiku and Paia quadrangles); datum is mean sea level; <, less than]

Station number	Stream name	Altitude (ft)	Date	Flow (Mgal/d)	Type of streamflow upstream of site	Water temperature (°C)	Water specific conductance (µS/cm)	Chloride concentration (mg/L)	Comments
Kuiaha 7.2	Lilikoi Gulch	380	10/29/97	0.09	gaining	23.8	147	20	
Kuiaha 8	Lilikoi Gulch	490	10/29/97	0	diversion	--	--	--	all water diverted by Lowrie Ditch
Kuiaha 9	Lilikoi Gulch	530	10/29/97	0.10	gaining	20.9	84	11	
Kuiaha 10	Lilikoi Gulch	930	10/29/97	0.01	diversion	--	--	--	most water diverted by Kauhikoa Ditch
Kuiaha 11	Lilikoi Gulch	960	10/29/97	0.17	gaining	20.5	140	20	
Kuiaha 12	Lilikoi Gulch	1,400	10/28/97	0	dry	--	--	--	
Kuiaha 13.1	Pauwela Gulch	300	10/28/97	0.01	losing	22.4	188	--	
Kuiaha 13.2	Pauwela Gulch	330	10/28/97	0.02[a]	diversion	22.9	175	--	most water diverted by Haiku Ditch
Kuiaha 14	Pauwela Gulch	375	10/28/97	0.26	gaining	22.9	167	24	
Kuiaha 15	Pauwela Gulch	475	10/28/97	0.25	gaining	22.2	159	23	
Kuiaha 16.1	Pauwela Gulch	560	10/28/97	0.04	diversion	22.2	135	23	water diverted from Ohia Gulch
Kuiaha 16.2	Pauwela Gulch	560	10/28/97	0.21	gaining	--	--	--	includes water diverted from Ohia Gulch
Kuiaha 17	Pauwela Gulch	840	10/28/97	0	dry	--	--	--	
Kuiaha 18	Pauwela Gulch	960	10/28/97	0	dry	--	--	--	
Kuiaha 19	Ohia Gulch	240	10/29/97	0	dry	--	--	--	
Kuiaha 20	Ohia Gulch	400	10/28/97	0	dry	--	--	--	
Kuiaha 21	Ohia Gulch	490	10/28/97	0	diversion	--	--	--	all water diverted to Pauwela Gulch
Kuiaha 22	Ohia Gulch	575	10/28/97	0.10	gaining	22.2	135	22	
Kuiaha 23	Ohia Gulch	930	10/28/97	0.01	diversion	--	--	--	most water diverted by Kauhikoa Ditch
Kuiaha 24	Ohia Gulch	960	10/28/97	1.34	gaining	23.5	87	12	
Kuiaha 25	Kapuaahoohui Gulch	1,260	10/28/97	1.29	gaining	20.5	89.3	12	
Kuiaha 26	Kapuaahoohui Gulch	1,420*	10/28/97	0	dry	--	--	--	
Kuiaha 27	Kaluanui ditch	1,520	10/28/97	1.20	--	19.7	81	11	water added to stream
Kuiaha 28	Huluhulunui Gulch	1,140	10/28/97	0	dry	--	--	--	
Kaupakulua 1	Kaupakulua Gulch	5	11/17/97	0	dry	21.2	53	8	pool with no flow
Kaupakulua 2	Kaupakulua Gulch	340	11/17/97	0	diversion	--	--	--	all water diverted by Haiku Ditch
Kaupakulua 3	Kaupakulua Gulch	350	11/17/97	0.06-0.07[a]	gaining	21.8	129	21	
Kaupakulua 4	Kaupakulua Gulch	480	11/17/97	0*	diversion	--	--	--	all water diverted by Lowrie Ditch

19.5

TESTIMONY, LETTERS AND RESPONSES TO COMMENTS ON DSEISPN

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

GENEVIEVE SALMONSON
DIRECTOR

0501070

RECEIVED
2001 MAY 17 PM 1:01
DEPT. OF WATER SUPPLY
COUNTY OF MAUI

May 11, 2001

Mr. David Craddick, Director
Department of Water Supply
County of Maui
200 South High Street
Wailuku, Hawai'i 96793

Dear Mr. Craddick:

Subject: EISPN for the East Maui Water Development Plan, Maui

Thank you for the opportunity to review the subject document. We have the following comments and questions.

1. Please review the attached "Guidelines for Assessing Water Development Projects" and answer all the pertinent questions in the Draft EIS.

2. Please prepare a cultural impact assessment for this project in accordance with the attached "Guidelines for Assessing Cultural Impacts."

3. All the streams in the project area should described in terms of their biological and stream flow characteristics. The project's impacts on the stream and its associated coastal areas should be disclosed.

4. Agricultural uses near the proposed wells should be described and its potential to contaminate the water supply should be disclosed. If the wells may be contaminated, how would the water be treated?

5. Different alternatives of meeting the water needs of Maui should be fully analyzed in the Draft EIS.

Sincerely,

Genevieve Salmonson
Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

June 3, 2002

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Subject: SEIS Preparation Notice for the East Maui Water Development Plan

Thank you for your letter of May 11, 2001 and your comments regarding the subject preparation notice.

The matter of water contamination and treatment will be discussed in the Draft SEIS. Impacts on stream flow characteristics and coastal waters will also be discussed. Various alternatives to the proposed project will be analyzed and evaluated. Stream biology and cultural impact assessments will be conducted when a final decision is made to relocate the well fields.

A copy of the Draft SEIS will be sent to your office for review.

If you should have any questions, please call our Engineering Division at (808) 270-7835.

Sincerely,

David R. Craddick
Director

WKT:so

"By Water All Things Find Life"

Printed on recycled paper

BENJAMIN J. CAYETANO
Governor

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawaii 96814-2512

JAMES J. NAKATANI
Chairperson, Board of Agriculture

LETITIA N. UYEHARA
Deputy to the Chairperson

Mailing Address:
P.O. Box 22159
Honolulu, Hawaii 96823-2159

Fax: (808) 973-9613

May 24, 2001

Mr. George A. L. Yuen, President
Mink and Yuen, Inc.
1670 Kalakaua Avenue, Suite 605
Honolulu Hawaii 96826

Dear Mr. Yuen:

Subject: Supplemental Environmental Impact Statement Preparation Notice for East Maui Water Development Plan

The Department of Agriculture has reviewed the subject document and offers the following comment.

It appears that the proposed project will have the desirable effect of increasing groundwater supply to meet potable water demand, thereby lessening demand for potable use of surface-fed irrigation water during extended dry periods. This positive outcome for Maui agriculture should be emphasized and elaborated upon.

Should you have any questions, please contact Mr. Paul T. Matsuo, Administrator/Chief Engineer, Agricultural Resources Management Division, at 973-9475.

Sincerely,

JAMES J. NAKATANI
Chairperson, Board of Agriculture

emwdp s01

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

June 3, 2002

Mr. James K. Nakatani
Chairperson, Board of Agriculture
Department of Agriculture
1428 South King Street
Honolulu, Hawaii 96814-2512

Dear Mr. Nakatani:

Subject: SEIS Preparation Notice for the East Maui Water Development Plan

Thank you for your letter of May 24, 2001 and your comments regarding the subject preparation notice.

We acknowledge your comments that the project will be beneficial to Maui agriculture by lessening the demand for surface-fed irrigation water during extended dry periods. We will continue to maintain a balance between the use of groundwater and surface sources which will be of maximum benefit to all.

If you should have any questions, please call our Engineering Division at (808) 270-7835.

Sincerely,

David R. Craddick
Director

WKT:sc

"By Water All Things Find Life"

JAMES "KIMO" APANA
Mayor

ROSALYN HESTER BAKER
Economic Development Coordinator

OFFICE OF ECONOMIC DEVELOPMENT

COUNTY OF MAUI
200 SOUTH HIGH STREET, 6TH FLOOR, WAILUKU, MAUI, HAWAII 96793, USA
Telephone: (808) 270-7710 • Facsimile: (808) 270-7995 • Email: economic.development@co.maui.hi.us

May 21, 2001

Mr. George A. L. Yuen
President
Mink and Yuen, Inc.
1670 Kalakaua Avenue, Ste. 605
Honolulu, Hawaii 96826

Re: Supplemental Environmental Impact Statement
Preparation Notice for East Maui Water Development Plan

Dear Mr. Yuen:

Thank you for this opportunity to provide comments concerning the subject environmental impact statement preparation notice.

This office has reviewed the information provided with your letter of May 7, 2001, and would agree with your conclusion that no action would hinder economic growth on Maui. It is our understanding the preparation of this document is a supplement to work previously done which will further study possible effects of groundwater withdrawal on stream flows.

Your preliminary conclusions which address the non-perennial nature of the region's streams appear to correlate well with data previously published in the EIS. The planned program to design, drill and test a monitor well to determine among other things this correlation between water level in the well and stream flow is well conceived.

We will look forward to final results in this regard.

Sincerely,

Rosalyn H. Baker
Rosalyn H. Baker
Economic Development Coordinator

Quality Seamless Service • Now and for the Future

DEPARTMENT OF WATER SUPPLY

COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

August 1, 2001

Ms. Rosalyn H Baker
Economic Development Coordinator
Office of Economic Development
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Ms. Baker:

SUBJECT: PREPARATION NOTICE FOR THE SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE EAST MAUI WATER DEVELOPMENT PLAN

We are in receipt of your letter dated May 21, 2001 and acknowledge that you have no comments to offer at this time.

Should you have any questions, please feel free to call our Engineering Division at 270-7835.

Sincerely,

David R. Craddick
Director

WKT

"By Water All Things Find Life"

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(12)

MAUI LAND & PINEAPPLE COMPANY, INC.

May 31, 2001

Mr. George A. L. Yuen
President
Mink & Yuen, Inc.
1670 Kalakaua Avenue, Suite 605
Honolulu, Hawaii 96826

Dear Mr. Yuen:

Subject: Supplemental Environmental Impact Statement Preparation Notice For East Maui Water Development Plan

We are in receipt of your transmittal of May 7, 2001, which provided a copy of the subject supplemental environmental impact statement preparation notice document for our review and comments. We have completed our review of the document provided and have no comments to offer at this time. May we request that we be provided with an opportunity to review and comment on the draft supplemental environmental impact statement. Your consideration will be greatly appreciated.

Thank you again for providing us with an opportunity to review and comment on the document provided. We look forward to receiving a copy of the draft supplemental environmental impact statement in the future.

If you have any questions or wish to discuss the matter, please do not hesitate to contact me at (808) 877-3882.

Mahalo,

Warren A. Suzuki
Vice President/Land & Water Asset Management

/dc
C: Paul J. Meyer
L. Douglas MacCluer

P.O. Box 187, Kahului, Hawaii 96733-6687
(808) 877-3351 • Fax (808) 877-3826 • www.mauiland.com

Maui Electric Company, Ltd. • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96733-6898 • (808) 871-8461

June 4, 2001

Mr. George A.L. Yuen
President
Mink & Yuen, Inc.
1670 Kalakaua Avenue, Suite 605
Honolulu, Hawaii 96826

Dear Mr. Yuen:

Subject: Supplemental Environmental Impact Statement Preparation Notice for East Maui Water Development Plan

Thank you for allowing us to comment on the subject project.

In reviewing the information transmitted and our records, Maui Electric Company (MECO) at this time has no objections to the proposed project.

MECO encourages the project's consultant meet with us as soon as practical so that we may discuss the electrical requirements of this project.

If you have any questions or concerns, please call Fred Oshiro at 872-3202.

Sincerely,

Neal Shinyama
Manager, Energy Delivery

NS:fo/lh

JAMES "KIMO" APANA
Mayor

JOHN E. MIN
Director

CLAYTON I. YOSHIDA
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PLANNING

May 30, 2001

Mr. George Yuen, President
Mink & Yuen, Inc.
1670 Kalakaua Avenue, Suite 605
Honolulu, Hawaii 96826

Dear Mr. Yuen:

RE: Supplemental Environmental Impact Statement (EIS) Preparation Notice for East Maui Water Development Plan

The Maui Planning Department (Department) received your Supplemental EIS on May 8, 2001, for review and comment. The Department has no comments at this time.

If you have any questions, please call John Summers, Administrative Officer, or Daren Suzuki, Staff Planner, of this office at 270-7735.

Very truly yours,

JOHN E. MIN
Planning Director

JEM:JH:cmb
c: Clayton Yoshida, AICP, Deputy Planning Director
Julie Higa, Staff Planner
John Summers, Administrative Officer
Project File
General File
S:\ALL\JULIE\ENVIRON\MauiEastMauiWaterPlan.wpd

250 SOUTH HIGH STREET, WAILUKU, MAUI, HAWAII 96793
PLANNING DIVISION (808) 243-7735; ZONING DIVISION (808) 243-7253; FACSIMILE (808) 243-7634

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

June 6, 2001

Civil Works Technical Branch

Mr. George A.L. Yuen, President
Mink and Yuen, Inc.
1670 Kalakaua Avenue, Suite 605
Honolulu, Hawaii 96826

Dear Mr. Yuen:

Thank you for the opportunity to review and comment on the Supplemental Environmental Impact Statement Preparation Notice for the East Maui Water Development Plan. Due to the broad base of the report and the non-specific project information provided, a thorough evaluation could not be completed at this time. However, any work performed within the 100-year floodplain will have to adhere to the requirements of the Federal Emergency Management Agency. Additionally, the need for a Department of the Army permit could not be determined based on the information submitted to us. We will need to review any future documentation when it becomes available so that site specific information can be provided to you.

If you require additional information, please feel free to contact Ms. Jessie Dobinchick of our Civil Works Technical Branch staff at (808) 438-8876.

Sincerely,

James Pennaz, P.E.
Chief, Civil Works
Technical Branch

JAMES "KIMO" APANA
Mayor

DAVID C. GOODE
Director

MILTON M. ARAKAWA, A.I.C.P.
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
LAND USE AND CODES ADMINISTRATION
250 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH M. NAGAMINE, L.S., P.E.
Land Use and Codes Administration

RONALD R. RISKA, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

Solid Waste Division

BRIAN HASHIRO, P.E.
Highways Division

June 12, 2001

Mr. George A.L.Yuen
MINK & YUEN, INC.
1670 Kalakaua Avenue, Suite 605
Honolulu, Hawaii 96826

SUBJECT: SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
EAST MAUI WATER DEVELOPMENT PLAN

Dear Mr. Yuen:

We have reviewed the subject application and have no comments.

Should you have any questions, please call Milton Arakawa at 270-7845.

Very truly yours,

DAVID GOODE
Director of Public Works
and Waste Management

MA:rg
S:\LUCA\CZM\EastMaui.wpd

3

BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

May 21, 2001

Mr. George A.L. Yuen, President
Mink & Yuen, Inc.
1670 Kalakaua Avenue, Suite 605
Honolulu, Hawaii 96826

Dear Mr. Yuen:

Subject: Supplemental Environmental Impact Statement Preparation Notice (SEISPN) for East Maui Water Development Plan

We have reviewed the SEISPN for the subject project forwarded by your letter dated May 7, 2001, and find that the original proposed well sites, as represented in Figure 4, are designated within the State Land Use Rural and Agricultural Districts. The new proposed well area is designated within the State Land Use Agricultural District. We suggest that the Draft SEIS include a map showing the original sites and the new sites in relation to the State land use districts.

We have no further comments to offer at this time. We appreciate the opportunity to comment on the SEISPN.

Please feel free to contact Bert Saruwatari of my office at (808)587-3822, should you require clarification or any further assistance.

Sincerely,

ANTHONY J.H. CHING
Executive Officer

c: OEQC
County of Maui Dept. of Water Supply

ALEXANDER & BALDWIN, INC.

MEREDITH J. CHING
Vice President

822 Bishop Street
Honolulu, Hawaii 96813
P.O. Box 3440
Honolulu, HI 96801-3440
www.alexanderbaldwin.com
Tel (808) 525-6669
Fax (808) 525-6677
email: mching@abinc.com

SE 15 PMAB

June 5, 2001

Mr. George Yuen
Mink and Yuen, Inc.
1670 Kalakaua Avenue, Suite 605
Honolulu, Hawaii 96826

Dear ~~Mr. Yuen~~ George

RE: Supplemental Environmental Impact Statement Preparation Notice for East Maui Water Development Plan

Thank you for providing us with a copy of the subject document. We have a couple of comments to offer at this time.

First, please note that by moving the line of wells further inland, as described on page 4 and Fig. 4 in your document, the proposed new location of the wells may be on land owned by Alexander & Baldwin, and currently leased for pineapple production to Maui Land and Pineapple Company.

Secondly, the reference to the Iao-Waikapu Ditch agreement on page 21 should be updated to reflect the extension of that agreement.

We look forward to further communications from you on this project, and again thank you for keeping us informed.

Sincerely Yours,

Meredith J. Ching

Meredith J. Ching

cc: G. S Holaday, HC&S
Garret Hew, EMI

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

June 3, 2002

Ms. Meredith J. Ching, Vice President
Alexander and Baldwin, Inc.
P. O. Box 3440
Honolulu, Hawaii 96801-3440

Dear Ms. Ching:

Subject: SEIS Preparation Notice for the East Maui Water Development Plan

Thank you for your letter of June 5, 2001 and your comments regarding the above preparation notice.

We wish to point out that the proposed well sites will be on lands not owned by A & B. Should the wells be moved further inland additional environmental work will be needed. Also, the Iao-Waikapu ditch agreement is not in force at this time.

A copy of the Draft Supplemental EIS will be mailed to your for review.

If you should have any questions, please call our Engineering Division at (808) 270-7835.

Sincerely,

David R. Craddick
Director

AHK/DRC:sc
xc: Mink & Yuen

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BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
File:
01-039/epo

June 4, 2001

Mr. George A.L. Yuen, President
Mink and Yuen Inc.
1670 Kalakaua Avenue, Suite 605
Honolulu, Hawaii 96826

Dear Mr. Yuen:

Subject: Preparation Notice for the East Maui Water Development Plan

Polluted Runoff Control

Proper planning, design and use of erosion control measures and management practices will substantially reduce the total volume of runoff and limit the potential impact to the coastal waters from polluted runoff. Please refer to the Hawaii's Coastal Nonpoint Source Control Plan, pages III-117 to III-119 for guidance on these management measures and practices for specific project activities. To inquire about receiving a copy of this plan, please call the Coastal Zone Management Program in the Planning Office of the Department of Business, Economic Development and Tourism at 587-2877.

The following practices are suggested to minimize erosion during construction activities:

1. Conduct grubbing and grading activities during the low rainfall months (minimum erosion potential);
2. Clear only areas essential for construction;
3. Locate potential nonpoint pollutant sources away from steep slopes, water bodies, and critical areas;
4. Protect natural vegetation with fencing, tree armoring, and retaining walls or tree wells;
5. Cover or stabilize topsoil stockpiles;
6. Intercept runoff above disturbed slopes and convey it to a permanent channel or storm drain;

7. On long or steep slopes, construct benches, terraces, or ditches at regular intervals to intercept runoff;
8. Protect areas that provide important water quality benefits and/or are environmentally sensitive ecosystems;
9. Protect water bodies and natural drainage systems by establishing streamside buffers;
10. Minimize the amount of construction time spent in any stream bed;
11. Properly dispose of sediment and debris from construction activities; and
12. Replant or cover bare areas as soon as grading or construction is completed. New plantings will require soil amendments, fertilizers and temporary irrigation to become established. Use high planting and/or seeding rates to ensure rapid stand establishment. Use seeding and mulch/mats. Sodding is an alternative.

The following practices are suggested to remove solids and associated pollutants in runoff during and after heavy rains and/or wind:

1. Sediment basins.
2. Sediment traps.
3. Fabric filter fences.
4. Straw bale barriers.
5. Vegetative filter strips.

Any questions regarding these matters should be directed to the Polluted Runoff Control Program in the Clean Water Branch at 586-4309.

Water Pollution

1. The applicant should contact the Army Corps of Engineers to identify whether a federal permit (including a Department of Army permit) is required for this project. If a federal permit is required, then a Section 401 Water Quality Certification is required from the State Department of Health, Clean Water Branch.
2. A National Pollutant Discharge Elimination System (NPDES) general permit is required for the following discharges to waters of the State:
    a. Storm water discharges relating to construction activities, such as clearing, grading, and excavation, for projects equal to or greater than five acres;
    b. Storm water discharges from industrial activities;

c. Construction dewatering activities;

d. Noncontact cooling water discharges less than one million gallons per day;

e. Treated groundwater from underground storage tank remedial activities;

f. Hydrotesting water;

g. Treated effluent from petroleum bulk stations and terminals; and

h. Treated effluent from well drilling activities.

Any person requesting to be covered by a NPDES general permit for any of the above activities should file a Notice of Intent with the Department's Clean Water Branch at least 30 days prior to commencement of any discharge to waters of the State.

3. After construction of the proposed facility is completed, a NPDES individual permit will be required if the operation of the facility involves any wastewater discharge into State waters.

Any questions regarding these comments should be directed to Mr. Denis Lau, Branch Chief, Clean Water Branch at 586-4309.

Safe Drinking Water

All new potable water sources require an engineering report and approval from the Safe Drinking Water Branch.

Any questions regarding these matters should be directed to Mr. William Wong, Branch Chief, Safe Drinking Water Branch at 586-4258.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

June 3, 2002

Mr. Gary Gill, Deputy Director
Environmental Health Administration
Department of Health
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Gill:

Subject: SEIS Preparation Notice for the East Maui Water Development Plan

Thank you for your letter of June 4, 2001 and for your comments regarding the above notice. We will consider your comments when preparing the Draft Supplemental EIS.

We note that many of your comments relate to the design, construction, and post-construction phases of the project. We will most assuredly take them into consideration when we decide to proceed with the design and construction phase of the project.

If you should have any questions, please call our Engineering Division at (808) 270-7835.

Sincerely,

David R. Craddick
Director

WKT:so

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DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793 6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

May 31, 2002

Mr. Jeff Parker
Tropical Orchid Farm, Inc.
P. O. Box 170
Haiku, Hawaii 96708

Dear Mr. Parker:

Subject: SEIS PREPARATION NOTICE FOR THE EAST MAUI WATER DEVELOPMENT PLAN

Thank you for your letter of June 5, 2001 and your comments regarding the subject preparation notice.

Your letter brought up a number of interesting and thoughtful points which we will consider during the preparation of the Draft SEIS.

With respect to the implications of the Waiahole decision regarding EMWDP, we have no intention of transporting ground water from one area to the detriment of that area. The Waiahole decision covers ground water that supply's surface water systems. Neither the Water Code nor State law prohibits the transfer of ground water, not affecting surface water, from one area to another area.

Concern over the possible effect of groundwater pumpage on stream flows is addressed in the SEIS. Our finding is that pumpage would have no effect on stream flows.

The Maui Department of Water Supply has been conducting a water conservation program during he past several years in concurrence with its water development program. The department is cognizant of the need for conservation to minimize demand on natural resources.

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Efforts to conserve to date include:

-ordinance requiring low flow fixtures in all new development (since 1992); also now federal law;
-distribution of low flow fixtures;
-conservation education;
-leak detection, meter replacement and other internal efforts to minimize unaccounted for water;
-tiered rate to encourage conservation;

At this time we estimate that we save approximately ½ mgd in Central Maui based on conservation measures to date. We recognize that there is room for further improvement.

Accommodating the water demands of the community would enhance the quality of life of the community and the growth issues should have been considered in the development of the Community and General Plans process.

I would like to allude to a statement you made regarding John Mink's opinion on the capacity of the Iao Aquifer. I understand he had written you to clarify his position on the matte, which I hope will allay any misunderstanding you and others may have. Mr. Mink is known for his professional ethics and I am convinced all issues will be analyzed fairly.

Sincerely,

David R. Craddick
Director

HK:sc

xc: Mink & Yuen

P2.

County of Maui
Department of Water Supply
200 High St.
Wailuku, HI 96793
Attn: David Craddick, Director

RECEIVED
June 6, 2001 05

Re: Comments on Preparation Notice for SEIS East Maui Water Development Plan

Maui Tomorrow is a citizen's group advocating sustainable planning solutions. A number of our 800 supporters live in the Ha'iku area and will be directly affected by this plan. We have concerns about the manner in which this preparation notice has gone out, with limited public notice in media read by average citizens. We request to be a consulted party on this matter. Our comments upon the scope of the proposed SEIS are as follows:

This SEIS appears to be relying on the same tired theories that resulted in previous EIS on the project being challenged. A long list of additional studies is suggested, but no time frame is mentioned. Past studies of stream flows have been both expensive and time consuming. We would like to see assurances that a comprehensive, state-of-the art model of East Maui ground and surface water resources is included in the scope of the SEIS. The language describing this in the SEIS notice is vague.

Long range water planning should be based on a long range growth management plan. The County currently has no such plan. The EMPLAN preparation notice does not even mention the Pa'ia-Ha'iku Community Plan and its policies and objectives related to this issue.

EMPLAN, AS PROPOSED, IS NOT CONSISTENT WITH PA'IA-HA'IKU COMMUNITY PLAN:

Water Allocation for Ha'iku not addressed:

Pa'ia-Haiku community plan clearly identifies (p.11) "Water Use Allocation" as a major concern and specifically states: "The development of new ground water resources in Ha'iku to service Central Maui area of Wailuku-Kahului and Kihei-Makena raises a concern over the allocation of water resources to these other regions, if and when the present and future needs of Pa'ia -Ha'iku are not met."

While the planned water transmission lines will deliver well water directly to A&B's controversial proposed golf course estates (Spreckelsville Mauka), it will not help Ha'iku families waiting years for a water meter, nor will it ease water shortages in Kula. Rather than serve the needs of existing residents and their families who will be underwriting its costs, it seems to be aimed at providing water for a type of future growth that will benefit a few large landowners luring out of state buyers.

Stream Protection, Traditional Agriculture & Conservation

The Pa'ia-Ha'iku Community Plan (P-HCP) places great emphasis upon protection of existing stream flows, groundwater resources and nearshore waters (Environment Policies #6 & 8) . It sets policies that encourage cultural practices and a rural lifestyle (Cultural Resources policies #1 &10). It calls upon the County to implement "incentives for water conservation" and to "prepare or update a water improvement master plan for the Paia-Ha'iku region.."

The East Maui Water Development Plan (EMPLAN) ignores the P-HCP's concern about using East Maui water to meet local needs. The SEIS preparation notice makes unsubstantiated claims that Ha'iku ground and surface water flows (and therefore cultural and agricultural practices dependent upon these flows) will be unaffected by proposed wells. The East Maui Plan ignores the Pa'ia-Ha'iku community's wish to see comprehensive water use planning done that includes water conservation as a major component.

IMPACTS OF WAIAHOLE DECISION ON EMPLAN NOT DISCUSSED:
The SEIS notice fails to even mention the recent Waiahole water decision when discussing applicable State laws. Waiahole made it clear that the state's public trusteeship extended over both stream and ground waters and viewed the two as inexorably linked. Transfer of water from one watershed to another would appear to require designation of a Water management Area under State Water Code regulations. Maui has no designated areas. The DSEIS needs to address Waiahole and the role of State Water Code rules on this project.

UNPROVED THEORIES OF SEPARATE AQUIFERS
The 1999 USGS report on the same Ha'iku watershed area proposed for EMPLAN states that: "Current knowledge of the relation between surface water and ground water in northeast Maui is limited and a better understanding of the groundwater flow system is needed for water resource management purposes."
(p.2 Ground Water and Surface Water in the Haiku Area, East Maui, Hawaii.)

The DSEIS should honestly acknowledge that past "theories" of hydrological systems in East Maui have often been proven untrue and admit that the EMPLAN may not meet the objectives of the Pa'ia-Ha'iku Community Plan to protect stream flows, etc. in the area.

The EMPLAN SEIS notice claims that regular pumping of 14 mgd from 10 wells will only access the "deeper" Honomanu aquifer and have no affect on existing stream flows or wells in the area (supposedly supplied by the higher "Kula" aquifer). This is a theory that common sense and local observation would not bear out. Many Ha'iku streams have Honomanu era geological flows exposed in their stream beds and are regularly recharged by waters that may be from this supposedly "separate" aquifer.

COMMUNITY NEEDS:
There are currently families and individuals utilizing stream waters of Kanemoeala and Maliko to grow taro and other agricultural products. Their operations are located in the supposed "impact zone" near the ocean. Will anyone monitor their springs? Residents along Kuiaha and Lilikoi stream have testified publicly that they use spring fed stream flows for agricultural purposes and fear wells will drain off their flows. Local families have favorite spring fed pools along Kakipi, Kuiaha and Opae pilau streams that they do not want to lose. The EMPLAN SEIS notice gives the impression that the wells will only affect empty pasture lands and meadows-not real people.

IMPACTS OF DROUGHT AND EXISTING WELLS OVERLOOKED
The SEIS preparation notice also fails to address the potential impacts of diminished rainfall patterns and more frequent droughts on potential ground waters available in Haiku's watershed. This important topic is not specifically listed as a research area for the future DSEIS. Existing wells in the area (such as those used by HC&S) have been recorded as pumping up to 17mgd from a single well during times of drought. The SEIS makes no attempt to discuss impacts of the project under "worst possible scenario" conditions. The East Maui Water Plan appears to take the same tack that the Central Maui Joint Venture well project did a quarter of a century ago: ignore impacts on the resources and assume that projected flows of water will always be available. This didn't prove true in the Iao Aquifer. Why repeat the same incautious pattern?

NO CONSIDERATION OF ADDITIONAL WATER STORAGE:
Under the Project Alternatives section of the SEIS, no discussion was made of the County investing in additional reservoirs in East Maui to help increase the supply of available water for Paia, Haiku and upcountry. Many citizens have suggested this at public hearings. Giving homeowners in rainy areas (like Haiku) incentives to develop catchment systems to help relieve public water demands during drought periods was also not discussed. In fact, water conservation planning was dismissed in the SEIS, whereas the Pa'ia-Ha'iku Community Plan regarded it as an important objective for the area. Taxpayers deserve to see a cost benefit analyses done comparing a multimillion dollar pipeline intended to water a desert with local projects that improve the quality of water delivery for Paia-Ha'iku-Upcountry residents.

NO DISCUSSION OF OVERALL COSTS:
It would be hoped that part of the additional research done on this project is its real costs: planning, site prep, construction, relocation of unsuitable wells, yearly pumping costs, anticipated maintenance. This discussion will allow citizens to be aware of what planning choices make sense and compare projected "returns" with anticipated costs.

PESTICIDE CONTAMINATION:
No alternative plan is being mentioned to deal with the possibility that a number of these proposed wells may be contaminated with DBCP's or other pesticides. Citizens are concerned when local officials appear to manipulate clean water standards to allow contaminated water to enter the public supply as is the case with the County's Hamakuapoko well. What is the County's water plan for South and Central Maui if East Maui ground water sources prove environmentally or economically unfeasible to use? This topic should be discussed in the DSEIS.

Thank you for this oppoertunity to comment,

Lucienne deNaie

Lucienne de Naie 572-8331
Maui Tomorrow Conservation Committee
Maui Tomorrow
P.O. Box 429
Makawao, Hi 97668
877-AINA

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

May 31, 2002

Ms. Lucienne de Naie
Maui Tomorrow Conservation Committee
Maui Tomorrow
P. O. Box 429
Makawao, Hawaii 96768

Dear Ms. de Naie:

Subject: SEIS PREPARATION NOTICE FOR THE EAST MAUI WATER DEVELOPMENT PLAN

Thank you for your letter of June 6, 2001 and your comments regarding the subject preparation notice. We acknowledge your request to become a consulted party and will send a copy of the Draft SEIS once it is published.

Your letter brought out a number of interesting and important points. We will address them as we proceed with the preparation of the SEIS, mindful of the Court Order which calls for the SEIS. At this time, we wish to point out that the subject of the impact of pumping on stream flows is discussed in the Draft SEIS. Our findings are that there would be no effect. Contamination by pesticides and herbicides and how it is treated is also evaluated. Lab tests of our monitor well samples show no contamination except for one sample which indicated a very low level of EDB which is far below the EPA allowable. The need for additional storage is actively under study by our department which will be of major benefit to up-country Maui.

The model of the East Maui ground resources is an objective to be considered when more substantive data can be ascertained, such as that obtained from the test well and others in the aquifer.

Analysis of the Paia-Haiku Community Plan estimates water use may be tripled over twenty years from the approximately 400,000 gpd that served these areas when the plan was passed in 1995. The anticipated demands of 1.2 to 1.5 mgd can be met with the resources of the East Maui Development Plan. No impact on availability of potable water for the residents of the Haiku area is expected to result from this plan, other than the benefit that those who are within the service area of new developments could be removed from the Makawao System.

"By Water All Things Find Life"

With respect to the implications of the Waiahole decision regarding the East Maui Development Plan, we have no intention of transporting ground water from one area to the detriment of that area. The Waiahole decision covers ground water that supplies surface water systems. Neither the Water Code nor the State law prohibits the transfer of ground water, not affecting surface water, from one area to another area.

Your concerns over the water resources of Maui are appreciated, and shared. We are glad you share the common goal of preserving our water resources for the benefit of the people of Maui. If you have any questions please call our Engineering Division at (808) 270-7835.

Sincerely,

David R. Craddick
Director

HK:sc
xc: Mink & Yuen

(13)

Valley Farm
Greg Westcott
P.O. Box 485 Ha'ikū, Hawai'i 96708 808-572-1609

June 6, 2001

Mr. Peter Rice
Chairman, Board of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Hawaii 96793-6109

Dear Sir:

I would like to offer the following comments on the Preparation Notice for the SEIS for the East Maui Water Development Plan and to request that I be placed on the list of consulting parties.

This SEIS is the result of a lawsuit brought by concerned Maui citizens and the Coalition to Protect East Maui Waters. That the plaintiffs and their expert consultants were not included in pre-assessment consultations does not bode well for the rigorous, critical examination of this proposal required by law and gives support to those who charge that Mr. Mink is hostile to ideas and interpretations that differ from his own.

The Court ordered that an SEIS must examine the impacts of groundwater pumping on stream flows. Mr. Mink ~~has~~ simplifies this task by claiming that there are no perennial streams in the project area. This is a gross misrepresentation of the facts. There are numerous streams in the project area including Maliko and Opana (not Kapiki) that would flow perennially if allowed to. These streams have been artificially de-watered. At each point where streams in the project area are diverted stream flow must be monitored. Without this data, how can the impacts of pumping be determined?

The first version of the EM Plan offered by the BWS proposed some 21 wells and a 36" pipeline. Over the years this number has been reduced to 10 but the 36" line remains. Why not size the delivery line to the 10mgd proposed in this plan? Surely a 20" line would suffice and save money.

VALLEY FARM
P. O. Box 485
Haiku, Maui, Hawaii 96708
808-572-1609

Why is there no mention in this prep notice of the recently brokered MOU between the BWS, A and B and others to drill privately financed production wells in East Maui? Since the plan is for these waters to enter the public system at Kamole isn't this a defacto extension of the EM Plan?

Why is there no mention in this notice of the Central Maui Joint Venture Agreement. Would water from the EM system be used to pay off the JV partners the water they claim they are owed?

Why is there no mention of the Supreme Court's Waiahole decision? Surely it will have an impact on the EM Plan.

Why are there no figures given in the notice for the Dowling, Kaupakalua, Kulamanu well—a large production well within the project area, connected to the public system and operated by the BWS? Why is the Dowling well not included in the EM Plan?

Under Alternatives, there is no mention that Wailuku Agribusiness is closing down and its lands are being sold. This would affect alternative #5. It would also affect alternative 6 since a substantial amount of Iao water is used for irrigation. ?

There is no mention in this notice of the distinct possiblilty that HC an S will, within the next 10 years, end sugar cultivation and no longer need the 100mgd from its ditches.

Those of us who fear this SEIS will be nothing more than a justification document for the EM Plan have been given no reason to abandon those fears by this prep notice.

Sincerely,

Greg Westcott

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

May 31, 2002

Mr. Greg Westcott
Valley Farm
P. O. Box 485
Haiku, Maui, Hawaii 96708

Dear Mr. Westcott:

Subject: SEIS PREPARATION NOTICE FOR THE EAST MAUI WATER DEVELOPMENT PLAN

Thank you for your letter of June 6, 2001 and you comments regarding the subject preparation notice.

As you are aware, the purpose of the preparation notice is to enable interested reviewers to raise concerns and issues that need to be dealt with during preparation of the Draft Supplemental EIS. We will take your comments into consideration. The following is a response to your concerns.

The concern on the impact of groundwater pumping on stream flow is discussed in the SEIS, including questions on perennial and non-perennial streams. The groundwater pump testing in the project area provides confirmation that stream flow is not affected.

The 36-inch transmission main in the EMPLAN was designed to carry a maximum day flow of 16 mgd, or peak hour flow of 30 mgd with an average day demand of 10 mgd. Hydraulic analysis indicates that the 36-inch main is the right size for these flows to avoid high friction losses. A 20-inch main, as you suggested, would not be adequate.

With respect to the Waiahole decision, we wish to point out that neither the State Water Code nor any State law prohibits the transfer of groundwater from one area to another groundwater system. The EMPLAN is not intended to deprive people in East Maui of water. The objective of our water development policy is to make water available to implement the General and Community Plans for the highest benefit for the greatest number of people in Maui.

"By Water All Things Find Life"

The Kaupakalua Well was constructed to supplement water for the Makawao area and is not part of the EMPLAN.

Crystal balling the future of the Waikapu, Iao, Waiehu or HC & S future is not something to risk reliance upon and delay water supply projects for meeting the demands called for in the General and Community Plans. Furthermore, that is surface water that may be subject to transfer laws and decisions.

Thank you for sharing your thoughts with us. We will send you a copy of the Draft SEIS when it is completed.

If you have any questions, please call our Engineering Division at (808) 270-7816.

Sincerely,

David R. Craddick
Director

HK:sc

xc: Mink & Yuen

PHONE (808) 594-1888

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

FAX (808) 594-1865

May 18, 2001

George Yuen, President
Mink & Yuen, Inc.
1670 Kalakaua Avenue, Suite 605
Honolulu, HI 96826

Subject: Supplemental Environmental Impact Statement Preparation Notice for East Maui Water Development Plan

Dear Mr. Yuen:

Thank you for the opportunity to comment on the preparation notice for the above referenced project. The Office of Hawaiian Affairs offers the following comments on the subject preparation notice.

Applicability of HRS 174C-49(c)
Since the proposed action transfers water from East Maui to Central Maui, the SEIS should explore the applicability of HRS 174C-49(c) which regulates the transfer of water from one watershed to another. The law states:

> The common law of the State to the contrary notwithstanding, the commission shall allow the holder of a use permit to transport and use surface or ground water beyond overlying land or outside the watershed from which it is taken if the commission determines that such transport and use are consistent with the public interest and the general plans and land use policies of the State and counties.

Department of Hawaiian Homelands Priority on Water Rights
The SEIS should explore the extent to which this proposed use is subject to State and Federal law enacted to ensure that the Department of Hawaiian Homelands receive sufficient water to support current and foreseeable needs.

Archeological and Cultural Resources
The preparation notice indicates that full-time monitoring is recommended for areas that show potential for subsurface remains. The SEIS should include a map of areas with high sensitivity for subsurface deposits and a detailed monitoring plan with protocol for evaluation of cultural and archeological findings, notification, and site management. The plan should also include quality control measures and guidelines for work stoppage.

The preparation notice does not indicate that the project's impacts on cultural practices will be studied and assessed. A cultural impact statement is required by Act 50, Session Laws of 2000. OHA requests that the SEIS identify and address the effects on Hawai'i's culture and traditional and customary rights pursuant to Section 343-2, Hawai'i Revised Statutes, as amended.

Consultation
OHA recommends that the applicant consult with the following individuals and organizations who may provide information on the project's impacts and references to other individuals and organizations for consultation.

Thelma Shimaoka
Office of Hawaiian Affairs Maui Community Resource Coordinator

Na Moku Aupuni o Ko'olau

We look forward to reviewing the draft SEIS upon its completion. If you have any questions, please contact Sharla Manley, Assistant Policy Analyst at 594-1944, or email her at sharlam@oha.org.

Sincerely,

Clua C. for

Colin C. Kippen, Jr.
Deputy Administrator

CK: sam

cc: OHA Board of Trustees
Randall K. Ogata, Administrator
Maui CAC

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

June 3, 2002

Mr. Colin C. Kippen, Jr.
Deputy Administrator
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

Dear Mr. Kippen:

Subject: SEIS Preparation Notice for the East Maui Water Development Plan

Thank you for your letter of May 18, 2001 and your comments on the subject preparation notice. A cultural impact assessment will be conducted should a final decision be made to relocate the well field. Also, archaeological monitoring, if needed, will be conducted during construction phases. The procedure would include a site specific evaluation which will be performed for each site for cultural and archeological assessment with the site selected. Based on the professional's recommendations, the protocol set by them in conjunction with the State Historic Preservation Division of the Department of Land and Natural Resources will be adhered to.

We concur that neither the Water Code nor any State law prohibits the transfer of ground water between groundwater systems. The Maui Water Department does not intend to deprive an area of water by transporting water over area needs to other areas. It is our policy to allocate our water resources to all the people of Maui on a fair and equitable basis.

When the Draft SEIS is completed, we will send you a copy for review.

If you should have any questions, please call our Engineering Division at (808) 270-7835.

Sincerely,

David R. Craddick
Director

DRC:so
xc: Mink & Yuen

"By Water All Things Find Life"

Denise Gonthery
Sierra Club (Maui)

June 7, 2001
County of Maui
Department of Water Supply
200 High St.
Wailuku, HI 96793
Attn: David Craddick

RECEIVED
'01 JUN -7 PM 3:51
DEPT. OF WATER SUPPLY
COUNTY OF MAUI

Re: Comments on Preparation Notice for SEIS East Maui Water Development Plan

Sierra Club Maui represents 650 Maui residents, many of whom live and own property in the area proposed for the East Maui water development project wells. We would like to be a consulted party on this project. Thank you for this opportunity to comment.

Sierra Club Maui has followed this proposed project for a number of years. Here are some of our concerns:

LACK OF ACTION ON WATERSHED RESEARCH:
This SEIS is the result of court actions dating as far back as August of 1994. The court found the DWS' East Maui Water Plan EIS inadequate because it failed to address important environmental issues such as water contamination and the project's impact upon stream flows. Seven years have passed and the DWS still has no reliable information on actual sustainable yield or nature of the existing aquifer. It appears DWS has used the time to gather only cursory data on stream flows, contamination, stream life and other characteristics of streams in the affected Ha'iku area.

Past EIS's on this project suffered from the same lack of vital information. Citizens were obliged to intervene to halt use of contaminated water and demand that reliable stream flow studies would be done. Although the SEIS paints a picture of a "sparsely populated area" thousands of Ha'iku residents will be affected by this plan.

The SEIS preparation notice identifies additional studies that will be completed during the DSEIS phase of the project to fill this gap. No time frame is given for these studies. We continue to have concerns that the future DSEIS on EMPLAN will rely on hasty, limited studies in order to reach foregone conclusions that have been offered in the past. Namely, that the proposed project will have limited or acceptable impacts. With numerous South Maui developments already naming this water source as the future supply for their projects, it seems unlikely that any additional studies will be thorough, or even sincere, in seeking actual long term environmental impacts, especially if these studies have yet to be started.

LACK OF BENEFITS FOR WATERSHED USERS:

The SEIS preparation notice does not mention any benefits that will result for local Ha'iku residents except the general notion that the plan will be necessary to improve Maui's future economy (i.e. insure large developers water for their South and Central Maui lands.) The Pa'ia-Ha'iku Community Plan is very outspoken on the topic of the need for fair allotment of Ha'iku water resources. The Preparation notice discussion does not refer at all to this Community Plan or its objectives.

LACK OF INFORMATION ON PROPOSED "TEST WELLS"
It appears that this notice is in part an attempt to justify drilling for a "test well" or "pair of test wells" in Haiku. It is not made clear whether the test well will later become one of the proposed 8 new wells. If the "test well" proves contaminated, will it be used for "emergencies" like the Hamakuapoko well? Our representative attended a Water Board meeting where this matter was discussed. The Board rejected a suggestion to drill a standard size test well and instead chose to support a larger diameter well in a location that is difficult to access. The test well process seems part of a pattern of avoiding public scrutiny for projects funded by public expenditures.

DSEIS STUDIES SHOULD INCLUDE ORAL HISTORIES OF LOCAL RESIDENTS
Experts often come into an area for a brief time and then leave with their short term observations. This appears to be the case in the studies that evaluated the Hanawi-Makapipi stream area ten years ago during the Kuhiwa Well controversy. "Experts" in that case declared the well would tap a distinct aquifer unconnected to the water flows that supplied recharge to Makapipi stream. Residents, speaking from personal observation, claimed otherwise. Current USGS surveys have borne out the resident's views. They show the aquifer from Ke'anae to Makapipi stream to have a common source for deep ground water and stream flow recharge

Local Ha'iku residents have already noted impacts to spring fed streams in the vicinity of Dowling's Ha'iku well (5318-01) since it began pumping. Old timers also claim to know when HC&S's deep Maliko Gulch wells are used. They can watch their spring flows diminish to a trickle. All of these wells tap the same allegedly "distinct" Honomanu Geological zone with its supposedly separate water. The forthcoming DSEIS should invite residents to share their observations during the stream flow studies.

NEED FOR WATERSHED RESTORATION, NOT FURTHER EXPLOITATION:
Local residents feel that the entire nature of Ha'iku's hydrology has been degraded gradually over time by the massive stream diversions which withdraw millions of gallons of surface and ground water recharge from the streams. Ha'iku residents see the long term health of their watershed, stream life and shorelines as dependent upon restoration of stream flows and protection of ground waters from massive pumping projects such as the proposed EMPLAN.

This preparation notice dismisses the notion of any of Ha'iku's streams being "perennial" because its scope only chooses to recognize their more recent degraded condition. By adapting this attitude, the DWS is seen as insuring this as a permanent future condition.

Many Ha'iku streams were probably perennial over most of their length at one time. Stearns noted Ha'iku's Kuiaha stream as perennial in his 1939 evaluation. Other

Halku streams regarded historically as perennial are Manawai'o, Kakipi and Halehaku. <u>The SEIS notice for EMPLAN does not mention the topic of stream and watershed restoration for the subject area. It seems primarily concerned with exploiting, not sustaining the area's water resources.</u>

DISCUSSION AREAS ABSENT IN SEIS NOTICE:

No mention is made of any low impact alternatives to the East Maui well development plan. Residents regularly suggest the County should better manage its surface water through developing additional storage capacity to take advantage of heavy rainfall areas and seasons. Conservation is dismissed, even though South Maui residents consume an average of 1,500 gpd per household, while Hai'ku residents consume only one third that amount.

No reference is made to the DEIS discussing cost benefit analyses of developing, transporting and pumping ground water versus developing more localized supplies of treated surface water. It is hoped that actual projected costs of the entire project, including impacts of potential increases in electric rates will be discussed in the forthcoming DSEIS.

Figures are needed to explain why a 36" diameter pipeline is being proposed for a flow of 14 mgd.

What is the effect of recent Wai'ahole water decision on the EMPLAN? It is not specifically mentioned as a research topic.

Thanks for the opportunity to comment

Daniel Grantham

Daniel Grantham, Sierra Club Maui Group co-chair

Please address correspondence to:
PO Box 2000
Kahului, HI 96733
808-579-9802

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
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TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

June 3, 2002

Mr. Daniel Grantham
Sierra Club, Maui
P.O. Box 2000
Kahului, Maui, Hawaii 96733

Dear Mr. Grantham:

Subject: SEIS PREPARATION NOTICE FOR THE EAST MAUI WATER DEVELOPMENT PLAN

Thank you for your letter and comments regarding the subject preparation notice and acknowledge your request to become a consulted party. Your observations are broad and far reaching. However, we have considered them and will address them from the standpoint of relevance to the SEIS.

Research from the observation well drilled provides information on stream flow affects, as well as on the basal aquifer, transmissibility, hydraulic conductivity, well capacity, water quality, including chlorides which result are a result of the watershed, all of which are discussed in detail in the Draft EIS. The observation well will remain as an observation well at least until all other wells have been drilled. The ability to observe and test for high level perched water that can affect stream flows will remain for the life of the well whether it is eventually pumped or not.

The thousands of Haiku residents you refer to that will be affected will no longer be subject to the drought conditions when the EM Plan is implemented. This affect is expected to be beneficial to the area.

The impact of pumping on stream flows and the subject contamination are discussed in detail in the Draft SEIS. The sustainable yield of the aquifer from which water is proposed to be developed has been analyzed and determined by the State Commission on Water Resources Management in order to protect the integrity of the water sources. Based on current estimates, we are developing only one third of the sustainable yield. Our testing shows that pumping would have no measurable effect on stream flows. Lab test results indicated only one sample with an EDB level far below the EPA allowable. The Department continues to support and fund watershed protection and restoration, as indicated by its joint participation with USGS, Water Commission on Water Resource Management, University of Hawaii and others.

"By Water All Things Find Life"

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Mr. Daniel Grantham
Sierra Club, Maui
May 31, 2002
Page 2

To say that water in a ground water area should be reserved for use for that area alone is not a good policy. In general, water resources in the county should be used for the benefit of all the people in the county. Nevertheless, you raise a good point and such policy issues will be discussed in context of the Water Use and Development Plan process. The Water Board, County Council and State CWRM approved 1990 Water Use and Development Plan contains this project. To develop and urbanize the area on top of the aquifer would increase the risk of contamination. Therefore, we believe that the best policy is to implement the General and Community Plans and bring water to where growth has been designated to occur without damage to the watershed or aquifer. This policy matter decided by the General and community plans would be more advisable than to have growth occur in the watershed. Additional surface water storage facilities are currently under study by the Department.

Your concerns about the Hanawi streams and the effect on them by the Kuhiwa well are not part of this SEIS. Oral histories have not been included for areas not part of SEIS.

Impacts to spring fed streams near the "Dowling" well have been evaluated in the Draft SEIS. These observations you provide would not be unusual for unexpected from the long dry period experienced on Maui during the 1990s. These effects will be observed whether the EM Plan is implemented or not

Watershed protection is an ongoing concern of the Department. The Board and County are currently spending four hundred thousand dollars per year toward this concern. The EM Plan does not further exploit the watershed but depends on the protection provided to the watershed for the water source.

The preparation notice does not dismiss perennial streams. We acknowledge that perennial streams exist and with the observation well results find no impact on them. Streams that are diverted may affect the EM Plan, the Draft SEIS has information that shows the EM Plan will not affect the streams.

The 36-inch transmission main in the EM Plan was designed to carry maximum day and peak hour flows from the pumps, not the average flows. Our analysis shows that the transmission pipeline is not overdesigned.

Concern has been expressed regarding the transfer of groundwater from one area to another groundwater system. Neither the State Water Code nor any State law prohibits such transfers. The Waiahole water decision deals with surface water had the ground water that affects surface water.

Mr. Daniel Grantham
Sierra Club, Maui
June 3, 2002
Page 3

Your comments are meritorious and appreciated. When the draft SEIS is complete, a copy will be sent to you. If you should have any questions, please call our Engineering Division at (808) 270-7835.

Sincerely,

David R. Craddick
Director

HK:sc
xc: Mink & Yuen

Tropical Orchid Farm, Inc.

Huelo, Maui

To:
Mink and Yuen
1670 Kalakaua Ave., Suite 605
Honolulu, HI, 96826

6-5-01

From:
Jeffrey Parker
President, Tropical Orchid Farm. Inc.
P.O. Box 170
Haiku, HI, 96708
Tel: 808 572-8569
Fax: 808 572-8917

Re: Comments on the Preparation Notice for SEIS for the East Maui Water Development Plan

Dear Sirs,

These will be my comments on the Preparation Notice. I am representing both myself and my company. This letter also serves as a formal request for my company to be put on the list of 'Consulting Parties'.

First, I wish to politely object to what I see as barriers to public participation in this process. There was no announcement in the local papers soliciting comments from the public, or advising of the cut-off date (of 6-7-01). While it was announced in OEQC Bulletin (as required by law), not many members of the public receive that publication. While there is a copy of the Prep Notice available at Kahului Library, there are no libraries in the subject project area for concerned residents to go to. Also, I was surprised that the document was not posted on the DWS website, even though the website was updated June 1, 2001 (a date long after publication in the OEQC Bulletin). Finally, DWS was only willing to give out copies for a cost of 50 cents per page. Since we, the ratepayers and taxpayers, pay for the operations of DWS, copies could be provided for free to any citizen interested in participating.

At the meeting of the Maui County BWS, held in Pukalani last year (where the board retained Mr. Mink to prepare the SEIS), myself and others suggested to the Board that it would be preferable to solicit a diversity of opinions from several hydrologists rather than relying on the opinion of just a single hydrologist. Hydrology is a "science" based on opinion to a large degree. I also suggested names of other hydrologists who might have been willing to contribute. We were ignored by the BWS. It is fair to point out that Mr. Mink, while possessing many qualifications, is the same hydrologist that originally placed the sustainable yield of the Iao Aquifer at far too high a figure. This over-enthusiastic projection has caused many problems, the Iao Aquifer has come close to being permanently damaged by over-pumping. Did not Mr. Mink place the yield of Iao Aquifer at around 36MGD, when in fact it barely sustains pumping at 18MGD?

<u>No Mention of Waiahole Decision</u>

In reviewing the current SEIS Notice, I was surprised that there is absolutely no mention of the recent landmark Supreme Court Waiahole Decision (decided August 22, 2000). This decision has major implications for those wishing to extract more water from Hawaii's environment. Any SEIS that fails to deal with Waiahole implications will be inadequate and invalid.

From the Waiahole Decision:

"Affirming that under the public trust, the state has both the authority and duty to preserve the rights of present and future generations in the waters of the state."

Importantly, the Court noted that the people of this state have elevated the public trust doctrine to the level of a constitutional mandate. Article XI, section 1 of the Hawaii Constitution mandates that "for the benefit of present and future generations, the State and its political subdivisions shall protect and conserve...all natural resources, including...water...and shall promote the development and utilization of these resources...in a manner consistent with their conservation" and further declares that "all public natural resources are held in trust for the benefit of the people."

Further, the Court rejected any distinction between surface and groundwater for purposes of the public trust:

"In sum, given the vital importance of all waters to the public welfare, we decline to carve out a ground water exception to the water resources trust. Based on the plain language of our constitution and a reasoned modern view of the sovereign reservation, we confirm that the public trust doctrine applies to all water resources, unlimited by any surface-ground distinction."

Further, the Court wrote "Modern Science and technology have discredited the surface-ground distinction." "Few cases highlight more plainly its diminished meaning and utility than the present one [Waiahole], involving surface streams depleted by ground water diversions and underground aquifers recharged by surface water applications. In determining the scope of the sovereign reservation, therefore, we see little sense in adhering to artificial distinctions neither recognized by the ancient system nor borne out in the present practical realities of this state."

<u>Perennial versus Not Perennial Streams</u>

The Preparation Notice for the SEIS mentions that all of the streams in the project area are "not perennial" streams. Let's look at my own situation: my farm gets 100% of its water from a stream (not in the project area). East Maui Irrigation diverts 100% of this stream above my property, and then again diverts 100% at my property's lower makai boundary. Yet, we have enough water because springs replenish the stream in-between the ditches. I have lived and farmed on this stream since 1971, a period of 30 years, and where it crosses my property, it has never stopped flowing once! Yet, it is classified as "not perennial". My contention is that it may be misleading to say that all the streams in the project are "not perennial" knowing full well that they may have been, and probably were, perennial before EMI and A & B diverted the water.

<u>Stream Flow Studies</u>

I am concerned that pumping of these deep production wells could affect flows of seeps and springs like the ones that replenish our stream and provide sustenance for my farm. Other hydrologists like William Meyer have also suggested that it is possible to diminish stream flows by pumping groundwater.

In the Prep Notice Section XXIV, Anticipated Research and Studies To Be Conducted, number 1- 3 says "Relevant studies and research initiatives that will be undertaken include...effects, if any, of groundwater pumpage on stream flow." Since the EM Plan first surfaced in 1992, I and others have been asking for stream monitoring and baseline studies for the purpose of knowing what the stream flows *are* prior to pumping groundwater. It is important that baseline studies be done over several years in order to account for drought years, to know the true stream flows. We were ignored then, and we are still being ignored. Why, with 9 years between then and now, has the DWS along with its engineers and consultants, done nothing? They could have had detailed, accurate data for each stream by now. While the Prep notice weakly mentions stream monitoring and baseline studies as being in the scope of the SEIS, I worry that any studies at this late date may be too small and especially, for too short a time period.

Possible "segmenting"

A big problem for me is the transmission pipeline. The project for which this SEIS is being prepared calls for the development of 10 wells yielding about 10 MGD. However, the 36" transmission line proposed for the project is capable of carrying much greater amounts of water. Clearly, this 36" transmission line is intended to eventually serve a far greater water development project than just the 10 wells described in the SEIS. This may amount to "segmenting". Under HEPA (Hawaii Environmental Protection Act), a project must be analyzed in its entirety.

Why is there no mention of the ultimate capacity of the 36" line in the Prep Notice?

Wellhead Protection Area may limit land use.

Property owners in Haiku and upcountry need to be worried about how this proposed project might limit land use for miles around the wells. Look at the recent lawsuit by the County of Maui against Shell Oil and others involving pollution of ground water by agricultural chemicals. It was established that the "transmissivity zone" of the ag chemicals extended 6 miles mauka of the well! This means that if you own property anywhere between the new well zone and say, Makawao, you may no longer be able to do commercial agriculture or other uses involving any kind of chemicals. Similarly, even putting-in a septic system on your property might conceivably be prohibited by the so-called "Wellhead Protection Area". Although human waste is generally not considered a threat to deep wells, it is a fact that many harmful chemicals are flushed down toilets or otherwise end up in septic systems. The State of Massachusetts already severely limits development and septic systems in Wellhead Protection Areas.

Why does the Prep Notice not mention the Wellhead Protection Area and its potential for limiting land use?

Growth Inducement

If the SEIS fails to analyze a projects' impact on "growth" it will be inadequate and invalid. The cost of the proposed project is so great that in order to pay off the bill, the DWS will be obligated to sell countless new water meters. This, by itself, will "induce growth".

(And yet, at the same time, this project will do nothing to help the hundreds of legitimate upcountry residents who have been waiting for their water meters, some for 25 years! Nor does this project do anything to help upcountry farmers who are desperate for water).

I didn't see anything in the preparation notice dealing with the project's growth-inducement potential.

Conservation Alternative

In the section B. Other Alternatives, #4 Water Conservation says "a public water conservation program is commendable but it would be viewed as a supplementary measure rather than one to obviate the need for large-scale source development." This reminds me of the Bush/Cheney Energy Plan, which environmentalists have called "The Energy Plan from Hell, designed to heat up the

planet". Cheney used almost the same exact wording to discredit the idea of conservation of energy, in favor of more fossil fuel development.

In fact, what hydrologists Brad Finney and Robert Willis of Hydro Resources International said in the original Draft EIS in 1992 still holds true: "Recent court rulings have upheld the concept of demand reduction as a valid alternative to increasing supply even when the community did not wish to consider such an alternative. Given the rate of growth in water demand in Maui, and the problems that the county has had with wastewater treatment, water conservation using mandatory retrofit of toilets and shower heads is a winner from all angles. The cost of implementing these conservation programs has been shown in other communities to be less than developing new supplies. Water quality benefits result since the demands on overloaded wastewater facilities are reduced..."

If the SEIS fails to study conservation as a real alternative to source development, it will be inadequate.

Finally, I noticed that the Notice does do some editorializing about how great this project will be for the economy of Maui. The problem is that increasingly, other costs associated with uncontrolled "growth" outweigh the supposed benefits.

Costs of more uncontrolled growth are:

increased strain on our existing public infrastructure, roads, schools etc.
increased need for police, fire, and hospital services
more crime
higher taxes
diminished Maui experience for tourists and visitors
loss of beaches and vistas
local families continue to be priced out of housing market
damaged or destroyed native ecosystems
etc.

Once again, I wish that the SEIS would take a much harder look at the growth-inducement impacts of this proposed project.

Respectfully,

Jeffrey Parker

Jeffrey Parker

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793 8109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

May 31, 2002

Mr. Jeff Parker
Tropical Orchid Farm, Inc.
P. O. Box 170
Haiku, Hawaii 96708

Dear Mr. Parker:

Subject: SEIS PREPARATION NOTICE FOR THE EAST MAUI WATER DEVELOPMENT PLAN

Thank you for your letter of June 5, 2001 and your comments regarding the subject preparation notice.

Your letter brought up a number of interesting and thoughtful points which we will consider during the preparation of the Draft SEIS.

With respect to the implications of the Waiahole decision regarding EMWDP, we have no intention of transporting ground water from one area to the detriment of that area. The Waiahole decision covers ground water that supply's surface water systems. Neither the Water Code nor State law prohibits the transfer of ground water, not affecting surface water, from one area to another area.

Concern over the possible effect of groundwater pumpage on stream flows is addressed in the SEIS. Our finding is that pumpage would have no effect on stream flows.

The Maui Department of Water Supply has been conducting a water conservation program during he past several years in concurrence with its water development program. The department is cognizant of the need for conservation to minimize demand on natural resources.

"By Water All Things Find Life"

Printed on recycled paper

Efforts to conserve to date include:

-ordinance requiring low flow fixtures in all new development (since 1992); also now federal law;
-distribution of low flow fixtures;
-conservation education;
-leak detection, meter replacement and other internal efforts to minimize unaccounted for water;
-tiered rate to encourage conservation;

At this time we estimate that we save approximately ½ mgd in Central Maui based on conservation measures to date. We recognize that there is room for further improvement.

Accommodating the water demands of the community would enhance the quality of life of the community and the growth issues should have been considered in the development of the Community and General Plans process.

I would like to allude to a statement you made regarding John Mink's opinion on the capacity of the Iao Aquifer. I understand he had written you to clarify his position on the matte, which I hope will allay any misunderstanding you and others may have. Mr. Mink is known for his professional ethics and I am convinced all issues will be analyzed fairly.

Sincerely,

David R. Craddick
Director

HK:sc
xc: Mink & Yuen

0601022

(10)

ISAAC DAVIS HALL
ATTORNEY AT LAW
2087 WELLS STREET
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FAX (808) 244-6775

RECEIVED
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DEPT. OF WATER SUPPLY
COUNTY OF MAUI

June 7, 2001

Via Hand Delivery

Mr. David Craddick, Director
Department of Water Supply and
the Board of Water Supply
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Re: Comments on Supplemental Environmental Impact Preparation Notice ("SEISPN") and Request to be a Consulting Party

Dear David Craddick and the Board of Water Supply,

This letter is written on behalf of The Coalition to Protect East Maui Water and Hui Alanui o Makena, two of the Plaintiffs in The Coalition to Protect East Maui Water Resources et. al. v. The Board of Water Supply et. al. Civ. No. 93-0734(3) now pending in the Second Circuit Courts. The East Maui Water Development Plan ("EM Plan") is not being treated with the seriousness that its size and scope dictate.

The EM Plan is as large as the Central Maui Source Development Plan and Central Maui Transmission Project which led to the development of Maalaea, Kihei, Wailea and Makena, with a similarly sized 36 inch transmission line. The EM Plan would also constitute the second de-watering of East Maui. The first de-watering occurred when A&B/EMI/HC&S constructed its ditch system and diverted the streams and surface water resources, transferring them to Central Maui. The second de-watering would occur through the pumping of the groundwater resources, indirectly affecting streams and transferring these water resources again to Central Maui and beyond.

I. THE INTENDED PURPOSE OF THE SEISPN

It is already admitted that the EM Plan may cause significant adverse impacts to the environment. The purpose of publishing a Preparation Notice is to provide agencies, citizens groups and concerned individuals an opportunity to submit written comments regarding the environmental effects of the proposed action and to establish the scope of the SEIS. See H.A.R. §11-200-15. It is the duty of the preparer to

> ... endeavor to develop a fully acceptable EIS prior to the time the EIS is filed with the office, through a full and complete consultation process, and shall not rely solely upon the review process to expose environmental concerns.

Pursuant to these Rules we request that a "public scoping meeting" be scheduled on this SEIS. This would provide and assure an "early open forum for discussion of adverse effects and available alternatives, and that the decision-makers will be enlightened to any environmental consequences of the proposed action." See H.A.R. §11-200-14.

II. THE LEGAL REQUIREMENT TO PREPARE A SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

A. The EIS for The EM Plan Was Inadequate

The Draft EIS and the Final EIS prepared for the EM Plan were both legally and factually inadequate. No real effort was made to take a "hard look" at the environmental consequences of the EM Plan. Numerous issues were illegally "swept under the rug."

B. Plaintiffs' Comments and Objections

Plaintiffs, on a number of occasions, submitted comments on the Draft EIS and on the Final EIS for the EM Plan and outlined its inadequacy. Plaintiffs have reviewed the "Preparation Notice for the Supplemental Environmental Impact Statement for the East Maui Water Development Plan" prepared by Mink and Yuen dated April, 2001 and find that it is as inadequate as the Draft and Final EIS. As such, many of Plaintiffs' original comments and objections are still equally valid and viable. These will be briefly restated and discussed below.

1. Definition of the Action Area

The Action Area is never adequately described. To do so it would be necessary to determine the amount of water which the 36 inch transmission has the capacity to carry. Once this number is calculated, it is then necessary to determine the number of wells that it would take to supply this capacity and it would be further necessary to string this total number of wells in a horizontal line in an eastward direction beginning at Maliko Gulch, leaving an adequate distance between the wells so that over-pumping would not occur. This, then, would define the true Action Area for the EM Plan. This true Action Area would be a great deal larger than the well field that has been discussed to date and would likely require environmental disclosures for an area which could extend as far as and perhaps beyond Kakipi Gulch and well into the Huelo region.

2. The Streams in the Action Area

There has been no description of the streams in the Action Area. No map has ever been included showing these streams. No section within the text of an EIS has ever been devoted to listing the names of all of these streams. The lengths of these streams have never been described. The width of these streams have never been described. The amount of water flowing in these streams (prior to diversions) has never been described.

It is extremely unfortunate that Mink and Yuen have elected to conclude in this preliminary document that there are no perennial streams in the Action Area. Residents of the Haiku area know full well that there are many perennial streams in the Haiku area. Anyone who has spent any amount of time in this area has seen streams that run for sufficiently long periods of time to meet the definition of a perennial stream. And yet Mink and Yuen on pages 9, 11 and 17 wrongly conclude that there are no perennial streams in the Haiku area. This fundamental error bodes poorly for this EIS process as a whole.

3. Groundwater Resources in the Action Area

There has been no thoroughgoing assembly of information on the groundwater resources which exist in the Action Area. This information must be collected in the SEIS.

4. A Catalogue of Riparian and Appurtenant Rights in the Action Area

There are numerous individuals in the Action Area who possess riparian water rights. There are also individuals within the Action Area who possess appurtenant water rights. Many of these possessors of riparian and appurtenant rights have registered these with the Commission on Water Resources Management. These rights were totally ignored in the Draft and Final EIS for the EM Plan. They are totally ignored in the SEISPN. For reasons which will be elucidated later in this document, it is not at all clear that groundwater pumping will not have an impact on stream flow or will not have an impact on those with riparian or appurtenant water rights. This project may therefore have an adverse impact on all of those with riparian and appurtenant water rights within the Action Area. These persons' rights must be catalogued and they must be notified of this project and be provided with an opportunity to object prior to its implementation.

5. Instream Values in the Action Area

For reasons to be discussed below, it has not been established that groundwater pumping will not have an impact on stream flow. The groundwater pumping which is proposed to take place through this project may therefore de-water streams in the Action Area and further degrade

instream values. Because the interim stream flow standards have been set at whatever flows now exist in these streams, any diminishment in the stream flows occasioned by the groundwater pumping through this project will be illegal. As importantly, area residents have been promised by the Board of Water Supply a program of stream restoration rather than further stream degradation. The stream restoration program must be fully funded and implemented before the EM Plan becomes operational.

6. Existing Farm, Domestic and Other Uses in the Action Area

There has been no effort made to determine the extent to which stream flow is being used for farming, domestic and other uses in the Action Area. Again, it is by no means clear that groundwater pumping will not have an impact on stream flow and will not further impact the use of these streams for farming, domestic and other uses. It is therefore imperative that these other uses of streams be documented in the EIS.

7. Existing Diversions in the Action Area

There must be a detailed description of the extent of the A&B/EMI/HC&S diversions of the streams in the Action Area. In other words, the SEIS must disclose on a stream by stream basis the amount of water that would flow in each stream without the diversions and the amount of water that is diverted in each stream at each diversion point. The discussion of the diversions in the SEISPN on page 9 is way too general to be of use in an environmental disclosure document. Streams in the Action Area are diverted between four and six locations. Mink and Yuen may have arrived at their conclusion that the streams are not perennial by only considering their conditions post-diversion.

The SEIS should disclose all of the end users of the diverted water and the amounts that each uses.

8. Existing Groundwater Pumping in the Action Area

The SEIS must include a detailed disclosure of all of the groundwater pumping now taking place within the Action Area. The discussion on pages 12-13 of the SEISPN is way too general to be meaningful in an environmental disclosure document.

9. Amount of Groundwater to be Transferred Out of the Basin of Origin

The SEIS must include a detailed discussion of the amount of groundwater to be transferred out of the basin of origin or out of the aquifer of origin. This discussion should also include a disclosure of the amount of groundwater that will remain within the basin or aquifer of origin.

10. Effect of Pumping Groundwater on Stream Flow

One of the central issues to be addressed in the SEIS is the effect of pumping groundwater on stream flow. It is extremely unfortunate that Mink and Yuen have already concluded in this preliminary document that groundwater pumping will not have an impact on stream flow on pages 9, 11 and 17. This is extremely unfortunate because the USGS has not reached this conclusion and because the specific test which has been devised to determine whether or not groundwater pumping does have an effect on stream flow has not yet even taken place. The SEISPN makes a matter of record the unscientific bias of Mink and Yuen which subverts this whole SEIS process.

11. Extent of Groundwater Contamination and Cost to Mitigate

The extent of groundwater contamination in the Action Area and the cost to mitigate is another central issue to be resolved in the SEIS. After denying that the groundwater was contaminated in the Draft EIS and the Final EIS, the Board of Water Supply turned around and subsequently filed its own lawsuit against the manufacturer of DBCP for causing the contamination of our groundwaters in Napili and East Maui. A settlement was reached which will be discussed below.

12. Effect on Extensive Cesspools Existing in the Action Area

The Groundwater Water Protection Program of the Department of Health, State of Hawaii, adopted the "Hawaii Wellhead Protection Program Plan" in May, 1995. This Plan includes certain policies with respect to siting new public water supply wells. They are to be sited away from sources of contaminated waters. This issue must be fully addressed in the SEIS.

In addition, H.A.R. §11-62-32 prohibits cesspools from being located within 1,000 feet of a public drinking water well. It is common knowledge that there are numerous cesspools within 1,000 feet of the proposed location of the EM Plan wells. The SEIS should investigate and disclose the number of cesspools located within 1,000 feet of the public drinking water wells. The SEIS should investigate, as alternative, locations for the public drinking water wells that are not within 1,000 feet of any cesspools.

13. Cumulative Impact on Ocean Resources of Transfer of Surface and Groundwater Out of Region

The surface water diversions already prevent a significant amount of fresh water from being discharged into the ocean. Groundwater pumping will now prevent an additional amount of fresh water from being discharged into the ocean. This fresh water has contributed to the near shore marine environment. The deprivation of this fresh water will cause adverse impacts to the marine environment. These adverse impacts must be carefully studied in the SEIS. They are unfortunately minimized on a premature basis by Mink and Yuen on pages 11-12 of the SEISPN.

14. Violations of the Water Code

The Hawaii Water Code, HRS Chapter 174C, requires the protection of stream values, riparian and appurtenant water rights. In addition, the Water Code prohibits out of watershed transfers in non-designated areas.

15. Lack of Legal Authority to Transport Groundwater Out of Haiku Region

The SEISPN deals only with the physical equipment effectuating the transmission of groundwater out of the Haiku region and fails to address the lack of legal authority to transport groundwater within this transmission system, as described in the paragraph above.

16. No Water Development Plan

Maui County has not yet lawfully adopted its Water Development Plan. The enactment of this Plan is a necessary precondition to the implementation of the EM Plan. The General Plan and the Community Plan cannot dictate the manner in which water is to be supplied when the Legislature has provided that the Water Development Plans are to perform this role. Without the Maui County Water Development Plan there is no basis for transporting the majority of the developed East Maui groundwater resources in Central Maui, Maalaea, Kihei Wailea and Makena. What resources are being reserved for the Haiku region? What resources are being transmitted to the Central Maui Joint Venturers to compensate for deficits perceived to be owed to them? Why are there now to be connections to the 36 inch transmission line at Paia, Haleakala Highway and Puunene, as indicated on page 16 of the SEISPN, when there were to be none before? All of these matters of water "policy" should be fully explored in the SEIS. In the end, however, these policy issues must be dictated by the enacted Maui County Water Development Plan.

17. Social and Economic Impacts

Only short term economic impacts are addressed in the SEISPN on page 14. Long term socioeconomic impacts must be fully addressed in detail in the SEIS.

18. All of These Comments Are Incorporated By Reference

The comments above, the numerous comments submitted by Plaintiffs to the Draft EIS and the Final EIS and the comments of other interested agencies, groups and individuals are hereby adopted and incorporated by reference in this document.

C. The 1994 Court Order

Hon. Doyd P. Mossman declared that the Final EIS for the EM Plan was inadequate and ordered the Board of Water Supply to prepare an SEIS on August 23, 1994. See the Order which is attached to this letter as Exhibit "1". The Court later confirmed that the SEIS was required to address "all phases of the Plan as a whole." See Exhibit "2". The Plaintiffs have done nothing to delay the BWS from preparing the SEIS between 1994 and the present, a period of seven years.

D. The DBCP Litigation

The Board of Water Supply thereafter elected to bring suit against the manufacturer of DBCP for contaminating groundwaters in Napili and East Maui. A settlement was reached requiring monetary compensation and a possible relocation "mauka" of the proposed East Maui well field. If the EM Plan well field is relocated mauka, this will have an impact on the testing program agreed to between the Plaintiffs and BWS, because this may require the monitoring wells agreed to by the parties to be relocated mauka as well. The SEIS must include a full description and disclosure of the DBCP lawsuit, the extent of the contamination that was discovered during the course of the lawsuit, the mitigation measures that were agreed to, the cost of the mitigation measures, the possible relocation of the well field and all other matters pertinent to the EM Plan.

E. The Order Entered on The Scope Of Testing to be Performed in the SEIS

Further hearings were held in the above-captioned lawsuit with respect to the type and extent of testing which would be done within the SEIS to determine whether groundwater pumping would have an impact on stream flow. Eventually the Order was entered which is attached as Exhibit "3".

Through this "Order" a "monitoring well" is to be drilled as part of the SEIS which is not a production size well and which does not have production size pumps, and through which drilling takes place under the supervision of the USGS to determine whether or not the rock encountered during drilling is saturated or not. If the BWS is unsatisfied with the results of this testing it may drill a production size well and install production size pumps and conduct a different kind of test under different conditions.

On information and belief, the BWS is already in violation of this Order because it has decided to install a production size well when the first well is not to be a production size well.

F. The Passage of Time

The passage of time between the Final EIS and the SEISPN requires that issues not addressed in the 1994 Court Order be addressed now.

G. Objections to the Hiring of Mink and Yuen to Prepare the SEIS

Plaintiffs, and others, objected to the hiring of Mink and Yuen to prepare the SEIS because they had well-established positions before they began their work and were incapable of preparing a non-biased SEIS. The SEISPN bears this out.

H. The Legal Requirements for the SEIS

An SEIS must meet the same requirements as an EIS. See H.A.R. §11-200-28. Plaintiffs do not waive any of these requirements by not mentioning them above.

I. Alternatives Which Must Be Studied

An EIS must study all alternatives which could achieve the objectives of the project. See H.A.R. §11-200-17(i). These are not fully addressed on pages 18-22 of the SEISPN. Relocating wells away from cesspools and relocating the well field mauka away from contaminated water sources are both alternatives that must be fully addressed. Locating wells away from streams whose flows could be affected is another alternative which must be studied.

III. THE SEISPN IS AN ADVOCACY DOCUMENT

H.A.R. §11-200-14 states, in pertinent part:

> An EIS is meaningless without the conscientious application of the EIS process as a whole, and shall not be merely a self-serving recitation of benefits and a rationalization of the proposed action.

So far the work of Mink and Yuen is self-serving and a rationalization for the proposed action. The BWS must exercise control over Mink and Yuen and this SEIS at this early juncture to assure that it is an adequate document and that critical issues are not "swept under the rug." Maui's citizens deserve more.

IV. REQUEST TO BE CONSULTING PARTIES

Plaintiffs hereby request to be consulting parties in the preparation of this SEIS, pursuant to H.A.R. §11-200-15. We trust that the BWS and Mink and Yuen will actually consult with us to the end that this SEIS is an adequate disclosure document.

V. THE IMPACT OF THE WAIAHOLE DECISION ON THIS PROJECT AND UPON THIS SEIS

The Waiahole Decision, In the Matter of the Water Use Permit Application, 94 Haw. 97, 1 P. 3d 409 (2000), establishes the constitutional and statutory obligations of those boards and commissions who manage water resources, including the Board of Water Supply. The Board has trust responsibilities in managing East Maui water. It has the obligation to protect instream values, riparian and appurtenant water rights. It has no authority to authorize an out of basin transfer of groundwater resources.

VI. THE USGS RECOMMENDATIONS

A. The Limits of the East Maui Study

The USGS has published a study entitled "Ground-Water Occurrence and Contribution to Stream Flow, Northeast Maui, Hawaii" (1999). An over-generalized conclusion has been circulated that groundwater pumping has an impact on stream flow east of the Ko'olau Gap but not west of the Ko'olau Gap. This is speculated but not stated definitively and is subject to numerous qualifications and suggested needs for further data collections and studies.

B. The Recommendations Contained Within the Haiku Study

The USGS also published "Ground Water and Surface Water in the Haiku Area, East Maui, Hawaii" (1999) in cooperation with the County of Maui Department of Water Supply and State of Hawaii Commission on Water Resource Management. This document deals with the Haiku area which is the subject of the EM Plan. It includes the following as "DATA NEEDS":

> **Additional data are needed to improve and confirm the understanding of the ground-water flow system in the study area.** A few specific data needs are briefly described below.
>
> **1. Data from exploratory wells could confirm the existence of an unsaturated layer between the upper and lower water tables.** The wells would be open only to a small part of the aquifer (a few tens of feet) above the freshwater lens but still in the Honomanu Basalt. Unsaturated conditions would be confirmed if the well remains dry or negative pressures can be measured in the well.
>
> **2. Continuous monitoring of selected springs and streamflow in the area is needed to measure baseline ground-water discharge before the start of proposed additional ground-water withdrawal.** Comparisons can then be made to determine if the additional withdrawal is affecting ground-water discharge at the high-level streams or springs.

> **3. An aquifer test in the Honomanu Basalt with multiple observation wells arranged both parallel and perpendicular to the preferred volcanic-dike orientation is needed to determine if the dike complex does indeed have higher conductivity in the north-south direction compared to the east-west direction. In addition, an observation well open only to the upper water body could be used to monitor any hydrologic effects felt there.**
>
> **4. Geologic logging of all additional wells drilled in the area could provide more information on the relation of the upper water body to the stratigraphy. Water levels in the wells need to be monitored daily during drilling to determine the vertical-flow gradient in the ground-water system.**

These types of data should be collected during this SEIS and the results reported in this SEIS.

VII. THE NECESSITY FOR MONITORING WELLS INCORPORATED INTO THE PROJECT

Monitoring wells should be made components of the EM Plan as mitigation measures. There should be monitoring wells, at appropriate locations, performing the following three distinct functions: (a) to determine whether or not groundwater pumping has an impact on stream flow by testing the saturation of the rock as drilling takes place, (b) to monitor salinity levels within the aquifer as a whole on a long term basis and (c) to monitor the performance of the aquifer generally. The incorporation of these monitoring wells were recommended long ago by the Commission on Water Resources Management and are also recommended in the State Water Plan. They have also been incorporated into most other large well field projects. The USGS should supervise all of these monitoring wells and this supervision should not be by Mink and Yuen or the Board or Department of Water Supply.

VIII. THE NECESSITY FOR ASSEMBLING DATA AND CONDUCTING STUDIES AND TESTS AS PART OF THE SEIS PROCESS

The EIS process involves at a minimum obtaining various relevant data and conducting necessary studies. See H.A.R. §11-200-14. It is essential in comparing an adequate EIS that Mink and Yuen assemble the necessary data described above and conduct the studies suggested above as well.

The BWS and Mink and Yuen are forcefully reminded of their binding trust obligations to analyze and address in the SEIS "the full range of responsible opinion" and "responsible opposing views on significant environmental issues" raised by the EM Plan. See H.A.R. §11-200-16. These views and issues should not be "swept under the rug" again, especially in an SEIS paid for with a substantial amount of taxpayers' funds.

Thank you for the opportunity to comment on this SEISPN.

Very truly yours,

Isaac Hall
Attorney for Plaintiffs

IH/jp
cc: Plaintiffs
Mr. George Yuen, Mink and Yuen, Inc., 1670 Kalakaua Ave., Suite 605, Honolulu HI 96826
Office of Environmental Quality Control, 235 S. Beretania St., Honolulu HI 96813

emc/letcrad8

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
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June 5, 2002

Mr. Isaac Hall
Attorney at Law
2087 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Hall

Subject: SEIS Preparation Notice for the East Maui Water Development Plan

This is in response to your letter of June 7, 2001 commenting on the Supplemental EIS Preparation Notice for the East Maui Water Development Plan. We will attempt to comment on all the salient points mentioned in your letter as follows:

II. Legal Requirement to Prepare an SEIS.

1. Action area:

The project area affects from Ulumalu to the Central Maui area in Kahului. The 'action area' for the wells are between the Maliko Gulch area to the Ulumalu area in the Haiku Aquifer System. We also will consider hydraulic and environmental effects in adjacent areas. The number of wells will be determined as the sites are drilled and become developed. Current numbers are based on the evaluations being developed. Current numbers are based on the evaluations being developed by the hydro geologist. The 36-inch transmission pipeline is designed to carry peak hour plus fire flows which are over three times the average day flow of 10 mgd being developed by the EM Plan. The line would only be able to carry a higher capacity with booster pumps pushing water through the line. This mode of operation would increase the Department's cost of service and the EM Plan is designed to not need any booster station.

2. Streams in the Action Area

The U.S. Geological Survey has concluded that there are no continuously perennial streams in the area, and Mink and Yuen, Inc.'s work, as well as the observations of other hydrologists have validated these conclusions. Accepted definitions of stream flow are as follows (from Handbook of Hydrology, 1992, D.R. Maidment, Editor, McGraw Hill, Inc.) Perennial...flow in a channel which never dries up. Intermittent...flow in a channel which at

drier times of the year may have some reaches with flowing water interspersed with other reaches in which water flows below the surface. Ephemeral...flow in a channel which occurs only after rainfall.

At best the streams in the Haiku Aquifer System are perennial over short reaches, intermittent over longer reaches, and ephemeral in the channel lengths not supplied by seepage from the Kula formation. Not any of the streams are sustained by the basal groundwater of the Honomanu formation, which is the aquifer that will supply the wells of the EMPLAN.

3. Groundwater Resources in the Action Area

All groundwater data on record has been collected and utilized for the SEIS. New data has been generated and understanding of groundwater behavior expanded.

4. Riparian and Appurtenant Rights

Riparian and Appurtenant Rights are not relevant to development of basal groundwater which is the resource to be developed in the EMPLAN.

5. Instream Values in the Action Area.

Groundwater to be developed by the EM Plan is not connected to stream flow. The issue of stream restoration is a subsidiary matter which the Department continues to support and fund watershed protection and restoration, as indicated by its joint participation with USGS, Water Commission of Water Resources Management, University of Hawaii and others.

6. Existing Farm, Domestic and Other Uses in the Action Area.

Pumping groundwater from the Honomanu basalt will have no effect on existing stream flow and therefore no effect on those who utilize stream flow.

7. Existing Diversions in the Action Area.

Diversions from streams in the Action Area are noted on the maps of stream flow included in the SEIS. However, because pumping from the Honomanu basalt will not affect stream flows, no additional reduction in stream flow will ensue.

8. Existing Groundwater Pumping in the Action Area.

Current pumpage from the Honomanu aquifer in the Action Area takes place at the Kulamalu well, which over the last year averaged 0.675 mgd. The upper Haiku well, just to the west of the Action Area, averaged 0.153 mgd. The Haiku School well is infrequently pumped by Maui Pine; its average is less than approximately 0.20 mgd. Several private wells, if they are pumped at all, average a total of approximately 0.3 mgd, and HC&S Pump 11, on the boundary of the Action Area, pumps an average of 2 mgd. The total, including Pump 11 and upper Haiku, is between 3.0 and 3.5 mgd.

9. Amount of Groundwater to be Transferred.

The average export of groundwater from the Action Area will be 9 to 10 mgd. The sustainable yield is calculated as at least 15 mgd by a conservative estimate and greater by estimates based on the U.S. geological Survey groundwater flux of 19.4 mgd per mile of coastline.

10. Effect of Pumping Groundwater on Stream Flow.

Mink & Yuen based on evaluations of the observation well and other wells in the study area, has concluded that pumping from the Honomanu formation in the study area will not affect stream flow.

11. Extent of Groundwater Contamination

Based on data from the Haiku monitor well and the Kaupakulua well the Honomanu formation in the Action Area does not exceed MCLs (maximum contamination levels) for DBCP, EDB and TCP.

12. Effect of Extensive Cesspools Existing in the Action Area.

The few analysis of N (nitrogen), a primary indicator of contamination from waste water in the Honomanu basalt indicates that in the Action Area seepage from septic tanks and cesspools is not detectable. In the final location of the wells the DOH (Department of Health) regulation concerning distances from cesspools-septic tanks will be taken into account.

13. Cumulative Impact on Ocean Resources.

Studies have indicated that the reduction in groundwater flow along the coastline of the Action Area will have no measurable impact, either positive or negative, on the near shore

environment. The SEIS addresses this matter as it does other issues raised.

14. Violations of the Water Code.

As previously stated, there are no violations of instream flow values, riparian and appurtenant water rights. The Water Code does not cover transfer of out of watershed water in non-designated areas.

D. The DBCP Litigation.

The possible relocation of the well field is discussed in detail in the SEIS. The location of the monitor well and its relation to the proposed new well field was agreed upon by the DWS and Bill Myers, formerly with USGS.

G. Objections to Hiring of Mink and Yuen, Inc.

Mink and Yuen, Inc. is a firm with high professional integrity and objectivity. We do not believe they undertook this assignment with pre-conceived positions.

I. Alternatives Which Must be Studied.

All reasonable alternatives are discussed in the SEIS, including all surface and groundwater sources, desalination, impounding of surface water, wastewater recovery, and conservation. Relocation of wells to preclude contamination is also discussed.

V. Impact of the Waiahole Decision.

The State constitution requires the State and its political subdivision to conserve and protect Hawaii's natural resources and to promote the development and utilization of these resources in a manner consistent with their conservation and in furtherance of the self-sufficiency of the State. We believe implementing the General Plan and the Community Plan is in furtherance of the self-sufficiency of the State.

VI. The USGS Recommendations.

B1. Date from Exploratory Wells..

One exploratory (monitor) well as required by the Court has been drilled and data collected. Plans for additional monitor wells are under review by the Maui Water Department.

B2. Continuous Monitoring of Selected Springs and Steam Flow.

The USGS conducted a comprehensive stream flow measuring program, the results of which were reported in its 1999 report, along with interpretations in the SEIS. Because the EMPLAN will exploit just the Honomanu aquifer, which does not provide groundwater for spring or stream flow except within a few hundred feet of the coast, there is no necessity to establish base line groundwater discharges for this SEIS. Further monitoring of the Hokoana Wells in Maliko Gulch will continue. The Board has entered into an agreement to provide the users of Hokoana Well water should its quality deteriorate.

B3. Aquifer Test.

The Haiku monitor well was drilled and tested. The results are reported in the SEIS. The calculated transmissivity (T) as determined by the step drawdown test is very high. Drawdown at pumping rates up to 760 gpm was small, less than 2 feet, most of it attributable to turbulence at the well face with just a fraction attributable to aquifer flow.

B4. Geologic Logging.

The Haiku monitor well was carefully logged and the relationship between the upper formation (Kula volcanics) and the Honomanu basalt clearly established. Water levels were monitored daily during drilling. It was unambiguously proved that the Honomanu basalt is unsaturated between the basal water table at about 5 feet above sea level and its contact with the Kula formation approximately 500 feet higher. The well was video-logged and the lithology determined by analyses of drill cuttings.

VII. Necessity for Monitoring Wells.

A monitor well was drilled and tested. The Honomanu basalt was found to be unsaturated except below the water table at about 5 feet above sea level. Salinity during the pump test did not exceed 51 mg/l chloride. The aquifer parameters of transmissivity and hydraulic conductivity were calculated from pump test results.

We have not responded to every point listed in your letter because of irrelevance and that they do not fall within the scope of the SEIS. We appreciate getting your views and will attempt to address them in every way reasonable. It is our hope that through the interchange of ideas between us and you and others in the community, the realization of the East Maui Water Development Plan will emerge as an accomplishment benefitting all the people of Maui.

Sincerely,

David R. Craddick
Director

DRC:sc
xc: Mink & Yuen

MEETING TO RECEIVE COMMUNITY INPUT
FOR THE PREPARATION NOTICE FOR THE SUPPLEMENTAL EIS
FOR THE EAST MAUI WATER DEVELOPMENT PLAN

ORIGINAL

Held at Haiku Community Center, Hana Highway, Haiku, Maui, Hawaii, commencing at 5:00 p.m. on Friday, May 17, 2002.

REPORTED BY: LYNANN NICELY, RPR/RMR/CSR #354

A P P E A R A N C E S

BOARD OF WATER SUPPLY MEMBERS PRESENT:

Clark Hashimoto
Mike Victorino
Jonathan Starr

STAFF PRESENT:

David Craddick, Director
Herb Kogasaka
Wendy Taomoto

SPEAKERS FROM THE PUBLIC:

Ed Wendt
Jeff Parker
Lucienne de Naie
Mr. Nikhilananda
Christina Hemming
Greg Blue
Edwin Young
Mark Sheehan
Steve Slater
Daniel Grantham
Kutia Decosterd

MR. CRADDICK: My name is David Craddick, I'm the director with the Maui Board of Water Supply. Thank you for coming tonight. We've got a couple of our board members here, Clark Hashimoto and Mike Victorino.

Anyway, this meeting has been called to get community input on the Supplemental EIS preparation notice that was filed in 2001 for the East Maui Water Development Plan.

We also have from our staff here the chief engineer, Herb Kogasaka, Wendy Taomoto, and we have our consultant here from Mink & Yuen, George Yuen and his wife Jean.

The notice of tonight's meeting was published in the Maui News May 10th and 12th and also announced on various radio stations May 11th, 13th, 15th and 17th.

As I said, this preparation notice was filed in 2001 on May 8th in the OEQC Bulletin.

Persons wanting to make statements are requested to fill out a form there and we'll be taking them in the order that we got them. Initially we'll give three minutes for the input and as long as there is not too much, we may be able to keep going afterwards.

Anyways, now if we've got the names there.

MR. PARKER: Excuse me, Mr. Craddick, I have a very important question concerning the legality of this meeting that I would like answered before any testimony is taken. Okay?

MR. CRADDICK: I'm not a lawyer and I won't be providing any answers to legal questions tonight.

MR. PARKER: No testimony can be taken until everybody here knows what the problem is. Now, this --

MR. CRADDICK: Jeff, when your turn comes to speak, you can say what you want to speak, but I'm not going to have you talk in here out of turn. I'll take --

MR. PARKER: I have a legal question about the legality of this meeting that I would like answered before any testimony is taken.

[Arrival of Mr. Starr].

MR. CRADDICK: As I said, I'm not a lawyer, I'm not going to be providing you with any legal nuances.

MR. PARKER: So I warned that you this is an illegal meeting and if you go ahead, it's at your own risk.

MR. CRADDICK: Anyways, the first person we

have to testify is Ed Wendt.

MR. WENDT: Aloha, I'm Ed Wendt. Thank you for allowing me to comment. My question is when these wells are drilled, what effect will it have on the springs, rivers, and streams? And that's all I got. Thank you.

MR. CRADDICK: Next we have Jeff Parker.

MR. PARKER: Okay. When this preparation notice first came out almost a year ago, lots of us wanted to participate and make comments in a timely fashion and the Department of Water Supply and David Craddick made that as difficult as possible for us. It was not posted on the website. Many of us couldn't make it to the Wailuku library to review the document. And people like myself took a week off of work at great risk to my partnership -- my partner wanted to kill me -- so that I could research this preparation notice and make written comments in a timely fashion by the cut-off date of June 7th, 2001. And my question is the cut-off date was June 7th, 2001 for comments on this preparation notice. So what the heck is this tonight? And I hope somebody will answer that.

And then, you know, this is especially deceitful because everyone knows that we're not really

talking about the preparation notice. It's common knowledge that the entire Environmental Impact Statement is completed. So here we're going way back into time to try and satisfy some legal requirement to include the public after the fact. And that's the way things are done here and that's why it's illegal.

Now, I'm going to use my three minutes to read the letter from Isaac Hall that was delivered to David Craddick today regarding objections to this meeting.

"Dear David Craddick and the Board of Water Supply. This letter is written on behalf of --" blah, blah, blah, the plaintiff. "We object to the illegal procedures now being utilized to prepare the SEIS." And then it gives the background, it said that after Judge Mossman entered an order requiring the Board of Water Supply to prepare this SEIS, it was not until May 6, 2001, almost seven years later, that the BWS took the first step in preparing this SEIS by publishing the environmental notice.

Now, a copy of that notice dated April 2001 was sent to Isaac Hall and his clients by Mink & Yuen. This document was also made available in public libraries including the Wailuku public library. This document represents in section so-and-so that among the parties to be consulted during the preparation

would be Hui Alanui O Makena and Isaac Hall and clients. "The public comment deadline on this preparation notice was June 7th, 2001. My clients and I submitted timely comments on this preparation notice within this legal deadline. Our comments contained within a letter dated June 7th, 2001, are hereby restated and incorporated by reference. They included a request to be a consulting party.

"It is common knowledge that the draft SEIS has been prepared and is being circulated internally. This was confirmed to me by George Yuen, president of Mink & Yuen and others. During a personal conversation with Mr. Yuen within the last two months, I reminded him that he had not consulted with any of the above-referenced parties in the preparation of the SEIS.

"The meeting noticed for this meeting indicates that the preparation notice is available at a number of libraries. I went to review this preparation notice and found that it was identical to the preparation notice dated April 2001. I could not understand why, after the draft SEIS had been completed, the BWS and Mink & Yuen were conducting a public meeting on the preparation notice at this late date. So I contacted the attorneys for the BWS to

request an explanation. They have not provided me with any."

The next part is called "Objection to the illegal procedures of the BWS and Mink & Yuen in preparation of the SEIS." "It is apparent from the foregoing facts that the BWS and Mink & Yuen are violating our environmental laws and regulations in conducting a public meeting on the preparation notice at this late date after the draft SEIS has been completed and circulated internally.

"The notice in the May 8, 2001 issue of the Environmental Notice establishes a deadline of June 7th, 2001 for comments on the preparation notice. The BWS and Mink & Yuen are violating these laws and the substantial rights of my clients by allowing and inviting further public comments on the same prep notice after the deadline for comments."

Section C is called -- I'm almost finished -- Section C is called "Failure to conduct legally required consultation." "HAR 11-20-15A requires consultation with citizen groups and concerned individuals in the preparation of a draft EIS. A full and complete consultation process is required. BWS and Mink & Yuen were legally required and promised to consult with plaintiffs and never did.

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"This eleventh hour meeting in Haiku is no substitution for the consultation required by HAR 11-200-15A. The BWS and Mink & Yuen are again forcefully reminded of their binding trust obligation to analyze and address in the SEIS the full range of responsible opinion and responsible opposing views of significant environmental issues raised by the East Maui plan. See HAR 11-200-16. These views and issues should not be swept under the rug again, especially in an SEIS paid for with a substantial amount of taxpayers' funds."

So I could go into the preparation notice itself, but I think that plays into the hands of Craddick, so I'll leave it at that. Thank you.

MR. CRADDICK: Thank you. Next is Lucienne de Naie.

MS. De NAIE: Aloha, David. Aloha, members of the board and members of the public. I am Lucienne de Naie. I am here speaking on behalf of Maui Tomorrow, it's a citizens organization.

I was one of the folks that did meet the last deadline and submitted comments on behalf of Maui Tomorrow on this preparation notice. And I have to say that I've kind of followed this issue for a number of years and I do share Mr. Parker's belief that it

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seems that citizens are not very genuinely included in the process. And I don't have the legal expertise that's contained in the letter that he just read into the record, but just common sense says that it's very hard to find out when these things are happening. The one last year in May, it's lucky I read the Environmental Quarterly Bulletin, I had a very hard time getting a copy. I went to the water department, they said, oh, we don't have any extra copies, maybe we could xerox you one, it's 50 cents a page, it's a 40-page document; maybe you could go to the library, it would be cheaper to xerox there, so forth and so on. So if you're sincere about being interested in these things, it's not made very easy.

I share the concerns that Ed Wendt has. It does not seem that there is the kind of information base that could tell us about water resources in the Haiku or Honopo area as far as what the interconnectedness of the streams and the underground aquifer sources are. If you look at the well drilling records for most of the wells that have been drilled for private use in that aquifer, they all hit water at about the same elevation and it appears they have to go all the way down into an aquifer to find water. There doesn't appear to be some floating level at some

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very high elevation perched water that is feeding our streams. It appears that there is water below the surface. Most of these wells have to go two to three hundred feet to hit water. And I just feel that a great deal more needs to be known before we commit ourselves to extensive money and extensive time.

We look at this aquifer in the report that was released by the state -- which is a very well-researched report on water source protection back in the early '90s. At that point, they go over the sustainable yields for the various aquifers. For Haiku aquifer, they said well, you know, it's listed on the map as 31 million gallons a day, but more realistically it's closer to 15 million gallons a day.

Now, I know the department is now using this figure and they're estimating that any project would aim for 10 million gallons a day. But if you follow this project for a while, boy, these numbers have really wildly fluctuated over the years. And, you know, if we would have just gone along with the program, we would have a bunch of wells at the 700-foot elevation trying to pump 20 million gallons a day, probably, and have the same problems we have in the Iao Aquifer.

So I guess my basic message is if this aquifer

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actually had 15 million gallons of water a day and could actually recharge at this year after year, drought years, rainy years, et cetera, and really produce this amount of water, then two or three questions remain. If we use 80 percent of it, which would be about 12 million gallons a day, we already have several sources drawing in this area for extensive use. We have the Kula Malu well, Dowling's well, that is capable of pumping a million gallons a day. I'm not sure if it is now. I don't have the current pumping figures. But in the reports at the State Water Commission, they did experiments indicating that would be a very good well to develop up to 2 million gallons a day out of. So are we then going to reduce the pumpage of these other wells? Because if you had 10 million from them and 2 million from Dowling, that's your 12 million and you already have several private wells that are going through the permit process. Mr. Kent Smith, Mr. Mike Robertson, they are proposing half million gallon a day wells.

So it's just adding up a little bit and I know Mr. Craddick has been tracking this because there is letters on file when Mr. Smith applied for his well, saying, hey, you're drilling your well right next parcel to where the county wants to drill as part of

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their East Maui water plan.

The State didn't do anything to stop Mr. Smith from getting a permit for his first smaller well and they don't appear to be doing anything to stop him from getting a permit for his larger proposed well. So I just really wonder if we are going to be bleeding this aquifer in the way that Iao appears to be kind of overtaxed simply because we have promised water in a way that is irresponsible.

And we do not know how these waters connect to the streams. The people of Haiku do depend on their streams for many personal and community uses. And I am not sure that the same recharge that goes to the streams in Haiku does not go to the streams in Huelo where I live where we have no county water sources and we are very dependent on our streams. I mean, when you go up the mountain, it gets pretty narrow and that area that's recharging is supplying all of these lower elevation areas.

So my watch word here would be why don't we really get to know what is going on in this aquifer before we spend millions of dollars of ratepayers' funds to develop a system -- even though I know it is gradually phased, and the first phase only deals with existing wells. Once these things are rolling, th[illegible]

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tend to just sort of roll.

It also doesn't make much sense to take this expense to pipe water to a different part of the island. It doesn't seem like it would really be consistent with the Waiahole decision to remove wholesale amounts of water out of one watershed and take it over to a completely different watershed. It's not a matter of some place upcountry needs a little bit more water and the Haiku system is already supplying it. This is taking water to Kihei and Maalaea. And, you know, we might as well be honest about it. And the Waiahole decision dealt with water that was being transported from one rainy side to the dry side, just like we're talking about here. And I'm not an attorney, but it appeared to me what that decision was saying is you can't just do this without a regulatory process. And that aquifer was designated; this aquifer is not designated at all. I don't see where there would be any permit process to actually do what's being proposed by the Department of Water Supply.

At any rate, I'm using up more than my allotted time here, but I feel there is many, many unanswered questions and I know many Haiku residents [illegible] my con[illegible] [illegible]at thi[illegible] [illegible]pt bee[illegible] [illegible]nt through all the way. Thank you. Aloha.

MR. CRADDICK: Next we've got Nikhilananda.

MR. NIKHILANANDA: Good evening, David and members of the public, my name is Nikhilananda. I'm just going to make a few brief comments. And by inclusion, I would like to thank both Lucienne and Jeff and Ed for their comments. They really shared a number of different issues much more involved and knowledgeable than as much as I've been trying to make myself.

I'm a resident of Huelo. As Lucienne mentioned, my water is totally dependent. I'm not on county water. My water actually comes out of the Haiku ditch, EMI ditch at around the 400-foot level.

I actually got through most of the most recent document, which is April of 2001, and I want to do make reference to Jeff's comments that we are making comment on a document prepared a year ago with -- and I was looking for the testimony tonight of actually comment that's made. Of course, we know what the plans are and Lucienne alluded to it and we can be blunt about it is that what's wanted is to take the water from East Maui and divert it for development in South Maui. It's not for bringing water to farmers up in Kula. It's not for a little bit of assistance for

those of us that live on the North Shore in East Maui. It's for further destruction of South Maui. So that's what it's for. And I couldn't find -- it was actually quoted in this document. The document is on the website and, like I said, I got through most of it.

So that's one point that I would like us to be blunt about. I think that I really appreciate the people that have been involved in both the Waiahole ditch decision on Oahu and the current lawsuit of East Maui property owners who have riparian rights, and I'm sure that this will be at least stopped in the courts for years and hopefully we will prevail and it will never come to fruition.

The thing I do want to make comment and some of you have heard me say this over and over again and I think that EMI is continually disingenuous when they say that -- I think I chased David out. I think Jeff's point about it's not really necessary for us to be here, that most of what we say tonight might be meaningless and this is just a physical example of that. Welcome back, David.

My stream that I live on is the Hokupapa stream and 90 percent of the year it is bone dry, it's as dry as the floor in here. And I love when there is rain upcountry and we have really heavy rains because

the dam that's located within feet of my property line overflows and my stream is flowing and it's filled with prawns and other flora and fauna that I'm just not knowledgeable about. Animal life is in there, it's just wonderful to see; within a couple days, it's bone dry again. And some of us were at the hearing about a year ago down in Wailuku where EMI had the gall to tell us that they do not affect the streams at all. And once again, I would like on the record to say that my stream is bone dry most of the year. And if the dam that's within inches of my property were dismantled, that stream would be flowing 24/7, 365 days.

So on page -- I do want to -- and I'll probably finish at this point. But on page 10, there is a quote hear: "The EMI ditch system will be unaffected by pumping from the Honomanu aquifer nor do they appreciably affect the volume of recharge region of the basal aquifer and the Haiku aquifer system." Once again, little if no concern has been made for the people who actually live off of the streams in Nahiku, and Huelo, in Keanae. It is reprehensible and I would feel -- based on the Waiahole ditch decision -- illegal for any water to be removed from East Maui until the streams are replenished -- not partially,

but totally -- and a stream flow is established, farmers get necessary water, and three or four or five or maybe a dozen steps down the road, the extra water, the surplus water that we have, then can be provided for upcountry farmers and probably a few buckets of water then brought over for South Maui development. Thank you.

MS. HEMMING: Aloha. My name is Christina Hemming and I want to acknowledge Mr. Starr here. Thank you for coming.

I would have to support Jeff Parker and Lucienne de Naie's comments concerning the participation of the citizens rights to the EIS.

The Board of Water Supply is a group of appointed citizens who are acting as trustees for a public trust. The water is a public trust. And a public trust must first represent the Hawaiian people, the people who use the water to plant taro and to feed themselves and their land.

EMI, who has created the ditch system, is a subsidiary of A&B, which is a privately held corporation and they are perpetually motivated to maximize their profits. This is against the will of a public trust.

I'm wondering if the Environmental Impact

Statement that has been created by Mr. Mink, if it really does address the interconnection of the streams, the aquifers, the actual water that is supposed to be in the streams for the minimum required amount of water to actually support the people and the environment, the riparian environment, the stream environment, and the ocean deposition environment where there are plants and fish and different wildlife that depend upon the mixture of fresh water and ocean water to survive that make up an important part of the Hawaiian environment.

I challenge the comment that I heard last time when I was at a Haiku meeting where Mr. Craddick said that only a million gallons of water was going to be let into the streams and that we should take it -- we could either take it or leave it, that that was all we were going to get from the Board of Water Supply. I don't understand how they feel like they have such a control over the environmental life, especially when they are taxpayer based, they are being funded by taxpayer money. And this is the main issue that -- this is one of the main issues that I have is that this whole pipe system and wells will be paid for by everybody who has a water meter in the whole of Maui County. And so why should the taxpayers in Kahului

have to pay for a water supply system to South Kihei to support resorts and have their water bills go up in order to maximize the profits for a few individuals?

These past several years have been -- have shown that there has been a severe drought situation with a lot of fluctuating rain and we have gone into drought situations many, many times and so how could you have consistent water in the streams with the wells that would go down, pump the water out of the perennial streams and the annual streams, and not have it affect the aquifer.

What I ask the Board of Water Supply is to require that if there is going to be any development in South Maui, that it be done with their own money to create their own desalinization plant and not touch any streams or any water in the East Maui region, that actually the groundwater ditch system should be opened back up, the water should be put back in the streams. It's been taken out for over a hundred years. We need the water back in the streams, the Hawaiian people and all the people who live on the streams as well as the wildlife. We deserve to have that water and the water that feeds the plant life encourages the rain to continue to come.

So I would encourage the Board of Water Supply

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to be fair and honest and just tell the developers to build their own desalinization plant.

And I want to use an example of Hanapo stream where my boyfriend has a piece of property. There is two 2-inch pipes that feed the whole Hanapo stream and he has 10 acres there and he has no -- there is no county road, he has no electricity, he only has rain water catch, and he wonders if he's even allowed to put a pipe, a one-inch pipe into the stream to take it out and pump it up to his land to feed his taro and bananas. Now, if he, someone who lives on the stream, can't take water out of the stream or if they're not sure if they can take water out of the stream, why should the Board of Water Supply spend 40 to 50 million dollars of Maui taxpayer money to drill wells to fuel a few private corporate development interests in South Maui? Thank you very much.

MR. BLUE: I'm Greg Blue, I live in Haiku. I'm not representing the Haiku Community Association, but I am a member.

When I read this notice here, I don't know much about it, but it says, "This meeting is to receive community input for the preparation notice for the Supplemental EIS." I asked at the beginning of the meeting -- because I didn't understand what this

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meant -- and I was told that -- as for the preparation notice, I was told they have to notify that they're preparing a Supplemental EIS. And I said, oh, that hasn't been done yet. And the response was yes, it has been done last year. So I don't know much about this, but I'm confused about why I'm here and what I'm being asked to observe because it's clear that the EIS was done and so how can they give a preparation notice now? I don't understand that.

Having said that, it's obvious to me that they want to develop more homes and shops and whatever over in Kihei side and I'm going to assume they can't get water from anywhere else, so they want to take it from here. That's obvious.

So the questions I have is, number one, if they do plan to take the water from Haiku and take it somewhere else, do they plan to fund Haiku with water for the people that live here before they take it away? That would be my first question. And if it was okay with us to take some of it away and, you know, fill the streams again and, you know, give people the water that they're entitled to, would the water that they're taking away affect the environment around here in a detrimental manner?

It's going to be an expensive process and it

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seems to me that whatever is going on here hasn't been made really clear to the public. I read a notice, I came here, I'm looking at this, and it doesn't make any sense. So I think somebody from the Department of Water has to really clarify what this meeting is exactly for and what we're being asked to do. And if it's to approve and get input on an EIS that was done a year ago, well, I would just walk out of here and they can just say that, you know, there was no public input. So that's my testimony. Thank you.

MR. YOUNG: My name is Edwin Young. Thank you for letting me speak. What I have here is a court thing from Maui Pineapple by East Maui Irrigation Company, allowing Maui Pine to take one million gallons a day out of the Kuhiwa well out in Nahiku. I live in Nahiku and I'm from Hana and I live off a spring down there. And ever since Maui Pine started taking water from this Kuhiwa well, my springs have been going dry very early. Before, prior to 1991, it would have to not rain for about two to three months before the springs would go dry. Now if it doesn't rain two to three weeks, the springs go dry already. And this only happen from 1991 on, when Maui Pine started taking one million gallons a day from the Kuhiwa well.

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Inside here is Ned Goodness, who's a part owner of this thousand acres that gave East Maui Irrigation permission to take this water. And this study was done in the early '90s and it was done during a very rainy time of the decade. Right here I have -- from the National Geographic Survey, I have the rainfall from 1998 there was 112 inches of rain. In 1989, there was 124 inches of rain. In 1990, there was 113 inches of rain. This was when the study was done.

Now, in 1995, there was 55 inches of rain. In 1996, there was 55 inches of rain. In 1998, there was 56 inches of rain. In 1999, there was 60 inches of rain. This was the drought season. I believe that this study should have been done during a drought season. How can you do a study when all the rivers are flowing to determine the effect of the springs that this thing is fed?

Now, in this court thing right here, it also says that East Maui Irrigation giving with permission to Maui Pine -- they're supposed to identify the aquifer that this -- they're sucking the water from. It's like a big reservoir under the ground, yeah. And it is affecting all the springs down in Lower Nahiku and all the way down the whole apupuaha. And a lot of

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people down there like the Hoopai family and the Lono families and stuff like that are suffering because we live off of this spring and if it doesn't rain for two to three weeks, now we don't have any water, we all have to go scrounge water tanks. And it's not our problem to do this. I believe that we always supposed to be supplied with water.

Also in this report over here, Ned Goodness, who owns a percentage in this thousand acres that give the permission to take the water here, says that if it impacts the environment and affects like the springs and the opai and the biological things down below where they taking the water from, he withdraws his permission to give them permission to take the water.

And also over here and there's pages back here of this report, it says that these people are supposed to report to the Hana Community Association on a timely basis as to the effects of the sucking the water from the springs over here for the biological and also the drying up of the springs below. For 10 years since 1991, they haven't reported a single sentence or paragraph or anything to the Hana Community Association, letting them know the effects of the springs. They're not doing any studies or anything, okay. And I'm over here and I'm saying that

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I don't think they should be able to drill any more wells whatsoever in East Maui at all until they go back to this study which was given to them in 1991 and have this study corrected and taken care of before they even go -- they should go back to square one and take care of this problem right here before they even go and want to drill more wells. You give them permission -- if they get permission to drill more wells, they're not even going to abide by the conditions because they didn't abide by the conditions of this one right here that was taken in 1991.

So I say no, no more wells, no more drilling at all. And again, I'm not a speaker and everything, but that's all I have to say. But I think they should go back and do this study over again and abide by the conditions by reporting to the Hana Community Association and letting them know. Because I have a complaint saying my springs are dried up and I told them about it, I called Maui Pine, I called the water resource commission and I called East Maui Irrigation, and they don't even respond to me. They said, well, we can't help you. You know, it's like I'm just a nobody, I don't have no lawyer, fancy lawyer or anything like that. But thank you very much for letting me speak and I hope [inaudible]. This is from

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Roy (inaudible), from the complaint guys down at the Water Resource Commission in Honolulu.

MR. CRADDICK: Get a copy of it. I guess the water commission must have that. Thanks. I just wanted to make sure he has a copy of that. Between the water commission and Maui Land & Pine.

MR. SHEEHAN: My name is Mark Sheehan. I've been involved with Maui Tomorrow over the last 12 years and I'm a member of the East Maui Water Preservation Coalition.

My attorney, Isaac Hall, addressed a letter dated today regarding this meeting which I object to because it's a sham. The purpose of this meeting is to pretend to meet the requirement that you go out and talk to the public and you have listened somehow to what they have to say, which is a joke because the report has already been written. It's being circulated internally -- of course, we can't see it. But the conclusions have already been reached. So the purpose of having this is a joke and it's just a pretext to show that somehow you've listened to the public and you care about the public, but you don't care about the public because you've already reached conclusions. So I think even to testify is a mistake because it will just justify your claim that we had a

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scoping meeting even though it was after the fact. So I would like any record that you have to clearly show that the conclusions were reached prior to meeting. with the public and my sentiments on the invalidity of this entire process -- I've already been on record and been expressed by my attorney and I don't want to really waste tape and time of the members of the public who are here going over it. But the whole production here is a sham and should be disbanded, start over again, have a legitimate scoping meeting, really go out and talk to the public and find out what their concerns are, and then go back and do the report.

MR. SLATER: I have been a resident of Haiku for almost 20 years now. I'm kind of nervous speaking in public meetings. I feel like it's been a sham almost every experience I've had in Maui government for almost the whole 20 years. This is not unusual to me. I mean, the amount of meetings that I've been to in the past where the public input was completely ignored has been frightful.

I wore my red shirt today because last time there was a water meeting, it looked like if you didn't have a red shirt, you weren't supposed to be sitting down. That was at one in town where A&B paid

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their employees to come out and occupy every seat.

You can hear my voice is uncomfortable. I'm really nervous. I'm scared in a way. I've had quite scary experiences speaking out in public before and this is the first time I've spoken out since 1991 when I had a squad of police come down and terrorize my family because I got politically active on the Big Island. Fortunately now my daughter is old enough to have moved out, so I feel like I can talk again.

But living in Hawaii has been a real challenge if you're feeling like you care anything about the environment and you -- I mean it hurts me. There is a lot of people that what are we getting out of this? I love the ocean, that's why I'm here. What are you getting out of it, Mr. Craddick? I heard that you might even have a well drilling business now. I mean, everybody is going for their own financial gain. I really resent hearing that this meeting again is after the fact.

Might be diverging from the subject a little bit, but I feel like I have to point out that in 1991 I as a private citizen brought out 750 references on the Big Island -- spent two years on the Big Island -- about the toxicity of hydrogen sulphide. If you look at the records of the environmental assessment that

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was done by Bruce Anderson, there were 28 references on that assessment for the Big Island drilling there. And as a private citizen, I can do some computer research, I am real computer knowledgeable, finding 750 references to toxicity that the state had completely covered up. I mean, these were references from Lawrence Livermore Labs, not from some offshoot scientific thing, that are not present in there. As a result of that, I had 12 police officers show up in front of my door about two months later, hold a gun up to the head of my nine-year-old daughter, threaten to shoot our dog in front of her, hold my 15-year-old son at gun point, tried to take me into jail naked, and all of it based on a phony trumped up charge that they said they might have seen a marijuana plant from the air a few days before, which was a complete trumped up lie. But because I was politically active -- and then we tried to challenge it and the state claimed that they lost the records. First they claim it was sealed. Anyway, then they lost the records. Then there was a statute of limitations. You have no idea who we're up against here. And therefore I take offense. I see people -- I mean, I know some of you are not -- to me it's like dealing with the Mafia and I'm scared of people like Mr. Craddick. Not him

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personally, but how do you take these -- this is disgusting. When you take democracy and chop it down -- this is exactly what was happening under the geothermal wells, they didn't really listen to public meetings, listen to the Hawaiians, almost a hundred percent dissidents in the meeting -- they okayed it anyway. Everything is rubber stamped. Sorry to diverge a bit.

The points I would like to point out is we've just been through a whole thing of dengue fever. I live near streams, too. What do you think happens when you take the water? All of a sudden you have puddles. We're hearing all this advertising about, you know, clean up your car inner tubes and your rain gutters. The best thing we could do to fight dengue fever would be to let the streams run at natural flow and not leave puddles sitting there.

I'm in the ocean. It's the only reason I'm here. I'm not here because of my feeling of politics, I'll tell you. I love the ocean. I'm in two, three times a day in the East Coast. I don't think there is any studies going on. I have to be past Huelo before I see any fish life. I'm in there snorkeling. I don't fish; I just look. I'm in there obsessively. The fish life is horrible along this whole coast from

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the ag chemicals. And you start taking more water out -- a year ago there was an environmental impact statement? What do you think has happened in the last year in marine biology? Has anybody bothered to look? I mean, you start taking the fresh water content out of this ocean, as far as I'm concerned I don't go to the south side any more. I drink the ocean water when I'm in the water. I can't touch the water anywhere this side of say Huelo. You start taking more water out, it's just so irresponsible. And it also changes the currents. You start removing the salinity of the water, it's a very well known thing in science that that changes the currents, which changes the temperature, and all of these species which are protected -- as far as I'm concerned, doing this to this amount of water is in violation of numerous federal environmental protection acts. But we're not going to of course get much protection out of our current federal government. It sets the stage for this kinds of state federal government -- government.

Also, I was in this room in 1986 and at that time had been working as a consultant -- computer consultant for both the president of Maui Land & Pine and the head of HC&S at that time. I was tipped off that there were some studies done in '86. I was a part of a group of people that called a meeting at Haiku school to want to go over if -- they were going to drill -- we wanted to go over having the water tested that our children were drinking.

Bruce Anderson came in with a report that they had done testing of the water at that time in parts per million. I stood up at the meeting and said that parts per million doesn't do it because EPA standards were parts per billion, 1,000-fold increase. I was shouted down, rudely told that that didn't make any difference, we didn't have money to test properly -- I called him a liar because if you test a thousand fold below limits, then to me you are a liar.

The next day my employer was told that he better fire me and get me off this island or there would be no more contracts from A&B or HC&S. He didn't fire me and his business went under. I'm disgusted. Thank you.

MR. GRANTHAM: Thank you, David. I'm speaking today as the chair of the Sierra Club on Maui. And the Sierra Club submitted comments on this within the legal comment period. And we have been concerned about this since the original plan back in the '80s and continue to be concerned. One concern is -- well, there is many concerns that were stated very well and

I'm not going to take up your time repeating -- I thought Mr. Wendt was very concise right in the beginning. And if he can keep those ideas in mind, I think we'll be doing -- on the right track.

One thing that I don't recall him mentioning is the water flowing into the ocean is not wasted. That's critical for the marine life. And if you have any questions about that, ask a biologist, ask the state biologist here, Skippy Hau, you can get him on the phone. Ask him how stream life interacts with marine life and what happens when the streams don't flow, they don't allow the fish to propagate upstream and those fish don't feed the reef fish and what happens when the reef fish die from lack of food.

Another concern that we have is whether this conforms to the community plan to take water out of a district to another district, particularly when there are people in this district who, you know, residents and farmers who are suffering water shortages.

I'd also like to mention since there didn't seem to be -- well, actually there is -- the Waiahole Supreme Court appeal decision is going to bear very heavily on this and I think that it's very important to consider this. The decision was that taking water out of a district to another district should be

treated as a very low priority compared to the benefits of keeping the water in that district. And this includes not just streams, it includes well water, groundwater, stream water. They recognize that all water is the same water, the streams, the springs, the ground water, it's all the same water.

And if any of you get cable, let me encourage you to tomorrow, Saturday, Sunday, there is a program -- a 20-minute program produced by Earth Justice on the issue that's coming before the State Water Commission on the 22nd of May, Monday, over Kamehameha School's application to take between 4 and 5 million gallons a day from the Waiahole stream to use in golf courses and watering, general development, and there is a cry for help from Native Hawaiian farmers who need the water critically for their farms. So I'm trying to remember the exact times. If you call Akaku, you can ask when the Waiahole decision program is on. I think it's on Saturday 10:45 AM, 10:00 PM. On Sunday I believe it's 7:35 AM and also PM. So I really encourage people to watch that program.

And I think that if we take into account some of these comments here, I think it will be helpful. And it's hard to really make serious detailed comments because we don't have the study in front of us. So at

this point I'm just going to leave it at the comments that we have made in the past until I can actually -- we can actually see the study. Thank you.

MS. DECOSTERD: My name is Kotia Decosterd. I work in Huelo. I moved in 1985 to the island of Maui and in 1988 I bought a piece of land in Huelo which is on a stream. Every day, 1988, when I drove to my land, the stream was flowing. There was always water. The water went into the ocean.

It's now the year 2002. I have watched it, I have observed it, I have seen the changes. The changes are dramatic. My stream is dead. When we have a big rain, yes, the stream is flowing. But if it doesn't rain, my stream is dry. The turtles, the fishes, right down where I live, have gone. I have seen them leaving.

Now, knowing that we have to be very careful for how we go into our future, I urge you to really carefully see what you do with water. Water has become so important to our life. Water is what nurtures and sustains us. And if you go without really carefully finding out and taking water, life changes too fast.

I wish this stream would bear the water I have seen and I wish that you do not trail water and take

it away. That's all I can say. Thank you for listening.

MR. CRADDICK: The process from here on out is these comments will be taken by the consultant and incorporated into the draft EIS. They will be submitted to the water board for their approval. And after they approve it, there will be a 45-day period in which people can again make comments on it. So there will still be more time to make comments on the draft EIS when it is completed.

We have another board member here, Jonathan Starr. I don't know if he's speaking as a board member, but Jonathan?

MR. STARR: My name is Jonathan Starr. I'm a member of the Maui Board of Water Supply. And supposedly the Maui board is the entity that is contracted and is doing the SEIS. And there is no one on the board who's pushed harder to get the SEIS done. When I got on the board, it had languished for over six years and we pushed forward action. And I would certainly like to see it get accomplished and get it done.

But in all honesty, I have no clue what we're doing here today. There was a water board meeting a few weeks ago and at that meeting we were told that

there is a draft SEIS that had been given to the department. And when I said that I wanted as a board member to see it and when can the public see it, I was told that the board members would not be allowed to see it. And I protested that. And then later on we're told that we could see it, but only in Executive Session. And so we called another meeting that we would receive it in Executive Session and then, you know, all the board members received a copy in the mail and this is the actual draft SEIS. However, it's confidential, attorney/client privileged communication. I am told that I'm not allowed to show it to anyone and I haven't nor will I. But there is a draft copy out.

So I really have no clue why there is a meeting being held today on the preparation notice. It doesn't make any sense to me at all. We'll see what happens, but this was not being done under the power of the board and we really -- I as a board member don't understand why the process is being done this way and it makes no sense to me. Thank you.

MR. CRADDICK: I'm going to close the meeting and you can talk if you want.

A VOICE: I would like to do it before you close the meeting. Is this -- I found this on the

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website. Do you have a hard copy of the one dated April 2001? Jonathan alluded to the --

MR. CRADDICK: That's the last document available to the public. The document Jonathan has is a preliminary copy of the draft Supplemental EIS.

A VOICE: So the comments that were made today, will they be incorporated into this top-secret document that --

MR. CRADDICK: Yes.

A VOICE: And at that point will that top-secret document that Jonathan has with our comments from today be then available to the public to make further comment on?

MR. CRADDICK: After the board approves it.

A VOICE: So am I right to say that there is absolutely -- the public has no further input into what the Board of Water Supply is going to do about East Maui water. Our limitation is either legal action or commentary after the fact; is that correct?

MR. CRADDICK: No. What happens is after this draft Supplemental EIS is completed, it goes to the board for their approval. It's an open board meeting.

A VOICE: Could they possibly not approve it?

MR. CRADDICK: Possibly.

A VOICE: I just wondered, when you say their

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approval. I just wondered if it --

MR. CRADDICK: No, nothing is a done deal with the board as I've known.

A VOICE: I'm sorry, I interrupted you. So then after it's approved, or disapproved, what happens?

MR. CRADDICK: Then there is a 45-day comment period for the public.

A VOICE: But if it gets not approved, what happens.

MR. CRADDICK: Then we keep working on it until the board approves it.

A VOICE: Okay. But there is a possibility that with the board -- that the board will not approve it and so then there will be no further comment, is that what you're saying? How is the public going to be -- besides legal action, to have an input into this process?

MR. CRADDICK: As I said, once the draft supplemental EIS is completed and the board approves it, it's open to the public for a 45-day comment period. Once that comment period is completed, then the final Supplemental EIS has to be completed. Again the board has to approve it. And at that point, once that is published in the OEQC, there is a 60-day legal

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challenge and you're right, at that point your only recourse is to challenge it in the courts, I guess.

A VOICE: Say, for example, the board happens to deny this supplemental report that we can't see because it's top-secret but they haven't yet and they deny it. Then where can there be an input for the community?

MR. CRADDICK: Once the board gets the final report, it's an open public document I guess at that point.

A VOICE: Okay. So when it goes to the Board of Water Supply, they are going to deny it but then we're going to be able to look at it.

MR. CRADDICK: Well, they may not deny it. They may approve it and -- but there is still a 45-day comment period for the public.

A VOICE: Okay. Thanks.

MR. CRADDICK: What I'm going to do is I'm going to close the meeting because these are not -- I'll still sit here and talk with you if you want.

MR. PARKER: No, I think this should be on the record.

MS. HEMMING: I would like this to be on the record.

MR. CRADDICK: If you're going to -- I'm not

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going to go back and forth with this. If you have comments on the draft -- or I mean the preliminary Supplemental EIS --

MR. PARKER: I think on the basis of what was said tonight, you owe everybody here an explanation about this idea of going back in history now and getting comments on this prep notice when in fact the final is done. This makes no sense. I would like to hear how you can justify that.

A VOICE: I agree, you have to --

MR. CRADDICK: Mr. Yuen, would you like to say whether it's complete or not, the draft EIS --

MR. PARKER: Wait, wait, wait, that's not how it works. You take comments on the prep notice. You finalize this before you move on to the preparation of the EIS.

MR. CRADDICK: Jeff, I'm going to close the meeting.

MS. HEMMING: I have one question, Mr. Craddick, that no one really addressed. This is Christina Hemming. Is the amount of road spraying and different pesticide and herbicides spraying that's done all along the ditches to kill the mollusks and all the plant life. The effect upon the water and the streams, the amount of levels of pesticides and

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herbicides in the streams, as well as automobile and other diesel type of runoff and the actual pollution and toxicity level that's already in the water and as well as the water in the aquifer, how much pollution has been actually formed in that and I'm wondering if the EIS is addressing that.

MR. CRADDICK: Thank you.

A VOICE: Are you testing the water at all?

MS. HEMMING: Are you testing the water?

MR. CRADDICK: Thank you.

MR. PARKER: Are we allowed to ask questions in this meeting or not?

MR. CRADDICK: No, we're taking public comments right now. The comments will be addressed in the draft EIS.

MR. PARKER: So no one at this meeting is -- the function of this meeting is not for us to ask any water board members here questions about this project?

MR. CRADDICK: No.

A VOICE: I would like to say that I did find a government website called USOGE for United States Office of Government Ethics, USOGE.gov. I personally am going to submit a complaint about the proceedings here.

There is another website called USAIC. That's

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the anti congressional resource center of the U.S. government, that's WWW.USAID.gov. I'm also going to be submitting something in a written form to them. I think we should. I think this is preposterous.

MR. CRADDICK: Thank you.

(WHEREUPON, the meeting was concluded at 7:00 p.m.)

CERTIFICATE

STATE OF HAWAII)
) SS.
COUNTY OF MAUI)

I, LYNANN NICELY, RPR, Notary Public for the State of Hawaii, certify:

That on the 17th day of May, 2002, that the meeting minutes was taken by me in machine shorthand and tape recording and were thereafter reduced to print under my supervision by means of computer-assisted transcription; that the foregoing represents, to my best ability, a true and accurate transcript of the proceedings had in the foregoing matter.

I further certify that I am not attorney for any of the parties hereto, nor in any way interested in the outcome of the cause named in the caption. Dated this 21st day of May, 2002.

____

NOTARY PUBLIC, State of Hawaii

My commission expires: 1/24/2006

Testimonials received at public meeting held on May 17, 2002 at the Haiku Community Center

Kutia DeCorsterd
Ed Wendt
Mr. Nikhilananda
Lucienne de Naie
Edwin Young
Christine Hemming
Greg Blue
Daniel Grantham
Steve Slater
Jeff Parker
Mark Sheehan
Jonathan Starr

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
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June 3, 2002

Mr. Edward Wendt
Na Moku Aupuni O Koolau Hui
HC1 Box 92
Haiku, Hawaii 96708

Dear Mr. Wendt:

Subject: TESTIMONY ON PREPARATION NOTICE FOR DSEIS FOR EAST MAUI WATER DEVELOPMENT PLAN

At the public meeting of May 17, 2002 held at the Haiku Community Center to accept testimony on the above matter, you expressed concern about how pumping from the project's proposed wells may reduce stream flows.

We understand your anxiety but our studies show such occurrences are not possible because the inverts of the streams are separated from the basal aquifer by hundreds of feet of unsaturated geological formations, thus precluding the existence of any hydraulic connections between the streams and the aquifer in the study area. To show that pumping from the basal lens will affect stream flow, it must be shown that the water table is intersected by stream channels. This is not the case in the study area between Maliko Gulch and Utumalu.

Thank you for providing us with your testimony. Please be assured that we are cognizant of the need to maintain stream flows and that we will do everything possible to see that nothing is done to adversely affect the streams within our authority.

Sincerely,

David R. Craddick
Director

DRC:sc
xc: Mink & Yuen

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June 3, 2002

Mr. Jeffrey Parker
Tropical Orchid Farm, Inc.
P. O. Box 170
Haiku, Hawaii 96708

Dear Mr. Parker:

Subject: TESTIMONY ON PREPARATION NOTICE FOR DSEIS FOR EAST MAUI WATER DEVELOPMENT PLAN

At the public meeting of May 17, 2002 held at the Haiku Community Center to accept testimony on the above matter, you voiced your displeasure about the manner in which the meeting was called as being illegal. We check with our Corporation Counsel's office and were satisfied that the meeting was indeed legal and proper.

We realize that the DSEIS Preparation Notice was distributed to various individuals and organizations sometime ago for review and comments. Although we received many interesting statements and observations, we felt that it would be desirable for those who did not have an opportunity to express their views initially be allowed to do so a this community meeting. We appreciate the response by those who testified.

Thank you for your testimony. We are hopeful that the matter will be resolved amicably in the near future.

Sincerely,

David R. Craddick
Director

DRC:sc
xc: Mink & Yuen

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June 3, 2002

Ms. Lucienne de Naie
Maui Tomorrow
SR1 Box 47
Haiku, Hawaii 96708

Dear Ms. de Naie:

Subject: TESTIMONY ON PREPARATION NOTICE FOR DSEIS FOR EAST MAUI WATER DEVELOPMENT PLAN

At the public meeting of May 17, 2002 held at the Haiku Community Center to accept testimony o the above matter, you stated that it is not right to transport water from East Maui to Central Maui. It is not our policy to transport water from one aquifer system to another to the detriment of the area from which the water is taken. However, we feel that water should be used for the maximum benefit of all the people of Maui as required by the Community General Plan and State CWRM. In preparing the East Maui Water Development Plan, our goal is to create such a balance which would be beneficial to all the people of Maui.

You also had a question about the sustainable yield of the Haiku area. In the State Water Protection Plan, the sustainable yield for the entire Haiku Aquifer system is listed at 31 mgd. Reanalysis for the Kuiaha Unit of the aquifer system in which the wells are to be drilled gives a sustainable yield of between 15 and 30 mgd, the value depending on the choice of variables employed in the calculations. The planned average yield from the well is 10 mgd. This combined with other wells in the area should not exceed 15 mgd over the life of the East Maui Water Development Plan. The appendix on future aquifer management identifies saltwater interface and water level monitoring wells that will be provided as the East Maui Water Development Plans is built out.

Thank you for taking the time to testify.

Sincerely,

David R. Craddick
Director
DRC:sc
xc: Mink & Yuen

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TOTAL P.27

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June 3, 2002

Mr. Nikhilananda
P. O. Box 1704
Makawao, Hawaii 96768

Dear Mr. Nikhilananda:

Subject: TESTIMONY ON PREPARATION NOTICE FOR DSEIS FOR EAST MAUI WATER DEVELOPMENT PLAN

At the public meeting of May 17, 2002 held at the Haiku Community Center to accept testimony o the above matter, you expressed concern about the pumping of groundwater from East Maui to Central Maui. It is not our policy to transport water from one aquifer system to another to the detriment of the area from which the water is taken. However, we feel that water should be used for the maximum benefit of all the people of Maui as required by the Community General Plan and State CWRM. In preparing the East Maui Water Development Plan, our goal is to create such a balance which would be beneficial to all the people of Maui.

With respect to your concern about the adverse effect on Mokupapa Stream, we wish to point out that the stream is not in the Kuiaha Unit of the Haiku Aquifer System. It will not be affected by activities in the Kuiaha Unit. The SEIS is limited to the Haiku Aquifer System and does not reach as far as Keanae and Nahiku.

We appreciate your taking the time to testify.

Sincerely,

David R. Craddick
Director

DRC:sc
xc: Mink & Yuen

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June 3, 2002

Ms. Christina Hemming
P. O. Box 791114
Paia, Hawaii 96779

Dear Ms. Hemming:

Subject: TESTIMONY ON PREPARATION NOTICE FOR DSEIS FOR EAST MAUI WATER DEVELOPMENT PLAN

At the public meeting of May 17, 2002 held at the Haiku Community Center to accept testimony on the above matter, you expressed concern about the effects of pumping wells on streams and the marine environment. The quantitative study done by marine biologists along the Haiku coast suggests that the natural flow of groundwater to the ocean does not play an important role in the marine biology of the Haiku coast. This subject is discussed in the Draft SEIS.

As for building desalination plants, the decision would depend on a thorough analysis of all available alternatives including the economic and environmental impacts.

Thank you for your testimony.

Sincerely,

David R. Craddick
Director

DRC:sc
xc: Mink & Yuen

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June 3, 2002

Mr. Gregg Blue
Haiku Community Association
265 W. Kuiaha Road
Haiku, Hawaii 96708

Dear Mr. Blue:

Subject: TESTIMONY ON PREPARATION NOTICE FOR DSEIS FOR EAST MAUI WATER DEVELOPMENT PLAN

At the public meeting of May 17, 2002 held at the Haiku Community Center to accept testimony on the above matter, you voiced your displeasure about the manner in which the meeting was called as being illegal. We check with our Corporation Counsel's office and were satisfied that eh meeting was indeed legal and proper.

We realize that the DSEIS Preparation Notice was distributed to various individuals and organizations sometime ago for review and comments. Although we received many interesting statements and observations, we felt that it would be desirable for those who did not have an opportunity to express their views initially be allowed to do so a this community meeting. We appreciate the response by those who testified.

In your testimony, you also objected to the pumping of groundwater from East Maui to Central. It is not our policy to transport water from one aquifer system to another to the detriment of the area from which the water is taken. However, water should be used for the maximum benefit of all the people of Maui as required by the Community General Plan and State CWRM. Our goal is to create such a balance which would be beneficial to all the people of Maui.

Thank you for your testimony. We are hopeful that the matter will resolved amicably in the near future.

Sincerely,

David R. Craddick
Director
DRC:sc
xc: Mink & Yuen

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June 3, 2002

Mr. Edwin Young
Only Ono Ti Gardens
P O. Box 284
Hana, Hawaii 96713

Dear Mr. Young:

Subject: TESTIMONY ON PREPARATION NOTICE FOR DSEIS FOR EAST MAUI WATER DEVELOPMENT PLAN

At the public meeting of May 17, 2002 held at the Haiku Community Center to accept testimony on the above matter, you expressed concern about the effects of the Kuhiwa Well on Nahiku Springs. We cannot comment on this matter because the area involved is outside the boundaries of the SEIS study.

You also stated that no additional wells should be drilled in East Maui but the 1990 Water Use and Development Plan has this project listed. The decision to drill more wells is under the jurisdiction of the State Water Commission. In making their decision, they will consider the existing plans and sustainable yields as listed in the State Water Protection Plan.

Thank you for your testimony.

Sincerely,

David R. Craddick
Director

DRC:sc
xc: Mink & Yuen

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June 3, 2002

Mr. Mark Sheehan
Maui Tomorrow
Box 429
Makawao, Hawaii 96768

Dear Mr. Sheehan:

Subject: TESTIMONY ON PREPARATION NOTICE FOR DSEIS FOR EAST MAUI WATER DEVELOPMENT PLAN

At the public meeting of May 17, 2002 held at the Haiku Community Center to accept testimony on the above matter, you voiced your displeasure about the manner in which the meeting was called as being illegal. We checked with our Corporation Counsel's office and were satisfied that the meeting was indeed legal and proper.

We realize that the DSEIS Preparation Notice was distributed to various individuals and organizations sometime ago for review and comments. Although we received many interesting statements and observations, we felt that it would be desirable for those who did not have an opportunity to express their views initially be allowed to do so at this community meeting. We appreciate the response by those who testified.

Thank you for your testimony. We are hopeful that the matter will be resolved amicably in the near future.

Sincerely,

David R. Craddick
Director
DRC:sc
xc: Mink & Yuen

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June 3, 2002

Mr. Kurtis Decosterd
P. O. Box 791213
Paia, Hawaii 96779

Dear Mr. Decosterd:

Subject: TESTIMONY ON PREPARATION NOTICE FOR DSEIS FOR EAST MAUI WATER DEVELOPMENT PLAN

At the public meeting of May 17, 2002 held at the Haiku Community Center to accept testimony on the above matter, you were concerned about what was happening to the stream which is flowing by your property in Huelo. The stream you refer to is outside the study area detailed in the SEIS.

Thank you for your testimony.

Sincerely,

David R. Craddick
Director

DRC:sc
xc: Mink & Yuen

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June 5, 2002

Mr. Jonathan Starr
P. O. Box 1888
Kahului, HI 96733

Dear Mr. Starr:

Subject: TESTIMONY ON PREPARATION NOTICE FOR DSEIS FOR EAST MAUI WATER DEVELOPMENT PLAN

In your testimony at the public meeting at the Haiku Community Center, you represented that the meeting was not condoned by the Board of Water Supply whom you were purporting to represent. The testimony you have presented does not preclude the effort on the consultant's part to offer opportunities to bring up other issues which may have been overlooked in the process.

Mink and Yuen were contracted to prepare a Supplemental Environmental Impact Statement for the East Maui Development Plan.

The Water Department has the option to hold a scoping meeting with the public. Normally the meeting would be held during the review time after the prep notice was filed with OEQC. The meeting didn't happen during the open comment period. However, one of the comments was that we should have an open meeting to collect information from people not consulted. OEQC and our legal advisors said it is okay to hold the meeting to accept public information as long as we include and respond to the information in the draft SEIS.

We have done that in all cases including your testimony.

Sincerely,

David R. Craddick
Director
DRC:sc
xc: Mink & Yuen

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TOTAL P.02

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June 3, 2002

Mr Steve Slater
P. O. Box 790913
Paia, Hawaii 96779

Dear Mr. Slater:

Subject: TESTIMONY ON PREPARATION NOTICE FOR DSEIS FOR EAST MAUI WATER DEVELOPMENT PLAN

At the public meeting of May 17, 2002 held at the Haiku Community Center to accept testimony on the above matter, you were concerned about the loss in flow of fresh water to ocean would be damaging to the marine environment. The quantitative study done by marine biologists along the Haiku coast suggests that the natural flow of groundwater to the ocean does not play an important role in the marine biology of the Haiku coast. This subject will be covered in detail in the DSEIS.

You also felt that the meeting was a sham and that public input is being ignored. All testimony provided at the meeting is being reviewed and commented on. We realize that the DSEIS Preparation Notice was distributed to various individuals and organizations sometime ago for review and comments. Although we received many interesting statements and observations, we felt that it would be desirable for those who did not have an opportunity to express their views initially be allowed to do so at this community meeting. We appreciate the response by those who testified.

Thank you for your testimony.

Sincerely,

David R. Craddick
Director

DRC:ao
xc: Mink & Yuen

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COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

June 3, 2002

Mr. Dan Grantham
Sierra Club
HC1 Box 47
Haiku, Hawaii 96708

Dear Mr. Grantham:

Subject: TESTIMONY ON PREPARATION NOTICE FOR DSEIS FOR EAST MAUI WATER DEVELOPMENT PLAN

At the public meeting of May 17, 2002 held at the Haiku Community Center to accept testimony on the above matter, you were concerned about the possible adverse effects due to pumpage from the proposed wells on the marine environment. The quantitative study done by marine biologists along the Haiku coast suggests that the natural flow of groundwater to the ocean does not play an important role in the marine biology of the Haiku coast. This subject is discussed in the Draft SEIS.

You also expressed reservations about pumping water from one aquifer system to another. It is not our policy to transport water from one aquifer system to another to the detriment of the area from which the water is taken. However, we feel that water should be used for the maximum benefit of all the people of Maui as required by the Community General Plan and State CWRM. In preparing the East Maui Water Development Plan our goal is to create such a balance which would be beneficial to all the people of Maui.

Your testimony is appreciated.

Sincerely,

David R. Craddick
Director

DRC:ao
xc: Mink & Yuen

"By Water All Things Find Life"

Printed on recycled paper

19.6

MONITOR WELL PUMP TEST RESULTS

MWH Laboratories
MONTGOMERY WATSON HARZA

555 East Walnut Street
Pasadena, California 91101
Tel: 626 568 6400
Fax: 626 568 6324
1 800 568 LABS (1 800 568 5227)

2002 MAR 23 PM 4:29
DEPT. OF WATER SUPPLY
COUNTY OF MAUI

Laboratory Report

for

Maui, County of, Department of Water Supply
614 Palapala Dr

Kahului , HI 96732

Attention: Cari Cerizo
Fax: (808) 270-6133

DATE OF ISSUE
MAR 2 1 2002
MWH LABORATORIES

HDS Hillary Strayer
Project Manager

ACCREDITED IN ACCORDANCE WITH nelac 01114CA

Report#: 91594
PHASEV

Laboratory certifies that the test results meet all NELAC requirements unless noted in the Comments section or the Case Narrative. Following the cover page are Comments,QC Report,QC Summary,Data Report,Hits Report, totaling 43 page[s].

MONTGOMERY WATSON LABORATORIES

CHAIN OF CUSTODY RECORD

~~91594~~ 91594 Rew

555 E. Walnut St., Pasadena, CA 91101
(626) 568-6400 (800) 566-5227

MWLABS USE ONLY:

LOGIN COMMENTS:

SAMPLES CHECKED/LOGGED IN BY: JF
SAMPLE TEMP, RECEIPT AT LAB 5°C (Compliance: 4 +/- 2°C)
SAMPLES RECEIVED DAY OF COLLECTION? ☐ (check for yes)
BLUE ICE: FROZEN ✓ PARTIALLY FROZEN ___ THAWED ___

TO BE COMPLETED BY SAMPLER:

TAT requested: STD___ 1 week___ 3 day___ 1 day___

(check for yes)
COMPLIANCE SAMPLES - Requires state forms: X / X
NON-COMPLIANCE SAMPLES
REGULATION: PHASE2/5,UCMR (SDWA, Phase V, NPDES, FDA, ...)

REFER TO ATTACHED BOTTLE ORDER FOR ANALYSES ☐ (check for yes)

CLIENT or PROJECT NAME: COUNTY OF MAUI
PROJECT JOB # / P.O.#:

SAMPLER(S): PRINTED NAME AND SIGNATURE: K KUBA A KIDO

ANALYSES REQUIRED (mark an 'X' in all tests required for each sample line): #MET-HE

TIME	DATE	SITE NAME or LOCATION	IDENTIFIER, STATE ID #	MATRIX *	GRAB	COMP	ANALYSES REQUIRED	SAMPLER COMMENTS
							+ CAP HALF OPEN, BOTTLE WITH LITTLE SAMPLE	
0900	2/5/02		EMWDP SEIS MONITOR WELL	RGW	X		see attached	FASTEST TAT as possible

* MATRIX TYPES:

Reported by Volume:
RSW = Raw Surface Water
RGW = Raw Ground Water
FW = Other Finished Water
CFW = Chlor(am)inated Finished Water
SW = Storm Water
WW = Other Waste Water
CWW = Chlorinated Waste Water

Reported by Weight:
SO = Soil
SL = Sludge

	SIGNATURE	PRINT NAME	COMPANY/TITLE	DATE	TIME
RELINQUISHED BY:	A KIDO	A KIDO	DWS MAUI	2/5/02	1330
RECEIVED BY:	JF	ROBERT F	MWH	2/6/02	11:30
RELINQUISHED BY:					
RECEIVED BY:					

C-O-C# ______

PAGE ___ OF ___

Montgomery Watson Laboratories
555 E. Walnut St., Pasadena, CA 91101
PHONE: 626-568-6400/FAX: 626-568-6324

ACKNOWLEDGMENT OF SAMPLES RECEIVED

Maui, County of, Department of Water Supply
614 Palapala Dr
Kahului, HI 96732
Attn: Cari Cerizo
Phone: (808) 270-7344

Customer Code: MAUI
Group#: 91594
Project#: PHASEV
Proj Mgr: Hillary Strayer
Phone: (626) 568-6412

The following samples were received from you on 02/06/02. They have been scheduled for the tests listed beside each sample. If this information is incorrect, please contact your service representative. Thank you for using Montgomery Watson Laboratories.

Sample#	Sample Id	Matrix	Sample Date
2202060051	EMWDP SEIS MONITOR WELL	Water	05-feb-2002 09:00:00

Tests Scheduled:

@DIQUAT	@EDB-DBC	@ML525	@ML531	@NPS3	@PESTSDW
@VOASDWA	ALK	AS-MS	BA-MS	BE-MS	CA
CD-MS	CNDW	CR-MS	CU-MS	EC	ENDOTHAL
F	GLYPHOS	HG	MIREX1	NI-MS	NO2-N
NO3	PB-MS	PH	SB-MS	SE-MS	TCDD-DW
TL-MS					

Test Acronym Description

Test Acronym	Description
@DIQUAT	Diquat and Paraquat
@EDB-DBC	EDB and DBCP by GC-ECD
@ML525	525 Semivolatiles by GC/MS
@ML531	Aldicarbs
@NPS3	Herbicides by 515.1
@PESTSDW	SDWA Pesticides
@VOASDWA	Regulated VOCs plus Lists 1&3
ALK	Alkalinity
AS-MS	Arsenic, Total, ICAP/MS
BA-MS	Barium, Total, ICAP/MS
BE-MS	Beryllium, Total, ICAP/MS
CA	Calcium, Total, ICAP
CD-MS	Cadmium, Total, ICAP/MS
CNDW	Cyanide
CR-MS	Chromium, Total, ICAP/MS
CU-MS	Copper, Total, ICAP/MS
EC	Specific Conductance
ENDOTHAL	Endothall
F	Fluoride
GLYPHOS	Glyphosate
HG	Mercury
MIREX1	Mirex

Maui, County of, Department of Water Supply
614 Palapala Dr
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Customer Code: MAUI
Group#: 91594
Project#: PHASEV
Proj Mgr: Hillary Strayer
Phone: (626) 568-6412

Test Acronym Description

Test Acronym	Description
NI-MS	Nickel, Total, ICAP/MS
NO2-N	Nitrite, Nitrogen by IC
NO3	Nitrate as Nitrogen by IC
PB-MS	Lead, Total, ICAP/MS
PH	Lab pH
SB-MS	Antimony, Total, ICAP/MS
SE-MS	Selenium, Total, ICAP/MS
TCDD-DW	2,3,7,8 - TCDD
TL-MS	Thallium, Total, ICAP/MS

MWH Laboratories
MONTGOMERY WATSON HARZA

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Report
Comments
#91594

Group Comments

(TCDD) Analyzed by Pace Analytical, Minneapolis, MN.
(508) Sample results for aldrin and heptachlor not reported, due to LCS failure. Use 525.2 for reporting. QIR-GC-02-042.
(525.2) Methoxychlor failed high in LFB. Use 508 data. Di-n-butylphthalate reported as NA, possible system contamination. Matrix interference with surrogate compounds.

(QC Ref#: 164254)

Test: Aldrin
QC Type: LCS1
Recovery out of limits, sample result may have a low bias. QIR-GC-02-042.

Test: Endosulfan I (alpha)
QC Type: MSD
MSD is a NELAC required QC, not a method requirement. LCS recovery was within QC acceptance limits. QIR-GC-02-042.

Test: Heptachlor
QC Type: LCS1
Recovery out of limits, sample result may have a low bias. QIR-GC-02-042.

Test: Heptachlor Epoxide
QC Type: MSD
MSD is a NELAC required QC, not a method requirement. LCS recovery was within QC acceptance limits. QIR-GC-02-042.

Test: Tetrachlorometaxylene (surr)
QC Type: LCS1
Recovery out of limits, secondary surrogate was within QC acceptance limits. QIR-GC-02-042.

(QC Ref#: 164391)

Test: Acifluorfen (qualitative)
QC Type: MS
Recovery out of limits, LCS recoveries were within QC acceptance limits. QIR-GC-02-052.
QC Type: MSD
Recovery out of limits, LCS recoveries were within QC acceptance limits. QIR-GC-02-052.

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Test: Tot DCPA Mono&Diacid Degradate
QC Type: LCS1
Recovery out of limits, sample result may have a low bias.
QIR-GC-02-052.
Test: Dinoseb
QC Type: LCS1
Recovery out of limits, sample result may have a low bias.
QIR-GC-02-052.
QC Type: MSD
Recovery out of limits, sample result may have a low bias.
QIR-GC-02-052.

(QC Ref#: 164400)
Test: 2-Butanone (MEK)
QC Type: MS
MS/MSD are NELAC, not method, specified QC. Meets method
criteriea for LFB.
QC Type: MSD
MS/MSD are NELAC, not method, specified QC. Meets method
criteriea for LFB.

(QC Ref#: 165825)
Test: Di-(2-Ethylhexyl)adipate
QC Type: MS
Failed high, no effect on ND data
Test: Methoxychlor
QC Type: LCS1
Bias high for methoxychlor - All samples ND.
Bias high for methoxychlor - All samples ND. See QIR#GCMS-02
Failed high, no effect on ND data
-073.
See QIR#GCMS-02-082.
QC Type: MS
Failed high, no effect on ND data
QC Type: MSD
Failed high, no effect on ND data

(QC Ref#: 2202060051)
Test: 525 Semivolatiles by GC/MS
SEE QIR-GCMS-02-90,system may be contaminated with (1.6ppb)

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Di-n-butyl phthalate. Surrogate#3 Perylene-d12 NA due to sev
ered matrix interference.

MWH Laboratories
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Laboratory
Hits Report
#91594

Maui, County of, Department of
Water Supply
Cari Cerizo
614 Palapala Dr
Kahului , HI 96732

Samples Received

06-feb-2002 13:13:26

Analyzed	Sample#	Sample ID	Result	UNITS	MRL
	2202060051	EMWDP SEIS MONITOR WELL			
02/07/02		Alkalinity	64	mg/l	1.000
02/12/02		Arsenic, Total, ICAP/MS	1.4	ug/l	1.000
02/12/02		Barium, Total, ICAP/MS	17	ug/l	2.000
02/11/02		Calcium, Total, ICAP	9.8	mg/l	1.000
02/12/02		Chromium, Total, ICAP/MS	13	ug/l	1.000
02/12/02		Copper, Total, ICAP/MS	88	ug/l	2.000
02/06/02		Fluoride	0.14	mg/l	.050
02/07/02		Lab pH	8.2	Units	.001
02/12/02		Lead, Total, ICAP/MS	9.1	ug/l	.500
02/12/02		Nickel, Total, ICAP/MS	23	ug/l	5.000
02/06/02		Nitrate as Nitrogen by IC	0.35	mg/l	.100
02/07/02		Specific Conductance	247	umho/c	4.000

SUMMARY OF POSITIVE DATA ONLY.

MWH Laboratories
MONTGOMERY WATSON HARZA

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Laboratory
Data Report
#91594

Maui, County of, Department of
Water Supply
Cari Cerizo
614 Palapala Dr
Kahului , HI 96732

Samples Received

02/06/02

EMWDP SEIS MONITOR WELL (2202060051) Sampled on 02/05/02 09:00

Prepared	Analyzed	QC Ref#	Method	Analyte	Result	Units	MRL	Dilution
	02/07/02 00:00	163572	(SM2320B/E310.1)	Alkalinity	64	mg/l	1.0	1
	02/12/02 12:28	163905	(EPA/ML 200.8)	Arsenic, Total, ICAP/MS	1.4	ug/l	1.0	1
	02/12/02 12:28	163928	(EPA/ML 200.8)	Barium, Total, ICAP/MS	17	ug/l	2.0	1
	02/12/02 12:28	163890	(EPA/ML 200.8)	Beryllium, Total, ICAP/MS	ND	ug/l	1.0	1
	02/11/02 10:05	163694	(ML/EPA 200.7)	Calcium, Total, ICAP	9.8	mg/l	1.0	1
	02/12/02 12:28	163920	(EPA/ML 200.8)	Cadmium, Total, ICAP/MS	ND	ug/l	0.50	1
	02/08/02 00:00	163606	(SM4500CN-F)	Cyanide	ND	mg/l	0.025	1
	02/12/02 12:28	163881	(EPA/ML 200.8)	Chromium, Total, ICAP/MS	13	ug/l	1.0	1
	02/12/02 12:28	163893	(EPA/ML 200.8)	Copper, Total, ICAP/MS	88	ug/l	2.0	1
	02/07/02 00:00	163435	(ML/S2510B)	Specific Conductance	247	umho/cm	4.0	1
02/08/02	02/15/02 00:00	164410	(ML/EPA 548.1)	Endothall	ND	ug/l	20	4
	02/06/02 00:00	163408	(SM4500F-C)	Fluoride	0.14	mg/l	0.050	1
	02/11/02 00:00	163779	(ML/EPA 547)	Glyphosate	ND	ug/l	6.0	1
	02/12/02 17:00	164006	(EPA/ML 245.1)	Mercury	ND	ug/l	0.20	1
02/07/02	02/16/02 00:00	164253	(ML/EPA 508)	Mirex	ND	ug/l	0.25	1
	02/12/02 12:28	163888	(EPA/ML 200.8)	Nickel, Total, ICAP/MS	23	ug/l	5.0	1
	02/06/02 14:43	163709	(ML/EPA 300.0)	Nitrite, Nitrogen by IC	ND	mg/l	0.10	1
	02/06/02 14:43	163710	(ML/EPA 300.0)	Nitrate as Nitrogen by IC	0.35	mg/l	0.10	1
	02/12/02 12:28	163943	(EPA/ML 200.8)	Lead, Total, ICAP/MS	9.1	ug/l	0.50	1
	02/07/02 00:00	163495	(S4500HB/E150.1)	Lab pH	8.2	Units	0.0010	1
	02/12/02 12:28	163931	(EPA/ML 200.8)	Antimony, Total, ICAP/MS	ND	ug/l	1.0	1
	02/12/02 12:28	163908	(EPA/ML 200.8)	Selenium, Total, ICAP/MS	ND	ug/l	5.0	1
02/15/02	02/22/02 00:00		(EPA 1613)	2,3,7,8 - TCDD	ND	pg/l	5.0	1
	02/12/02 12:28	163937	(EPA/ML 200.8)	Thallium, Total, ICAP/MS	ND	ug/l	1.0	1
				525 Semivolatiles by GC/MS				
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	2,4-Dinitrotoluene	ND	ug/l	0.10	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	alpha-Chlordane	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Diazinon	ND	ug/l	0.10	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Acenaphthylene	ND	ug/l	0.10	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Alachlor	ND	ug/l	0.050	1

MWH Laboratories
MONTGOMERY WATSON HARZA

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Laboratory
Data Report
#91594

Maui, County of, Department of
Water Supply
(continued)

Prepared	Analyzed	QC Ref#	Method	Analyte	Result	Units	MRL	Dilution
EMWDP SEIS MONITOR WELL (2202060051) (continued)					Sampled on 02/05/02			
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Aldrin	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Anthracene	ND	ug/l	0.020	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Atrazine	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Benz(a)Anthracene	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Benzo(a)pyrene	ND	ug/l	0.020	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Benzo(b)Fluoranthene	ND	ug/l	0.020	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Benzo(g,h,i)Perylene	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Benzo(k)Fluoranthene	ND	ug/l	0.020	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Di(2-Ethylhexyl)phthalate	ND	ug/l	0.60	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Butylbenzylphthalate	ND	ug/l	0.50	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Bromacil	ND	ug/l	0.20	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Butachlor	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Caffeine	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Chrysene	ND	ug/l	0.020	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Dibenz(a,h)Anthracene	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Di-(2-Ethylhexyl)adipate	ND	ug/l	0.60	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Diethylphthalate	ND	ug/l	0.50	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Dieldrin	ND	ug/l	0.20	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Dimethylphthalate	ND	ug/l	0.50	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Dimethoate	ND	ug/l	10	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Di-n-Butylphthalate	NA	ug/l	0.50	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Endrin	ND	ug/l	0.10	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Fluoranthene	ND	ug/l	0.10	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Fluorene	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) gamma-Chlordane	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Hexachlorobenzene	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Hexachlorocyclopentadiene	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Heptachlor	ND	ug/l	0.040	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Heptachlor Epoxide	ND	ug/l	0.020	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Indeno(1,2,3,c,d)Pyrene	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Isophorone	ND	ug/l	0.50	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Lindane	ND	ug/l	0.020	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2	) Methoxychlor	NA	ug/l	0.050	1

MWH Laboratories
MONTGOMERY WATSON HARZA

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Laboratory
Data Report
#91594

Maui, County of, Department of
Water Supply
(continued)

Prepared	Analyzed	QC Ref#	Method	Analyte	Result	Units	MRL	Dilution
EMWDP SEIS MONITOR WELL (2202060051) (continued)						**Sampled on**	**02/05/02**	
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Metribuzin	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Molinate	ND	ug/l	0.20	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Metolachlor	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	trans-Nonachlor	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Pentachlorophenol	ND	ug/l	1.0	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Phenanthrene	ND	ug/l	0.020	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Prometryn	ND	ug/l	0.50	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Propachlor	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Pyrene	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Simazine	ND	ug/l	0.050	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Thiobencarb	ND	ug/l	0.20	1
02/09/02	03/11/02 00:00	165825	(ML/EPA 525.2)	Trifluralin	ND	ug/l	0.10	1
			(Surrogate)	Perylene-d12	NA	% Rec		
			Aldicarbs					
	02/16/02 00:00	164298	(ML/EPA 531.1)	3-Hydroxycarbofuran	ND	ug/l	2.0	1
	02/16/02 00:00	164298	(ML/EPA 531.1)	Aldicarb (Temik)	ND	ug/l	0.50	1
	02/16/02 00:00	164298	(ML/EPA 531.1)	Aldicarb sulfone	ND	ug/l	0.70	1
	02/16/02 00:00	164298	(ML/EPA 531.1)	Aldicarb sulfoxide	ND	ug/l	0.50	1
	02/16/02 00:00	164298	(ML/EPA 531.1)	Baygon	ND	ug/l	2.0	1
	02/16/02 00:00	164298	(ML/EPA 531.1)	Carbofuran (Furadan)	ND	ug/l	0.90	1
	02/16/02 00:00	164298	(ML/EPA 531.1)	Carbaryl	ND	ug/l	2.0	1
	02/16/02 00:00	164298	(ML/EPA 531.1)	Methiocarb	ND	ug/l	2.0	1
	02/16/02 00:00	164298	(ML/EPA 531.1)	Methomyl	ND	ug/l	1.0	1
	02/16/02 00:00	164298	(ML/EPA 531.1)	Oxamyl (Vydate)	ND	ug/l	2.0	1
			(Surrogate)	BDMC	98	% Rec		
			Diquat and Paraquat					
02/12/02	02/19/02 00:00	164668	(ML/EPA 549.2)	Diquat	ND	ug/l	0.40	1
02/12/02	02/19/02 00:00	164668	(ML/EPA 549.2)	Paraquat	ND	ug/l	2.0	1

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Prepared	Analyzed	QC Ref#	Method	Analyte	Result	Units	MRL	Dilution
EMWDP SEIS MONITOR WELL (2202060051) (continued) Sampled on 02/05/02								
			EDB and DBCP by GC-ECD					
02/07/02	02/12/02 00:00	164005	(ML/EPA 504.1)	Dibromochloropropane (DBCP)	ND	ug/l	0.010	1
02/07/02	02/12/02 00:00	164005	(ML/EPA 504.1)	Ethylene Dibromide (EDB)	ND	ug/l	0.010	1
			(Surrogate)	1,2-dibromopropane	87	% Rec		
			Herbicides by 515.1					
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	2,4,5-T	ND	ug/l	0.20	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	2,4,5-TP (Silvex)	ND	ug/l	0.20	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	2,4-D	ND	ug/l	0.10	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	2,4-DB	ND	ug/l	2.0	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	Dichlorprop	ND	ug/l	0.50	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	Acifluorfen (qualitative)	ND	ug/l	0.20	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	Bentazon	ND	ug/l	0.50	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	Dalapon (qualitative)	ND	ug/l	1.0	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	3,5-Dichlorobenzoic acid	ND	ug/l	0.50	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	Tot DCPA Mono&Diacid Degradate	ND	ug/l	0.10	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	Dicamba	ND	ug/l	0.080	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	Dinoseb	ND	ug/l	0.20	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	Pentachlorophenol	ND	ug/l	0.040	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	Picloram	ND	ug/l	0.10	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	4-Nitrophenol (qualitative)	ND	ug/l	5.0	1
02/13/02	02/17/02 00:00	164391	(ML/EPA 515.1)	2,4-Dichlorophenylacetic acid	ND	%R	0.0000	1
			(Surrogate)	2,4-Dichlorophenylacetic acid	95	% Rec		
			Regulated VOCs plus Lists 1&3					
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,1,1,2-Tetrachloroethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,1,1-Trichloroethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,1,2,2-Tetrachloroethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,1,2-Trichloroethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,1-Dichloroethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,1-Dichloroethylene	ND	ug/l	0.50	1

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Prepared	Analyzed	QC Ref#	Method	Analyte	Result	Units	MRL	Dilution
EMWDP SEIS MONITOR WELL (2202060051) (continued)					**Sampled on**		**02/05/02**	
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,1-Dichloropropene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,2,3-Trichlorobenzene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,2,3-Trichloropropane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,2,4-Trichlorobenzene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,2,4-Trimethylbenzene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,2-Dichloroethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,2-Dichloropropane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,3,5-Trimethylbenzene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	1,3-Dichloropropane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	p-Dichlorobenzene (1,4-DCB)	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	2,2-Dichloropropane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	2-Butanone (MEK)	ND	ug/l	5.0	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	o-Chlorotoluene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	p-Chlorotoluene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	4-Methyl-2-Pentanone (MIBK)	ND	ug/l	5.0	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Benzene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Bromobenzene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Bromomethane (Methyl Bromide)	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	cis-1,2-Dichloroethylene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Chlorobenzene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Carbon Tetrachloride	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	cis-1,3-Dichloropropene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Bromoform	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Chloroform (Trichloromethane)	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Bromochloromethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Chloroethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Chloromethane(Methyl Chloride)	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Chlorodibromomethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Dibromomethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Bromodichloromethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Dichloromethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Di-isopropyl ether	ND	ug/l	5.0	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Ethyl benzene	ND	ug/l	0.50	1

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Prepared	Analyzed	QC Ref#	Method	Analyte	Result	Units	MRL	Dilution
EMWDP SEIS MONITOR WELL (2202060051) (continued)					Sampled on 02/05/02			
	02/13/02 00:00	164400	(ML/EPA 524.2)	Dichlorodifluoromethane	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Fluorotrichloromethane-Freon11	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Hexachlorobutadiene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Isopropylbenzene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	m-Dichlorobenzene (1,3-DCB)	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	m,p-Xylenes	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Methyl Tert-butyl ether (MTBE)	ND	ug/l	3.0	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Naphthalene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	n-Butylbenzene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	n-Propylbenzene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	o-Xylene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	o-Dichlorobenzene (1,2-DCB)	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Tetrachloroethylene (PCE)	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	p-Isopropyltoluene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	sec-Butylbenzene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Styrene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	trans-1,2-Dichloroethylene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	tert-amyl Methyl Ether	ND	ug/l	3.0	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	tert-Butyl Ethyl Ether	ND	ug/l	3.0	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	tert-Butylbenzene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Trichloroethylene (TCE)	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Trichlorotrifluoroethane(Freon	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	trans-1,3-Dichloropropene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Toluene	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Total THM	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Total xylenes	ND	ug/l	0.50	1
	02/13/02 00:00	164400	(ML/EPA 524.2)	Vinyl chloride (VC)	ND	ug/l	0.30	1
			(Surrogate)	1,2-Dichloroethane-d4	107	% Rec		
			(Surrogate)	4-Bromofluorobenzene	97	% Rec		
			(Surrogate)	Toluene-d8	100	% Rec		

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Prepared	Analyzed	QC Ref#	Method	Analyte	Result	Units	MRL	Dilution

EMWDP SEIS MONITOR WELL (2202060051) (continued) Sampled on 02/05/02

SDWA Pesticides

Prepared	Analyzed	QC Ref#	Method	Analyte	Result	Units	MRL	Dilution
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) PCB 1016 Aroclor	ND	ug/l	0.070	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) PCB 1221 Aroclor	ND	ug/l	0.10	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) PCB 1232 Aroclor	ND	ug/l	0.10	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) PCB 1242 Aroclor	ND	ug/l	0.10	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) PCB 1248 Aroclor	ND	ug/l	0.10	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) PCB 1254 Aroclor	ND	ug/l	0.10	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) PCB 1260 Aroclor	ND	ug/l	0.10	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Alpha-BHC	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Alachlor (Alanex)	ND	ug/l	0.050	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Aldrin	NA	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Beta-BHC	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Chlordane	ND	ug/l	0.10	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Chlorthalonil (Draconil,Bravo)	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Delta-BHC	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) p,p' DDD	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) p,p' DDE	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) p,p' DDT	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Dieldrin	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Endrin Aldehyde	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Endrin	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Endosulfan I (alpha)	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Endosulfan II (beta)	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Endosulfan sulfate	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Heptachlor	NA	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Heptachlor Epoxide	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Lindane (gamma-BHC)	ND	ug/l	0.010	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Methoxychlor	ND	ug/l	0.050	1
02/07/02	02/16/02 00:00	164254	(ML/EPA 508	) Toxaphene	ND	ug/l	0.50	1
			(Surrogate	) Dibutyl Chlorendate	70	% Rec		
			(Surrogate	) Tetrachlorometaxylene	104	% Rec		

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Prepared	Analyzed	QC Ref#	Method	Analyte	Result	Units	MRL	Dilution

EMWDP SEIS MONITOR WELL (2202060051) (continued) Sampled on 02/05/02

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QC Ref #163408 - Fluoride		Analysis Date: 02/06/2002
2202060051	EMWDP SEIS MONITOR WELL	
QC Ref #163435 - Specific Conductance		Analysis Date: 02/07/2002
2202060051	EMWDP SEIS MONITOR WELL	
QC Ref #163495 - Lab pH		Analysis Date: 02/07/2002
2202060051	EMWDP SEIS MONITOR WELL	
QC Ref #163572 - Alkalinity		Analysis Date: 02/07/2002
2202060051	EMWDP SEIS MONITOR WELL	
QC Ref #163606 - Cyanide		Analysis Date: 02/08/2002
2202060051	EMWDP SEIS MONITOR WELL	
QC Ref #163694 - Calcium, Total, ICAP		Analysis Date: 02/11/2002
2202060051	EMWDP SEIS MONITOR WELL	
QC Ref #163709 - Nitrite, Nitrogen by IC		Analysis Date: 02/06/2002
2202060051	EMWDP SEIS MONITOR WELL	
QC Ref #163710 - Nitrate as Nitrogen by IC		Analysis Date: 02/06/2002
2202060051	EMWDP SEIS MONITOR WELL	

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QC Ref #163779 - Glyphosate		Analysis Date: 02/11/2002
	2202060051	EMWDP SEIS MONITOR WELL
QC Ref #163881 - Chromium, Total, ICAP/MS		Analysis Date: 02/12/2002
	2202060051	EMWDP SEIS MONITOR WELL
QC Ref #163888 - Nickel, Total, ICAP/MS		Analysis Date: 02/12/2002
	2202060051	EMWDP SEIS MONITOR WELL
QC Ref #163890 - Beryllium, Total, ICAP/MS		Analysis Date: 02/12/2002
	2202060051	EMWDP SEIS MONITOR WELL
QC Ref #163893 - Copper, Total, ICAP/MS		Analysis Date: 02/12/2002
	2202060051	EMWDP SEIS MONITOR WELL
QC Ref #163905 - Arsenic, Total, ICAP/MS		Analysis Date: 02/12/2002
	2202060051	EMWDP SEIS MONITOR WELL
QC Ref #163908 - Selenium, Total, ICAP/MS		Analysis Date: 02/12/2002
	2202060051	EMWDP SEIS MONITOR WELL
QC Ref #163920 - Cadmium, Total, ICAP/MS		Analysis Date: 02/12/2002
	2202060051	EMWDP SEIS MONITOR WELL

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QC Ref #163928 - Barium, Total, ICAP/MS **Analysis Date: 02/12/2002**

2202060051 EMWDP SEIS MONITOR WELL

QC Ref #163931 - Antimony, Total, ICAP/MS **Analysis Date: 02/12/2002**

2202060051 EMWDP SEIS MONITOR WELL

QC Ref #163937 - Thallium, Total, ICAP/MS **Analysis Date: 02/12/2002**

2202060051 EMWDP SEIS MONITOR WELL

QC Ref #163943 - Lead, Total, ICAP/MS **Analysis Date: 02/12/2002**

2202060051 EMWDP SEIS MONITOR WELL

QC Ref #164005 - EDB and DBCP by GC-ECD **Analysis Date: 02/12/2002**

2202060051 EMWDP SEIS MONITOR WELL

QC Ref #164006 - Mercury **Analysis Date: 02/12/2002**

2202060051 EMWDP SEIS MONITOR WELL

QC Ref #164253 - Mirex **Analysis Date: 02/16/2002**

2202060051 EMWDP SEIS MONITOR WELL

QC Ref #164254 - SDWA Pesticides **Analysis Date: 02/16/2002**

2202060051 EMWDP SEIS MONITOR WELL

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QC Ref #164298 - Aldicarbs **Analysis Date: 02/16/2002**

2202060051 EMWDP SEIS MONITOR WELL

QC Ref #164391 - Herbicides by 515.1 **Analysis Date: 02/17/2002**

2202060051 EMWDP SEIS MONITOR WELL

QC Ref #164400 - Regulated VOCs plus Lists 1&3 **Analysis Date: 02/13/2002**

2202060051 EMWDP SEIS MONITOR WELL

QC Ref #164410 - Endothall **Analysis Date: 02/15/2002**

2202060051 EMWDP SEIS MONITOR WELL

QC Ref #164668 - Diquat and Paraquat **Analysis Date: 02/19/2002**

2202060051 EMWDP SEIS MONITOR WELL

QC Ref #165825 - 525 Semivolatiles by GC/MS **Analysis Date: 03/11/2002**

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QC Ref #163408 Fluoride

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
MS	Spiked sample	Lab # 22	02060051		(0.00 - 0.00)	
LCS1	Fluoride	1.00	0.967	96.7	(90.00 - 110.00)	
LCS2	Fluoride	1.00	0.974	97.4	(90.00 - 110.00)	0.72
MBLK	Fluoride	ND				
MS	Fluoride	1.00	0.974	97.4	(80.00 - 120.00)	
MSD	Fluoride	1.00	0.980	98.0	(80.00 - 120.00)	0.61

QC Ref #163435 Specific Conductance

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
DUP	Specific Conductance	1380	1380		(0.00 - 20.00)	0.0

QC Ref #163495 Lab pH

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
DUP	Lab pH	7.4	7.4		(0.00 - 20.00)	0.0

QC Ref #163572 Alkalinity

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
MS	Spiked sample	Lab # 22	02050239		(0.00 - 0.00)	
LCS1	Alkalinity	96.2	97.0	100.8	(90.00 - 110.00)	
LCS2	Alkalinity	96.2	96.8	100.6	(90.00 - 110.00)	0.21
MBLK	Alkalinity	ND				
MS	Alkalinity	96.2	96.2	100.0	(80.00 - 120.00)	
MSD	Alkalinity	96.2	94.7	98.4	(80.00 - 120.00)	1.6

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QC Ref #163606 Cyanide

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
MS	Spiked sample	Lab # 22	02070131		(0.00 - 0.00)	
LCS1	Cyanide	0.10	0.100	100.0	(80.00 - 120.00)	
MBLK	Cyanide	ND				
MS	Cyanide	0.10	0.108	108.0	(80.00 - 120.00)	
MSD	Cyanide	0.10	0.112	112.0	(80.00 - 120.00)	3.6

QC Ref #163694 Calcium, Total, ICAP

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
LCS1	Calcium, Total, ICAP	50	52.7	105.4	(85.00 - 115.00)	
LCS2	Calcium, Total, ICAP	50	52.6	105.2	(85.00 - 115.00)	0.19
MBLK	Calcium, Total, ICAP	ND				
MS	Calcium, Total, ICAP	50	50.8	101.6	(70.00 - 130.00)	
MSD	Calcium, Total, ICAP	50	50.4	100.8	(70.00 - 130.00)	0.79

QC Ref #163709 Nitrite, Nitrogen by IC

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
LCS1	Nitrite, Nitrogen by IC	1.0	1.00	100.0	(90.00 - 110.00)	
LCS2	Nitrite, Nitrogen by IC	1.0	0.987	98.7	(90.00 - 110.00)	1.3
MBLK	Nitrite, Nitrogen by IC	ND				
MS	Nitrite, Nitrogen by IC	1.0	1.03	103.0	(80.00 - 120.00)	
MSD	Nitrite, Nitrogen by IC	1.0	1.02	102.0	(80.00 - 120.00)	0.98

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QC Ref #163710 Nitrate as Nitrogen by IC

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
MS	Nitrate as Nitrogen by IC	2.5	2.61	104.4	(80.00 - 120.00)	
MSD	Nitrate as Nitrogen by IC	2.5	2.63	105.2	(80.00 - 120.00)	0.76

QC Ref #163779 Glyphosate

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
MS	Spiked sample	Lab # 22	01310109		(0.00 - 0.00)	
LCS1	Glyphosate	10	10.5	105.0	(70.00 - 130.00)	
MBLK	Glyphosate	ND				
MS	Glyphosate	10	10.4	104.0	(70.00 - 130.00)	

QC Ref #163881 Chromium, Total, ICAP/MS

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
AASPKSMP	Spiked sample	Lab # 22	02060070		(0.00 - 0.00)	
LCS1	Chromium, Total, ICAP/MS	100	103	103.0	(85.00 - 115.00)	
LCS2	Chromium, Total, ICAP/MS	100	103	103.0	(85.00 - 115.00)	0.00
MBLK	Chromium, Total, ICAP/MS	ND				
MS	Chromium, Total, ICAP/MS	100	96.1	96.1	(70.00 - 130.00)	
MSD	Chromium, Total, ICAP/MS	100	95.3	95.3	(70.00 - 130.00)	0.84

QC Ref #163888 Nickel, Total, ICAP/MS

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
AASPKSMP	Spiked sample	Lab # 22	02060070		(0.00 - 0.00)	
LCS1	Nickel, Total, ICAP/MS	50	49.9	99.8	(85.00 - 115.00)	
LCS2	Nickel, Total, ICAP/MS	50	50.4	100.8	(85.00 - 115.00)	1.00

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MBLK	Nickel, Total, ICAP/MS	ND				
MS	Nickel, Total, ICAP/MS	50	46.4	92.8	(70.00 - 130.00)	
MSD	Nickel, Total, ICAP/MS	50	46.4	92.8	(70.00 - 130.00)	0.00

QC Ref #163890 Beryllium, Total, ICAP/MS

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
AASPKSMP	Spiked sample	Lab # 22	02060070		(0.00 - 0.00)	
LCS1	Beryllium, Total, ICAP/MS	5.00	5.1	102.0	(70.00 - 130.00)	
LCS2	Beryllium, Total, ICAP/MS	5.00	5.17	103.4	(85.00 - 115.00)	1.4
MBLK	Beryllium, Total, ICAP/MS	ND				
MS	Beryllium, Total, ICAP/MS	5.00	4.83	96.6	(70.00 - 130.00)	
MSD	Beryllium, Total, ICAP/MS	5.00	4.86	97.2	(70.00 - 130.00)	0.62

QC Ref #163893 Copper, Total, ICAP/MS

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
AASPKSMP	Spiked sample	Lab # 22	02060070		(0.00 - 0.00)	
LCS1	Copper, Total, ICAP/MS	100	103	103.0	(85.00 - 115.00)	
LCS2	Copper, Total, ICAP/MS	100	103	103.0	(85.00 - 115.00)	0.00
MBLK	Copper, Total, ICAP/MS	ND				
MS	Copper, Total, ICAP/MS	100	93	93.0	(70.00 - 130.00)	
MSD	Copper, Total, ICAP/MS	100	91.5	91.5	(70.00 - 130.00)	1.6

QC Ref #163905 Arsenic, Total, ICAP/MS

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
AASPKSMP	Spiked sample	Lab # 22	02060070		(0.00 - 0.00)	
LCS1	Arsenic, Total, ICAP/MS	20	20.6	103.0	(85.00 - 115.00)	
LCS2	Arsenic, Total, ICAP/MS	20	20.9	104.5	(85.00 - 115.00)	1.4
MBLK	Arsenic, Total, ICAP/MS	ND				
MS	Arsenic, Total, ICAP/MS	20	20	100.0	(70.00 - 130.00)	

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MSD	Arsenic, Total, ICAP/MS	20	20.2	101.0	(70.00 - 130.00)	1.00

QC Ref #163908 Selenium, Total, ICAP/MS

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
AASPKSMP	Spiked sample	Lab # 22	02060070		(0.00 - 0.00)	
LCS1	Selenium, Total, ICAP/MS	20	20	100.0	(85.00 - 115.00)	
LCS2	Selenium, Total, ICAP/MS	20	20.5	102.5	(85.00 - 115.00)	2.5
MBLK	Selenium, Total, ICAP/MS	ND				
MS	Selenium, Total, ICAP/MS	20	19.8	99.0	(70.00 - 130.00)	
MSD	Selenium, Total, ICAP/MS	20	20	100.0	(70.00 - 130.00)	1.0

QC Ref #163920 Cadmium, Total, ICAP/MS

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
AASPKSMP	Spiked sample	Lab # 22	02060070		(0.00 - 0.00)	
LCS1	Cadmium, Total, ICAP/MS	20	20.3	101.5	(85.00 - 115.00)	
LCS2	Cadmium, Total, ICAP/MS	20	20.4	102.0	(85.00 - 115.00)	0.49
MBLK	Cadmium, Total, ICAP/MS	ND				
MS	Cadmium, Total, ICAP/MS	20	20	100.0	(70.00 - 130.00)	
MSD	Cadmium, Total, ICAP/MS	20	20.1	100.5	(70.00 - 130.00)	0.50

QC Ref #163928 Barium, Total, ICAP/MS

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
AASPKSMP	Spiked sample	Lab # 22	02060070		(0.00 - 0.00)	
LCS1	Barium, Total, ICAP/MS	100	104	104.0	(85.00 - 115.00)	
LCS2	Barium, Total, ICAP/MS	100	105	105.0	(85.00 - 115.00)	0.96
MBLK	Barium, Total, ICAP/MS	ND				
MS	Barium, Total, ICAP/MS	100	104	104.0	(70.00 - 130.00)	
MSD	Barium, Total, ICAP/MS	100	105	105.0	(70.00 - 130.00)	0.96

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QC Ref #163931 Antimony, Total, ICAP/MS

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
AASPKSMP	Spiked sample	Lab # 22	02060070		(0.00 - 0.00)	
LCS1	Antimony, Total, ICAP/MS	50	51.8	103.6	(85.00 - 115.00)	
LCS2	Antimony, Total, ICAP/MS	50	52.6	105.2	(85.00 - 115.00)	1.5
MBLK	Antimony, Total, ICAP/MS	ND				
MS	Antimony, Total, ICAP/MS	50	53.1	106.2	(70.00 - 130.00)	
MSD	Antimony, Total, ICAP/MS	50	53.5	107.0	(70.00 - 130.00)	0.75

QC Ref #163937 Thallium, Total, ICAP/MS

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
AASPKSMP	Spiked sample	Lab # 22	02060070		(0.00 - 0.00)	
LCS1	Thallium, Total, ICAP/MS	20.0	19.8	99.0	(85.00 - 115.00)	
LCS2	Thallium, Total, ICAP/MS	20.0	20.1	100.5	(85.00 - 115.00)	1.5
MBLK	Thallium, Total, ICAP/MS	ND				
MS	Thallium, Total, ICAP/MS	20.0	20.5	102.5	(70.00 - 130.00)	
MSD	Thallium, Total, ICAP/MS	20.0	20.3	101.5	(70.00 - 130.00)	0.98

QC Ref #163943 Lead, Total, ICAP/MS

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
AASPKSMP	Spiked sample	Lab # 22	02060070		(0.00 - 0.00)	
LCS1	Lead, Total, ICAP/MS	20	21.4	107.0	(85.00 - 115.00)	
LCS2	Lead, Total, ICAP/MS	20	21.4	107.0	(85.00 - 115.00)	0.00
MBLK	Lead, Total, ICAP/MS	ND				
MS	Lead, Total, ICAP/MS	20	21.8	109.0	(70.00 - 130.00)	
MSD	Lead, Total, ICAP/MS	20	21.8	109.0	(70.00 - 130.00)	0.00

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QC Ref #164005 EDB and DBCP by GC-ECD

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
MS	Spiked sample	Lab # 22	02050193		(0.00 - 0.00)	
LCS1	Dibromochloropropane (DBCP)	0.02	0.016	80.0	(70.00 - 130.00)	
LCS2	Dibromochloropropane (DBCP)	0.20	0.15	75.0	(70.00 - 130.00)	
MBLK	Dibromochloropropane (DBCP)	ND				
MS	Dibromochloropropane (DBCP)	0.20	0.15	75.0	(65.00 - 135.00)	
MSD	Dibromochloropropane (DBCP)	0.20	0.14	70.0	(65.00 - 135.00)	6.9
LCS1	Ethylene Dibromide (EDB)	0.02	0.020	100.0	(70.00 - 130.00)	
LCS2	Ethylene Dibromide (EDB)	0.20	0.20	100.0	(70.00 - 130.00)	
MBLK	Ethylene Dibromide (EDB)	ND				
MS	Ethylene Dibromide (EDB)	0.20	0.18	90.0	(65.00 - 135.00)	
MSD	Ethylene Dibromide (EDB)	0.20	0.18	90.0	(65.00 - 135.00)	0.00
LCS1	1,2-dibromopropane (surr)	100	78	78.0	(60.00 - 140.00)	
LCS2	1,2-dibromopropane (surr)	100	76	76.0	(60.00 - 140.00)	2.6
MBLK	1,2-dibromopropane (surr)	100	92	92.0		
MS	1,2-dibromopropane (surr)	100	80	80.0	(60.00 - 140.00)	
MSD	1,2-dibromopropane (surr)	100	80	80.0	(60.00 - 140.00)	0.00

QC Ref #164006 Mercury

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
MS	Spiked sample	Lab # 22	02050007		(0.00 - 0.00)	
LCS1	Mercury	1.50	1.55	103.3	(85.00 - 115.00)	
LCS2	Mercury	1.50	1.56	104.0	(85.00 - 115.00)	0.64
MBLK	Mercury	ND				
MS	Mercury	1.50	1.56	104.0	(70.00 - 130.00)	
MSD	Mercury	1.50	1.58	105.3	(70.00 - 130.00)	1.3

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QC Ref #164253 Mirex

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
LCS1	Mirex	0.25	0.26	104.0	(70.00 - 130.00)	
MBLK	Mirex	ND				
MS	Mirex	0.25	0.26	104.0	(70.00 - 130.00)	
MSD	Mirex	0.25	0.29	116.0	(70.00 - 130.00)	11

QC Ref #164254 SDWA Pesticides

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
MBLK	PCB 1016 Aroclor	ND				
MBLK	PCB 1221 Aroclor	ND				
MBLK	PCB 1232 Aroclor	ND				
LCS2	PCB 1242 Aroclor	0.500	0.526	105.2	(70.00 - 130.00)	
MBLK	PCB 1242 Aroclor	ND				
MS	PCB 1242 Aroclor	0.500	0.472	94.4	(65.00 - 135.00)	
MSD	PCB 1242 Aroclor	0.500	0.464	92.8	(65.00 - 135.00)	1.7
MBLK	PCB 1248 Aroclor	ND				
MBLK	PCB 1254 Aroclor	ND				
MBLK	PCB 1260 Aroclor	ND				
LCS1	Alpha-BHC	0.050	0.049	98.0	(62.00 - 122.00)	
MBLK	Alpha-BHC	ND				
MS	Alpha-BHC	0.050	0.051	102.0	(57.00 - 127.00)	
MSD	Alpha-BHC	0.050	0.056	112.0	(57.00 - 127.00)	9.3
MS	Spiked sample	Lab # 22	02060213		(0.00 - 0.00)	
LCS1	Alachlor (Alanex)	0.100	0.100	100.0	(70.00 - 130.00)	
MBLK	Alachlor (Alanex)	ND				
MS	Alachlor (Alanex)	0.100	0.106	106.0	(65.00 - 135.00)	
MSD	Alachlor (Alanex)	0.100	0.117	117.0	(65.00 - 135.00)	9.9
LCS1	Aldrin	0.050	0.014	28.0	(56.00 - 116.00)	
MBLK	Aldrin	ND				

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MS	Aldrin	0.050	0.047	94.0	(51.00 - 121.00)	
MSD	Aldrin	0.050	0.057	114.0	(51.00 - 121.00)	19
LCS1	Beta-BHC	0.050	0.053	106.0	(65.00 - 125.00)	
MBLK	Beta-BHC	ND				
MS	Beta-BHC	0.050	0.057	114.0	(60.00 - 130.00)	
MSD	Beta-BHC	0.050	0.062	124.0	(60.00 - 130.00)	8.4
MBLK	Chlordane	ND				
LCS1	Chlorthalonil (Draconil,Bravo)	0.100	0.092	92.0	(61.00 - 121.00)	
MBLK	Chlorthalonil (Draconil,Bravo)	ND				
MS	Chlorthalonil (Draconil,Bravo)	0.100	0.100	100.0	(56.00 - 126.00)	
MSD	Chlorthalonil (Draconil,Bravo)	0.100	0.109	109.0	(56.00 - 126.00)	8.6
LCS1	Delta-BHC	0.050	0.057	114.0	(72.00 - 132.00)	
MBLK	Delta-BHC	ND				
MS	Delta-BHC	0.050	0.055	110.0	(67.00 - 137.00)	
MSD	Delta-BHC	0.050	0.061	122.0	(67.00 - 137.00)	10
LCS1	p,p' DDD	0.100	0.102	102.0	(77.00 - 137.00)	
MBLK	p,p' DDD	ND				
MS	p,p' DDD	0.100	0.107	107.0	(72.00 - 142.00)	
MSD	p,p' DDD	0.100	0.117	117.0	(72.00 - 142.00)	8.9
LCS1	p,p' DDE	0.100	0.094	94.0	(69.00 - 129.00)	
MBLK	p,p' DDE	ND				
MS	p,p' DDE	0.100	0.117	117.0	(64.00 - 134.00)	
MSD	p,p' DDE	0.100	0.131	131.0	(64.00 - 134.00)	11
LCS1	p,p' DDT	0.100	0.117	117.0	(82.00 - 142.00)	
MBLK	p,p' DDT	ND				
MS	p,p' DDT	0.100	0.120	120.0	(77.00 - 147.00)	
MSD	p,p' DDT	0.100	0.132	132.0	(77.00 - 147.00)	9.5
LCS1	Dieldrin	0.100	0.098	98.0	(57.00 - 117.00)	
MBLK	Dieldrin	ND				
MS	Dieldrin	0.100	0.086	86.0	(52.00 - 122.00)	
MSD	Dieldrin	0.100	0.106	106.0	(52.00 - 122.00)	21
LCS1	Endrin Aldehyde	0.100	0.087	87.0	(58.00 - 118.00)	
MBLK	Endrin Aldehyde	ND				
MS	Endrin Aldehyde	0.100	0.078	78.0	(53.00 - 123.00)	
MSD	Endrin Aldehyde	0.100	0.094	94.0	(53.00 - 123.00)	19

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LCS1	Endrin	0.100	0.099	99.0	(58.00 - 118.00)	
MBLK	Endrin	ND				
MS	Endrin	0.100	0.106	106.0	(53.00 - 123.00)	
MSD	Endrin	0.100	0.117	117.0	(53.00 - 123.00)	9.9
LCS1	Endosulfan I (alpha)	0.050	0.050	100.0	(57.00 - 117.00)	
MBLK	Endosulfan I (alpha)	ND				
MS	Endosulfan I (alpha)	0.050	0.056	112.0	(52.00 - 122.00)	
MSD	Endosulfan I (alpha)	0.050	0.062	<u>124.0</u>	(52.00 - 122.00)	10
LCS1	Endosulfan II (beta)	0.100	0.101	101.0	(62.00 - 122.00)	
MBLK	Endosulfan II (beta)	ND				
MS	Endosulfan II (beta)	0.100	0.109	109.0	(57.00 - 127.00)	
MSD	Endosulfan II (beta)	0.100	0.118	118.0	(57.00 - 127.00)	7.9
LCS1	Endosulfan sulfate	0.100	0.108	108.0	(72.00 - 132.00)	
MBLK	Endosulfan sulfate	ND				
MS	Endosulfan sulfate	0.100	0.111	111.0	(67.00 - 137.00)	
MSD	Endosulfan sulfate	0.100	0.121	121.0	(67.00 - 137.00)	8.6
LCS1	Heptachlor	0.050	0.018	<u>36.0</u>	(68.00 - 128.00)	
MBLK	Heptachlor	ND				
MS	Heptachlor	0.050	0.043	86.0	(63.00 - 133.00)	
MSD	Heptachlor	0.050	0.052	104.0	(63.00 - 133.00)	19
LCS1	Heptachlor Epoxide	0.050	0.053	106.0	(57.00 - 117.00)	
MBLK	Heptachlor Epoxide	ND				
MS	Heptachlor Epoxide	0.050	0.060	120.0	(52.00 - 122.00)	
MSD	Heptachlor Epoxide	0.050	0.067	<u>134.0</u>	(52.00 - 122.00)	11
LCS1	Lindane (gamma-BHC)	0.050	0.052	104.0	(59.00 - 119.00)	
MBLK	Lindane (gamma-BHC)	ND				
MS	Lindane (gamma-BHC)	0.050	0.053	106.0	(54.00 - 124.00)	
MSD	Lindane (gamma-BHC)	0.050	0.059	118.0	(54.00 - 124.00)	11
LCS1	Methoxychlor	0.500	0.509	101.8	(75.00 - 135.00)	
MBLK	Methoxychlor	ND				
MS	Methoxychlor	0.500	0.524	104.8	(70.00 - 140.00)	
MSD	Methoxychlor	0.500	0.580	116.0	(70.00 - 140.00)	10
LCS1	Tetrachlorometaxylene (surr)	100	59	<u>59.0</u>	(70.00 - 130.00)	
LCS2	Tetrachlorometaxylene (surr)	100	83	83.0	(70.00 - 130.00)	34
MBLK	Tetrachlorometaxylene (surr)	100	79	79.0		

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MS	Tetrachlorometaxylene (surr)	100	74	74.0	(70.00 - 130.00)	
MSD	Tetrachlorometaxylene (surr)	100	85	85.0	(70.00 - 130.00)	14
LCS1	Dibutyl chlorendate (surr)	100	94	94.0	(70.00 - 130.00)	
LCS2	Dibutyl chlorendate (surr)	100	104	104.0	(70.00 - 130.00)	10
MBLK	Dibutyl chlorendate (surr)	100	98	98.0		
MS	Dibutyl chlorendate (surr)	100	93	93.0	(70.00 - 130.00)	
MSD	Dibutyl chlorendate (surr)	100	102	102.0	(70.00 - 130.00)	9.2
MBLK	Toxaphene	ND				

QC Ref #164298 Aldicarbs

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
LCS1	3-Hydroxycarbofuran	10.0	9.40	94.0	(80.00 - 120.00)	
MBLK	3-Hydroxycarbofuran	ND				
MS	3-Hydroxycarbofuran	10.0	9.39	93.9	(65.00 - 135.00)	
MS	Spiked sample	Lab # 22	01310099		(0.00 - 0.00)	
LCS1	Aldicarb (Temik)	10.0	9.31	93.1	(80.00 - 120.00)	
MBLK	Aldicarb (Temik)	ND				
MS	Aldicarb (Temik)	10.0	9.43	94.3	(65.00 - 135.00)	
LCS1	Aldicarb sulfone	10.0	9.58	95.8	(80.00 - 120.00)	
MBLK	Aldicarb sulfone	ND				
MS	Aldicarb sulfone	10.0	9.40	94.0	(65.00 - 135.00)	
LCS1	Aldicarb sulfoxide	10.0	9.30	93.0	(80.00 - 120.00)	
MBLK	Aldicarb sulfoxide	ND				
MS	Aldicarb sulfoxide	10.0	9.41	94.1	(65.00 - 135.00)	
LCS1	Baygon	10.0	9.53	95.3	(80.00 - 120.00)	
MBLK	Baygon	ND				
MS	Baygon	10.0	9.49	94.9	(65.00 - 135.00)	
LCS1	Carbofuran (Furadan)	10.0	9.64	96.4	(80.00 - 120.00)	
MBLK	Carbofuran (Furadan)	ND				
MS	Carbofuran (Furadan)	10.0	9.51	95.1	(65.00 - 135.00)	
LCS1	Carbaryl	10.0	10.2	102.0	(80.00 - 120.00)	
MBLK	Carbaryl	ND				
MS	Carbaryl	10.0	9.24	92.4	(65.00 - 135.00)	

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LCS1	Methiocarb	10.0	9.47	94.7	(80.00 - 120.00)
MBLK	Methiocarb	ND			
MS	Methiocarb	10.0	8.50	85.0	(65.00 - 135.00)
LCS1	Methomyl	10.0	9.53	95.3	(80.00 - 120.00)
MBLK	Methomyl	ND			
MS	Methomyl	10.0	9.27	92.7	(65.00 - 135.00)
LCS1	Oxamyl (Vydate)	10.0	9.60	96.0	(80.00 - 120.00)
MBLK	Oxamyl (Vydate)	ND			
MS	Oxamyl (Vydate)	10.0	9.33	93.3	(65.00 - 135.00)
LCS1	BDMC	100	97.7	97.7	(70.00 - 130.00)
MBLK	BDMC	100	97.4	97.4	
MS	BDMC	100	98.6	98.6	(70.00 - 130.00)

QC Ref #164391 Herbicides by 515.1

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
LCS1	2,4,5-T	0.80	0.65	81.2	(68.00 - 166.00)	
MBLK	2,4,5-T	ND				
MS	2,4,5-T	0.80	0.72	90.0	(68.00 - 166.00)	
MSD	2,4,5-T	0.80	0.65	81.2	(68.00 - 166.00)	10
LCS1	2,4,5-TP (Silvex)	0.80	0.60	75.0	(42.00 - 226.00)	
MBLK	2,4,5-TP (Silvex)	ND				
MS	2,4,5-TP (Silvex)	0.80	0.63	78.8	(42.00 - 226.00)	
MSD	2,4,5-TP (Silvex)	0.80	0.59	73.8	(42.00 - 226.00)	6.6
LCS1	2,4-D	0.40	0.29	72.5	(49.00 - 214.00)	
MBLK	2,4-D	ND				
MS	2,4-D	0.40	0.31	77.5	(49.00 - 214.00)	
MSD	2,4-D	0.40	0.32	80.0	(49.00 - 214.00)	3.2
LCS1	2,4-DB	8.00	6.11	76.4	(48.00 - 126.00)	
MBLK	2,4-DB	ND				
MS	2,4-DB	8.00	6.56	82.0	(48.00 - 126.00)	
MSD	2,4-DB	8.00	5.92	74.0	(48.00 - 126.00)	10
LCS1	Dichlorprop	2.00	1.56	78.0	(46.00 - 168.00)	
MBLK	Dichlorprop	ND				

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MS	Dichlorprop	2.00	1.64	82.0	(46.00 - 168.00)	
MSD	Dichlorprop	2.00	1.50	75.0	(46.00 - 168.00)	8.9
MS	Spiked sample	Lab # 22	02040077		(0.00 - 0.00)	
LCS1	Acifluorfen (qualitative)	0.80	0.50	62.5	(60.00 - 168.00)	
MBLK	Acifluorfen (qualitative)	ND				
MS	Acifluorfen (qualitative)	0.80	0.42	52.5	(60.00 - 168.00)	
MSD	Acifluorfen (qualitative)	0.80	0.29	36.2	(60.00 - 168.00)	37
LCS1	Bentazon	2.00	1.56	78.0	(70.00 - 170.00)	
MBLK	Bentazon	ND				
MS	Bentazon	2.00	1.72	86.0	(70.00 - 170.00)	
MSD	Bentazon	2.00	1.58	79.0	(70.00 - 170.00)	8.5
LCS1	Dalapon (qualitative)	4.00	3.59	89.8	(40.00 - 160.00)	
MBLK	Dalapon (qualitative)	ND				
MS	Dalapon (qualitative)	4.00	4.02	100.5	(40.00 - 160.00)	
MSD	Dalapon (qualitative)	4.00	3.55	88.8	(40.00 - 160.00)	12
LCS1	3,5-Dichlorobenzoic acid	2.00	1.45	72.5	(53.00 - 151.00)	
MBLK	3,5-Dichlorobenzoic acid	ND				
MS	3,5-Dichlorobenzoic acid	2.00	1.57	78.5	(53.00 - 151.00)	
MSD	3,5-Dichlorobenzoic acid	2.00	1.46	73.0	(53.00 - 151.00)	7.3
LCS1	Tot DCPA Mono&Diacid Degradate	0.80	0.21	26.2	(62.00 - 116.00)	
MBLK	Tot DCPA Mono&Diacid Degradate	ND				
MS	Tot DCPA Mono&Diacid Degradate	0.80	0.60	75.0	(62.00 - 116.00)	
MSD	Tot DCPA Mono&Diacid Degradate	0.80	0.57	71.2	(62.00 - 116.00)	5.1
LCS1	Dicamba	0.20	0.17	85.0	(38.00 - 232.00)	
MBLK	Dicamba	ND				
MS	Dicamba	0.20	0.18	90.0	(38.00 - 232.00)	
MSD	Dicamba	0.20	0.17	85.0	(38.00 - 232.00)	5.7
LCS1	Dinoseb	0.80	0.54	67.5	(73.00 - 133.00)	
MBLK	Dinoseb	ND				
MS	Dinoseb	0.80	0.60	75.0	(73.00 - 133.00)	
MSD	Dinoseb	0.80	0.51	63.7	(73.00 - 133.00)	16
LCS1	Pentachlorophenol	0.16	0.12	75.0	(36.00 - 224.00)	
MBLK	Pentachlorophenol	ND				
MS	Pentachlorophenol	0.16	0.10	62.5	(36.00 - 224.00)	
MSD	Pentachlorophenol	0.16	0.06	37.5	(36.00 - 224.00)	50

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LCS1	Picloram	0.40	0.23	57.5	(45.00 - 138.00)	
MBLK	Picloram	ND				
MS	Picloram	0.40	0.32	80.0	(45.00 - 138.00)	
MSD	Picloram	0.40	0.28	70.0	(45.00 - 138.00)	13
LCS1	4-Nitrophenol (qualitative)	4.00	3.20	80.0	(60.00 - 202.00)	
MBLK	4-Nitrophenol (qualitative)	ND				
MS	4-Nitrophenol (qualitative)	4.00	3.53	88.2	(60.00 - 202.00)	
MSD	4-Nitrophenol (qualitative)	4.00	3.17	79.2	(60.00 - 202.00)	11
LCS1	2,4-Dichlorophenylacetic acid	100	74	74.0	(70.00 - 130.00)	
MBLK	2,4-Dichlorophenylacetic acid	100	79	79.0		
MS	2,4-Dichlorophenylacetic acid	100	78	78.0	(70.00 - 130.00)	
MSD	2,4-Dichlorophenylacetic acid	100	73	73.0	(70.00 - 130.00)	6.6

QC Ref #164400 Regulated VOCs plus Lists 1&3

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
LCS1	1,1,1,2-Tetrachloroethane	4	4.15	103.8	(70.00 - 130.00)	
MBLK	1,1,1,2-Tetrachloroethane	ND				
MS	1,1,1,2-Tetrachloroethane	10	11.6	116.0	(84.00 - 131.00)	
MSD	1,1,1,2-Tetrachloroethane	10	10.9	109.0	(84.00 - 131.00)	6.2
LCS1	1,1,1-Trichloroethane	4	3.80	95.0	(70.00 - 130.00)	
MBLK	1,1,1-Trichloroethane	ND				
MS	1,1,1-Trichloroethane	10	11.8	118.0	(70.00 - 130.00)	
MSD	1,1,1-Trichloroethane	10	10.9	109.0	(70.00 - 130.00)	7.9
LCS1	1,1,2,2-Tetrachloroethane	4	3.98	99.5	(70.00 - 130.00)	
MBLK	1,1,2,2-Tetrachloroethane	ND				
MS	1,1,2,2-Tetrachloroethane	10	11.0	110.0	(70.00 - 130.00)	
MSD	1,1,2,2-Tetrachloroethane	10	10.6	106.0	(70.00 - 130.00)	3.7
LCS1	1,1,2-Trichloroethane	4	4.62	115.5	(70.00 - 130.00)	
MBLK	1,1,2-Trichloroethane	ND				
MS	1,1,2-Trichloroethane	10	12.1	121.0	(70.00 - 130.00)	
MSD	1,1,2-Trichloroethane	10	11.2	112.0	(70.00 - 130.00)	7.7
LCS1	1,1-Dichloroethane	4	4.25	106.2	(70.00 - 130.00)	
MBLK	1,1-Dichloroethane	ND				

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MS	1,1-Dichloroethane	10	11.6	116.0	(70.00 - 130.00)	
MSD	1,1-Dichloroethane	10	11.2	112.0	(70.00 - 130.00)	3.5
LCS1	1,1-Dichloroethylene	4	3.67	91.8	(70.00 - 130.00)	
MBLK	1,1-Dichloroethylene	ND				
MS	1,1-Dichloroethylene	10	11.6	116.0	(70.00 - 130.00)	
MSD	1,1-Dichloroethylene	10	10.7	107.0	(70.00 - 130.00)	8.1
LCS1	1,1-Dichloropropene	4	3.84	96.0	(70.00 - 130.00)	
MBLK	1,1-Dichloropropene	ND				
MS	1,1-Dichloropropene	10	12.3	123.0	(81.00 - 127.00)	
MSD	1,1-Dichloropropene	10	12.0	120.0	(81.00 - 127.00)	2.5
LCS1	1,2,3-Trichlorobenzene	4	4.77	119.2	(70.00 - 130.00)	
MBLK	1,2,3-Trichlorobenzene	ND				
MS	1,2,3-Trichlorobenzene	10	11.8	118.0	(70.00 - 130.00)	
MSD	1,2,3-Trichlorobenzene	10	11.7	117.0	(70.00 - 130.00)	0.85
LCS1	1,2,3-Trichloropropane	4	3.94	98.5	(70.00 - 130.00)	
MBLK	1,2,3-Trichloropropane	ND				
MS	1,2,3-Trichloropropane	10	10.7	107.0	(70.00 - 130.00)	
MSD	1,2,3-Trichloropropane	10	10.1	101.0	(70.00 - 130.00)	5.8
LCS1	1,2,4-Trichlorobenzene	4	4.27	106.7	(70.00 - 130.00)	
MBLK	1,2,4-Trichlorobenzene	ND				
MS	1,2,4-Trichlorobenzene	10	11.4	114.0	(70.00 - 130.00)	
MSD	1,2,4-Trichlorobenzene	10	11.5	115.0	(70.00 - 130.00)	0.87
LCS1	1,2,4-Trimethylbenzene	4	3.90	97.5	(70.00 - 130.00)	
MBLK	1,2,4-Trimethylbenzene	ND				
MS	1,2,4-Trimethylbenzene	10	10.7	107.0	(70.00 - 130.00)	
MSD	1,2,4-Trimethylbenzene	10	9.95	99.5	(70.00 - 130.00)	7.3
LCS1	1,2-Dichloroethane	4	4.54	113.5	(70.00 - 130.00)	
MBLK	1,2-Dichloroethane	ND				
MS	1,2-Dichloroethane	10	11.9	119.0	(80.00 - 140.00)	
MSD	1,2-Dichloroethane	10	11.0	110.0	(80.00 - 140.00)	7.9
LCS1	1,2-Dichloropropane	4	4.35	108.7	(70.00 - 130.00)	
MBLK	1,2-Dichloropropane	ND				
MS	1,2-Dichloropropane	10	11.5	115.0	(70.00 - 130.00)	
MSD	1,2-Dichloropropane	10	11.1	111.0	(70.00 - 130.00)	3.5
LCS1	1,3,5-Trimethylbenzene	4	3.71	92.8	(70.00 - 130.00)	

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MBLK	1,3,5-Trimethylbenzene	ND			
MS	1,3,5-Trimethylbenzene	10	10.3	103.0	(70.00 - 130.00)
MSD	1,3,5-Trimethylbenzene	10	9.87	98.7	(70.00 - 130.00) 4.3
LCS1	1,3-Dichloropropane	4	4.44	111.0	(70.00 - 130.00)
MBLK	1,3-Dichloropropane	ND			
MS	1,3-Dichloropropane	10	11.5	115.0	(70.00 - 130.00)
MSD	1,3-Dichloropropane	10	11.3	113.0	(70.00 - 130.00) 1.8
LCS1	p-Dichlorobenzene (1,4-DCB)	4	3.81	95.2	(70.00 - 130.00)
MBLK	p-Dichlorobenzene (1,4-DCB)	ND			
MS	p-Dichlorobenzene (1,4-DCB)	10	11.1	111.0	(70.00 - 130.00)
MSD	p-Dichlorobenzene (1,4-DCB)	10	10.3	103.0	(70.00 - 130.00) 7.5
LCS1	2,2-Dichloropropane	4	3.67	91.8	(70.00 - 130.00)
MBLK	2,2-Dichloropropane	ND			
MS	2,2-Dichloropropane	10	10.6	106.0	(84.00 - 131.00)
MSD	2,2-Dichloropropane	10	10.1	101.0	(84.00 - 131.00) 4.8
LCS1	2-Butanone (MEK)	100	110	110.0	(70.00 - 130.00)
MBLK	2-Butanone (MEK)	ND			
MS	2-Butanone (MEK)	100	101	<u>101.0</u>	(56.00 - 85.00)
MSD	2-Butanone (MEK)	100	99.2	<u>99.2</u>	(56.00 - 85.00) 1.8
LCS1	o-Chlorotoluene	4	3.87	96.8	(70.00 - 130.00)
MBLK	o-Chlorotoluene	ND			
MS	o-Chlorotoluene	10	11.3	113.0	(70.00 - 130.00)
MSD	o-Chlorotoluene	10	10.7	107.0	(70.00 - 130.00) 5.5
LCS1	p-Chlorotoluene	4	3.86	96.5	(70.00 - 130.00)
MBLK	p-Chlorotoluene	ND			
MS	p-Chlorotoluene	10	11.4	114.0	(70.00 - 130.00)
MSD	p-Chlorotoluene	10	10.9	109.0	(70.00 - 130.00) 4.5
LCS1	4-Methyl-2-Pentanone (MIBK)	40	45.7	114.2	(70.00 - 130.00)
MBLK	4-Methyl-2-Pentanone (MIBK)	ND			
MS	4-Methyl-2-Pentanone (MIBK)	100	117	117.0	(70.00 - 130.00)
MSD	4-Methyl-2-Pentanone (MIBK)	100	115	115.0	(70.00 - 130.00) 1.7
MS	Spiked sample	Lab # 22	02050138		(0.00 - 0.00)
LCS1	Benzene	4	4.40	110.0	(70.00 - 130.00)
MBLK	Benzene	ND			
MS	Benzene	10	11.9	119.0	(70.00 - 130.00)

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MSD	Benzene	10	11.3	113.0	(70.00 - 130.00)	5.2
LCS1	Bromobenzene	4	4.07	101.8	(70.00 - 130.00)	
MBLK	Bromobenzene	ND				
MS	Bromobenzene	10	11.3	113.0	(70.00 - 130.00)	
MSD	Bromobenzene	10	10.4	104.0	(70.00 - 130.00)	8.3
LCS1	Bromomethane (Methyl Bromide)	4	4.27	106.7	(70.00 - 130.00)	
MBLK	Bromomethane (Methyl Bromide)	ND				
MS	Bromomethane (Methyl Bromide)	10	9.97	99.7	(74.00 - 137.00)	
MSD	Bromomethane (Methyl Bromide)	10	9.88	98.8	(74.00 - 137.00)	0.91
LCS1	cis-1,2-Dichloroethylene	4	4.29	107.2	(70.00 - 130.00)	
MBLK	cis-1,2-Dichloroethylene	ND				
MS	cis-1,2-Dichloroethylene	10	11.6	116.0	(86.00 - 129.00)	
MSD	cis-1,2-Dichloroethylene	10	11.2	112.0	(86.00 - 129.00)	3.5
LCS1	Chlorobenzene	4	4.39	109.7	(70.00 - 130.00)	
MBLK	Chlorobenzene	ND				
MS	Chlorobenzene	10	12.1	121.0	(70.00 - 130.00)	
MSD	Chlorobenzene	10	11.8	118.0	(70.00 - 130.00)	2.5
LCS1	Carbon Tetrachloride	4	3.46	86.5	(70.00 - 130.00)	
MBLK	Carbon Tetrachloride	ND				
MS	Carbon Tetrachloride	10	11.9	119.0	(70.00 - 130.00)	
MSD	Carbon Tetrachloride	10	11.6	116.0	(70.00 - 130.00)	2.6
LCS1	cis-1,3-Dichloropropene	4	4.10	102.5	(70.00 - 130.00)	
MBLK	cis-1,3-Dichloropropene	ND				
MS	cis-1,3-Dichloropropene	10	11.5	115.0	(85.00 - 120.00)	
MSD	cis-1,3-Dichloropropene	10	11.1	111.0	(85.00 - 120.00)	3.5
LCS1	Bromoform	4	3.97	99.2	(70.00 - 130.00)	
MBLK	Bromoform	ND				
MS	Bromoform	10	10.9	109.0	(70.00 - 130.00)	
MSD	Bromoform	10	10.1	101.0	(70.00 - 130.00)	7.6
LCS1	Chloroform (Trichloromethane)	4	4.20	105.0	(70.00 - 130.00)	
MBLK	Chloroform (Trichloromethane)	ND				
MS	Chloroform (Trichloromethane)	10	11.0	110.0	(70.00 - 130.00)	
MSD	Chloroform (Trichloromethane)	10	10.6	106.0	(70.00 - 130.00)	3.7
LCS1	Bromochloromethane	4	4.44	111.0	(70.00 - 130.00)	
MBLK	Bromochloromethane	ND				

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MS	Bromochloromethane	10	11.6	116.0	(70.00 - 130.00)	
MSD	Bromochloromethane	10	11.5	115.0	(70.00 - 130.00)	0.87
LCS1	Chloroethane	4	4.21	105.2	(70.00 - 130.00)	
MBLK	Chloroethane	ND				
MS	Chloroethane	10	10.8	108.0	(69.00 - 151.00)	
MSD	Chloroethane	10	10.2	102.0	(69.00 - 151.00)	5.7
LCS1	Chloromethane(Methyl Chloride)	4	4.12	103.0	(70.00 - 130.00)	
MBLK	Chloromethane(Methyl Chloride)	ND				
MS	Chloromethane(Methyl Chloride)	10	9.66	96.6	(76.00 - 138.00)	
MSD	Chloromethane(Methyl Chloride)	10	9.51	95.1	(76.00 - 138.00)	1.6
LCS1	Chlorodibromomethane	4	4.50	112.5	(70.00 - 130.00)	
MBLK	Chlorodibromomethane	ND				
MS	Chlorodibromomethane	10	11.9	119.0	(70.00 - 130.00)	
MSD	Chlorodibromomethane	10	11.5	115.0	(70.00 - 130.00)	3.4
LCS1	Dibromomethane	4	4.56	114.0	(70.00 - 130.00)	
MBLK	Dibromomethane	ND				
MS	Dibromomethane	10	11.5	115.0	(70.00 - 130.00)	
MSD	Dibromomethane	10	11.6	116.0	(70.00 - 130.00)	0.87
LCS1	Bromodichloromethane	4	4.31	107.7	(70.00 - 130.00)	
MBLK	Bromodichloromethane	ND				
MS	Bromodichloromethane	10	11.6	116.0	(70.00 - 130.00)	
MSD	Bromodichloromethane	10	10.9	109.0	(70.00 - 130.00)	6.2
LCS1	Dichloromethane	4	4.32	108.0	(70.00 - 130.00)	
MBLK	Dichloromethane	ND				
MS	Dichloromethane	10	10.6	106.0	(70.00 - 130.00)	
MSD	Dichloromethane	10	10.4	104.0	(70.00 - 130.00)	1.9
LCS1	Di-isopropyl ether	4	4.50	112.5	(70.00 - 130.00)	
MBLK	Di-isopropyl ether	ND				
MS	Di-isopropyl ether	10	11.6	116.0	(70.00 - 130.00)	
MSD	Di-isopropyl ether	10	11.3	113.0	(70.00 - 130.00)	2.6
LCS1	Ethyl benzene	4	4.36	109.0	(70.00 - 130.00)	
MBLK	Ethyl benzene	ND				
MS	Ethyl benzene	10	12.4	124.0	(70.00 - 130.00)	
MSD	Ethyl benzene	10	11.9	119.0	(70.00 - 130.00)	4.1
LCS1	Dichlorodifluoromethane	4	4.05	101.2	(70.00 - 130.00)	

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MBLK	Dichlorodifluoromethane	ND				
MS	Dichlorodifluoromethane	10	9.94	99.4	(53.00 - 168.00)	
MSD	Dichlorodifluoromethane	10	8.79	87.9	(53.00 - 168.00)	12
LCS1	Fluorotrichloromethane-Freon11	4	3.99	99.8	(70.00 - 130.00)	
MBLK	Fluorotrichloromethane-Freon11	ND				
MS	Fluorotrichloromethane-Freon11	10	10.8	108.0	(70.00 - 130.00)	
MSD	Fluorotrichloromethane-Freon11	10	10.1	101.0	(70.00 - 130.00)	6.7
LCS1	Hexachlorobutadiene	4	3.84	96.0	(70.00 - 130.00)	
MBLK	Hexachlorobutadiene	ND				
MS	Hexachlorobutadiene	10	11.1	111.0	(70.00 - 130.00)	
MSD	Hexachlorobutadiene	10	10.6	106.0	(70.00 - 130.00)	4.6
LCS1	Isopropylbenzene	4	3.56	89.0	(70.00 - 130.00)	
MBLK	Isopropylbenzene	ND				
MS	Isopropylbenzene	10	11.6	116.0	(70.00 - 130.00)	
MSD	Isopropylbenzene	10	11.1	111.0	(70.00 - 130.00)	4.4
LCS1	m-Dichlorobenzene (1,3-DCB)	4	3.86	96.5	(70.00 - 130.00)	
MBLK	m-Dichlorobenzene (1,3-DCB)	ND				
MS	m-Dichlorobenzene (1,3-DCB)	10	10.8	108.0	(70.00 - 130.00)	
MSD	m-Dichlorobenzene (1,3-DCB)	10	10.0	100.0	(70.00 - 130.00)	7.7
LCS1	m,p-Xylenes	8	9.87	123.4	(70.00 - 130.00)	
MBLK	m,p-Xylenes	ND				
MS	m,p-Xylenes	20	25.9	129.5	(70.00 - 130.00)	
MSD	m,p-Xylenes	20	24.6	123.0	(70.00 - 130.00)	5.1
LCS1	Methyl Tert-butyl ether (MTBE)	4	4.79	119.8	(70.00 - 130.00)	
MBLK	Methyl Tert-butyl ether (MTBE)	ND				
MS	Methyl Tert-butyl ether (MTBE)	10	9.77	97.7	(70.00 - 130.00)	
MSD	Methyl Tert-butyl ether (MTBE)	10	9.85	98.5	(70.00 - 130.00)	0.82
LCS1	Naphthalene	4	4.87	121.8	(70.00 - 130.00)	
MBLK	Naphthalene	ND				
MS	Naphthalene	10	11.6	116.0	(70.00 - 130.00)	
MSD	Naphthalene	10	12.1	121.0	(70.00 - 130.00)	4.2
LCS1	n-Butylbenzene	4	3.54	88.5	(70.00 - 130.00)	
MBLK	n-Butylbenzene	ND				
MS	n-Butylbenzene	10	11.4	114.0	(70.00 - 130.00)	
MSD	n-Butylbenzene	10	11.1	111.0	(70.00 - 130.00)	2.7

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LCS1	n-Propylbenzene	4	3.48	87.0	(70.00 - 130.00)	
MBLK	n-Propylbenzene	ND				
MS	n-Propylbenzene	10	10.9	109.0	(70.00 - 130.00)	
MSD	n-Propylbenzene	10	10.0	100.0	(70.00 - 130.00)	8.6
LCS1	o-Xylene	4	4.51	112.8	(70.00 - 130.00)	
MBLK	o-Xylene	ND				
MS	o-Xylene	10	12.9	129.0	(70.00 - 130.00)	
MSD	o-Xylene	10	12.2	122.0	(70.00 - 130.00)	5.6
LCS1	o-Dichlorobenzene (1,2-DCB)	4	4.06	101.5	(70.00 - 130.00)	
MBLK	o-Dichlorobenzene (1,2-DCB)	ND				
MS	o-Dichlorobenzene (1,2-DCB)	10	10.8	108.0	(70.00 - 130.00)	
MSD	o-Dichlorobenzene (1,2-DCB)	10	10.7	107.0	(70.00 - 130.00)	0.93
LCS1	Tetrachloroethylene (PCE)	4	3.98	99.5	(70.00 - 130.00)	
MBLK	Tetrachloroethylene (PCE)	ND				
MS	Tetrachloroethylene (PCE)	10	12.0	120.0	(70.00 - 130.00)	
MSD	Tetrachloroethylene (PCE)	10	11.4	114.0	(70.00 - 130.00)	5.1
LCS1	p-Isopropyltoluene	4	3.66	91.5	(70.00 - 130.00)	
MBLK	p-Isopropyltoluene	ND				
MS	p-Isopropyltoluene	10	10.7	107.0	(70.00 - 130.00)	
MSD	p-Isopropyltoluene	10	10.3	103.0	(70.00 - 130.00)	3.8
LCS1	sec-Butylbenzene	4	3.56	89.0	(70.00 - 130.00)	
MBLK	sec-Butylbenzene	ND				
MS	sec-Butylbenzene	10	12.0	120.0	(70.00 - 130.00)	
MSD	sec-Butylbenzene	10	11.4	114.0	(70.00 - 130.00)	5.1
LCS1	Styrene	4	4.52	113.0	(70.00 - 130.00)	
MBLK	Styrene	ND				
MS	Styrene	10	11.1	111.0	(70.00 - 130.00)	
MSD	Styrene	10	10.3	103.0	(70.00 - 130.00)	7.5
LCS1	trans-1,2-Dichloroethylene	4	4.24	106.0	(70.00 - 130.00)	
MBLK	trans-1,2-Dichloroethylene	ND				
MS	trans-1,2-Dichloroethylene	10	11.8	118.0	(85.00 - 129.00)	
MSD	trans-1,2-Dichloroethylene	10	11.1	111.0	(85.00 - 129.00)	6.1
LCS1	tert-amyl Methyl Ether	4	4.66	116.5	(70.00 - 130.00)	
MBLK	tert-amyl Methyl Ether	ND				
MS	tert-amyl Methyl Ether	10	12.1	121.0	(70.00 - 130.00)	

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MSD	tert-amyl Methyl Ether	10	11.6	116.0	(70.00 - 130.00)	4.2
LCS1	tert-Butyl Ethyl Ether	4	4.49	112.2	(70.00 - 130.00)	
MBLK	tert-Butyl Ethyl Ether	ND				
MS	tert-Butyl Ethyl Ether	10	11.7	117.0	(70.00 - 130.00)	
MSD	tert-Butyl Ethyl Ether	10	11.1	111.0	(70.00 - 130.00)	5.3
LCS1	tert-Butylbenzene	4	3.47	86.8	(70.00 - 130.00)	
MBLK	tert-Butylbenzene	ND				
MS	tert-Butylbenzene	10	10.7	107.0	(70.00 - 130.00)	
MSD	tert-Butylbenzene	10	10.1	101.0	(70.00 - 130.00)	5.8
LCS1	Trichloroethylene (TCE)	4	4.21	105.2	(70.00 - 130.00)	
MBLK	Trichloroethylene (TCE)	ND				
MS	Trichloroethylene (TCE)	10	12.1	121.0	(70.00 - 130.00)	
MSD	Trichloroethylene (TCE)	10	11.7	117.0	(70.00 - 130.00)	3.4
LCS1	Trichlorotrifluoroethane(Freon	4	4.36	109.0	(70.00 - 130.00)	
MBLK	Trichlorotrifluoroethane(Freon	ND				
MS	Trichlorotrifluoroethane(Freon	10	10.9	109.0	(70.00 - 130.00)	
MSD	Trichlorotrifluoroethane(Freon	10	9.99	99.9	(70.00 - 130.00)	8.7
LCS1	trans-1,3-Dichloropropene	4	4.31	107.7	(70.00 - 130.00)	
MBLK	trans-1,3-Dichloropropene	ND				
MS	trans-1,3-Dichloropropene	10	11.7	117.0	(80.00 - 131.00)	
MSD	trans-1,3-Dichloropropene	10	11.4	114.0	(80.00 - 131.00)	2.6
LCS1	Toluene	4	4.37	109.2	(70.00 - 130.00)	
MBLK	Toluene	ND				
MS	Toluene	10	12.0	120.0	(70.00 - 130.00)	
MSD	Toluene	10	11.4	114.0	(70.00 - 130.00)	5.1
LCS1	Vinyl chloride (VC)	4	4.26	106.5	(70.00 - 130.00)	
MBLK	Vinyl chloride (VC)	ND				
MS	Vinyl chloride (VC)	10	10.7	107.0	(67.00 - 152.00)	
MSD	Vinyl chloride (VC)	10	10.1	101.0	(67.00 - 152.00)	5.8

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Laboratory
QC Report
#91594

Maui, County of, Department of
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QC Ref #164410 Endothall

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
MS	Spiked sample	Lab # 22	02060209		(0.00 - 0.00)	
LCS1	Endothall	25	29.7	118.8	(80.00 - 120.00)	
MBLK	Endothall	ND				
MS	Endothall	25	23.7	94.8	(80.00 - 120.00)	

QC Ref #164668 Diquat and Paraquat

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
MS	Spiked sample	Lab # 22	02070131		(0.00 - 0.00)	
LCS1	Diquat	10.0	7.9	79.0	(70.00 - 130.00)	
LCS2	Diquat	10.0	7.8	78.0	(70.00 - 130.00)	1.3
MBLK	Diquat	ND				
MS	Diquat	10.0	8.2	82.0	(70.00 - 130.00)	
LCS1	Paraquat	10.0	8.3	83.0	(70.00 - 130.00)	
LCS2	Paraquat	10.0	8.1	81.0	(70.00 - 130.00)	2.4
MBLK	Paraquat	ND				
MS	Paraquat	10.0	8.4	84.0	(70.00 - 130.00)	

QC Ref #165825 525 Semivolatiles by GC/MS

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
LCS1	alpha-Chlordane	2	1.99	99.5	(70.00 - 130.00)	
MBLK	alpha-Chlordane	ND				
MS	alpha-Chlordane	2	2.06	103.0	(70.00 - 130.00)	
MSD	alpha-Chlordane	2	2.01	100.5	(70.00 - 130.00)	2.5
MBLK	Diazinon	ND				
MS	Spiked sample	Lab # 22	02060060		(0.00 - 0.00)	
MSD	Spiked sample	Lab # 22	02060060		(0.00 - 0.00)	0.00

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LCS1	Acenaphthylene	2	1.95	97.5	(70.00 - 130.00)	
MBLK	Acenaphthylene	ND				
MS	Acenaphthylene	2	1.97	98.5	(70.00 - 130.00)	
MSD	Acenaphthylene	2	1.96	98.0	(70.00 - 130.00)	0.51
LCS1	Alachlor	2	2.16	108.0	(70.00 - 130.00)	
MBLK	Alachlor	ND				
MS	Alachlor	2	2.17	108.5	(70.00 - 130.00)	
MSD	Alachlor	2	2.17	108.5	(70.00 - 130.00)	0.00
LCS1	Aldrin	2	2.01	100.5	(70.00 - 130.00)	
MBLK	Aldrin	ND				
MS	Aldrin	2	2.06	103.0	(70.00 - 130.00)	
MSD	Aldrin	2	2.06	103.0	(70.00 - 130.00)	0.00
LCS1	Anthracene	2	1.95	97.5	(70.00 - 130.00)	
MBLK	Anthracene	ND				
MS	Anthracene	2	1.94	97.0	(70.00 - 130.00)	
MSD	Anthracene	2	1.98	99.0	(70.00 - 130.00)	2.0
LCS1	Atrazine	2	2.24	112.0	(70.00 - 130.00)	
MBLK	Atrazine	ND				
MS	Atrazine	2	2.26	113.0	(70.00 - 130.00)	
MSD	Atrazine	2	2.24	112.0	(70.00 - 130.00)	0.89
LCS1	Benz(a)Anthracene	2	2.34	117.0	(70.00 - 130.00)	
MBLK	Benz(a)Anthracene	ND				
MS	Benz(a)Anthracene	2	2.43	121.5	(70.00 - 130.00)	
MSD	Benz(a)Anthracene	2	2.34	117.0	(70.00 - 130.00)	3.8
LCS1	Benzo(a)pyrene	2	2.26	113.0	(70.00 - 130.00)	
MBLK	Benzo(a)pyrene	ND				
MS	Benzo(a)pyrene	2	1.93	96.5	(70.00 - 130.00)	
MSD	Benzo(a)pyrene	2	2.10	105.0	(70.00 - 130.00)	8.4
LCS1	Benzo(b)Fluoranthene	2	2.30	115.0	(70.00 - 130.00)	
MBLK	Benzo(b)Fluoranthene	ND				
MS	Benzo(b)Fluoranthene	2	2.02	101.0	(70.00 - 130.00)	
MSD	Benzo(b)Fluoranthene	2	2.13	106.5	(70.00 - 130.00)	5.3
LCS1	Benzo(g,h,i)Perylene	2	2.23	111.5	(70.00 - 130.00)	
MBLK	Benzo(g,h,i)Perylene	ND				
MS	Benzo(g,h,i)Perylene	2	1.93	96.5	(70.00 - 130.00)	

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MSD	Benzo(g,h,i)Perylene	2	2.16	108.0	(70.00 - 130.00)	11
LCS1	Benzo(k)Fluoranthene	2	2.16	108.0	(70.00 - 130.00)	
MBLK	Benzo(k)Fluoranthene	ND				
MS	Benzo(k)Fluoranthene	2	2.06	103.0	(70.00 - 130.00)	
MSD	Benzo(k)Fluoranthene	2	2.06	103.0	(70.00 - 130.00)	0.00
LCS1	Di(2-Ethylhexyl)phthalate	2	1.67	83.5	(70.00 - 130.00)	
MBLK	Di(2-Ethylhexyl)phthalate	ND				
MS	Di(2-Ethylhexyl)phthalate	2	1.90	95.0	(70.00 - 130.00)	
MSD	Di(2-Ethylhexyl)phthalate	2	1.77	88.5	(70.00 - 130.00)	7.1
LCS1	Butylbenzylphthalate	2	2.05	102.5	(70.00 - 130.00)	
MBLK	Butylbenzylphthalate	ND				
MS	Butylbenzylphthalate	2	2.03	101.5	(70.00 - 130.00)	
MSD	Butylbenzylphthalate	2	2.03	101.5	(70.00 - 130.00)	0.00
MBLK	Bromacil	ND				
MBLK	Butachlor	ND				
LCS1	Caffeine	2	1.58	79.0	(70.00 - 130.00)	
MBLK	Caffeine	ND				
MS	Caffeine	2	1.79	89.5	(70.00 - 130.00)	
MSD	Caffeine	2	1.76	88.0	(70.00 - 130.00)	1.7
LCS1	Chrysene	2	2.28	114.0	(70.00 - 130.00)	
MBLK	Chrysene	ND				
MS	Chrysene	2	2.39	119.5	(70.00 - 130.00)	
MSD	Chrysene	2	2.33	116.5	(70.00 - 130.00)	2.5
LCS1	Dibenz(a,h)Anthracene	2	2.40	120.0	(70.00 - 130.00)	
MBLK	Dibenz(a,h)Anthracene	ND				
MS	Dibenz(a,h)Anthracene	2	2.05	102.5	(70.00 - 130.00)	
MSD	Dibenz(a,h)Anthracene	2	2.27	113.5	(70.00 - 130.00)	10
LCS1	Di-(2-Ethylhexyl)adipate	2	2.41	120.5	(70.00 - 130.00)	
MBLK	Di-(2-Ethylhexyl)adipate	ND				
MS	Di-(2-Ethylhexyl)adipate	2	2.92	<u>146.0</u>	(70.00 - 130.00)	
MSD	Di-(2-Ethylhexyl)adipate	2	2.57	128.5	(70.00 - 130.00)	13
LCS1	Diethylphthalate	2	2.31	115.5	(70.00 - 130.00)	
MBLK	Diethylphthalate	ND				
MS	Diethylphthalate	2	2.26	113.0	(70.00 - 130.00)	
MSD	Diethylphthalate	2	2.33	116.5	(70.00 - 130.00)	3.1

Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u>
Criteria for MS and DUP are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

MWH Laboratories
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Maui, County of, Department of
Water Supply
(continued)

MBLK	Dieldrin	ND				
LCS1	Dimethylphthalate	2	2.22	111.0	(70.00 - 130.00)	
MBLK	Dimethylphthalate	ND				
MS	Dimethylphthalate	2	2.17	108.5	(70.00 - 130.00)	
MSD	Dimethylphthalate	2	2.20	110.0	(70.00 - 130.00)	1.4
MBLK	Dimethoate	ND				
LCS1	Di-n-Butylphthalate	2	2.38	119.0	(70.00 - 130.00)	
MBLK	Di-n-Butylphthalate	ND				
MS	Di-n-Butylphthalate	2	2.46	123.0	(70.00 - 130.00)	
MSD	Di-n-Butylphthalate	2	2.46	123.0	(70.00 - 130.00)	0.00
LCS1	Endrin	2	2.30	115.0	(70.00 - 130.00)	
MBLK	Endrin	ND				
MS	Endrin	2	2.37	118.5	(70.00 - 130.00)	
MSD	Endrin	2	2.44	122.0	(70.00 - 130.00)	2.9
LCS1	Fluoranthene	2	2.03	101.5	(70.00 - 130.00)	
MBLK	Fluoranthene	ND				
MS	Fluoranthene	2	2.02	101.0	(70.00 - 130.00)	
MSD	Fluoranthene	2	2.02	101.0	(70.00 - 130.00)	0.00
LCS1	Fluorene	2	2.06	103.0	(70.00 - 130.00)	
MBLK	Fluorene	ND				
MS	Fluorene	2	2.03	101.5	(70.00 - 130.00)	
MSD	Fluorene	2	2.08	104.0	(70.00 - 130.00)	2.4
LCS1	gamma-Chlordane	2	1.99	99.5	(70.00 - 130.00)	
MBLK	gamma-Chlordane	ND				
MS	gamma-Chlordane	2	2.06	103.0	(70.00 - 130.00)	
MSD	gamma-Chlordane	2	2.01	100.5	(70.00 - 130.00)	2.5
LCS1	Hexachlorobenzene	2	1.93	96.5	(70.00 - 130.00)	
MBLK	Hexachlorobenzene	ND				
MS	Hexachlorobenzene	2	1.91	95.5	(70.00 - 130.00)	
MSD	Hexachlorobenzene	2	1.90	95.0	(70.00 - 130.00)	0.52
LCS1	Hexachlorocyclopentadiene	2	1.88	94.0	(70.00 - 130.00)	
MBLK	Hexachlorocyclopentadiene	ND				
MS	Hexachlorocyclopentadiene	2	1.82	91.0	(70.00 - 130.00)	
MSD	Hexachlorocyclopentadiene	2	1.79	89.5	(70.00 - 130.00)	1.7
LCS1	Heptachlor	2	2.02	101.0	(70.00 - 130.00)	

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Laboratory
QC Report
#91594

Maui, County of, Department of
Water Supply
(continued)

MBLK	Heptachlor	ND				
MS	Heptachlor	2	2.08	104.0	(70.00 - 130.00)	
MSD	Heptachlor	2	2.07	103.5	(70.00 - 130.00)	0.48
LCS1	Heptachlor Epoxide	2	2.16	108.0	(70.00 - 130.00)	
MBLK	Heptachlor Epoxide	ND				
MS	Heptachlor Epoxide	2	2.19	109.5	(70.00 - 130.00)	
MSD	Heptachlor Epoxide	2	2.16	108.0	(70.00 - 130.00)	1.4
LCS1	Indeno(1,2,3,c,d)Pyrene	2	2.47	123.5	(70.00 - 130.00)	
MBLK	Indeno(1,2,3,c,d)Pyrene	ND				
MS	Indeno(1,2,3,c,d)Pyrene	2	2.02	101.0	(70.00 - 130.00)	
MSD	Indeno(1,2,3,c,d)Pyrene	2	2.19	109.5	(70.00 - 130.00)	8.1
MBLK	Isophorone	ND				
LCS1	Lindane	2	2.07	103.5	(70.00 - 130.00)	
MBLK	Lindane	ND				
MS	Lindane	2	2.13	106.5	(70.00 - 130.00)	
MSD	Lindane	2	2.15	107.5	(70.00 - 130.00)	0.93
LCS1	Methoxychlor	2	3.43	171.5	(70.00 - 130.00)	
MBLK	Methoxychlor	ND				
MS	Methoxychlor	2	3.46	173.0	(70.00 - 130.00)	
MSD	Methoxychlor	2	3.39	169.5	(70.00 - 130.00)	2.0
MBLK	Metribuzin	ND				
LCS1	Molinate	2	2.00	100.0	(70.00 - 130.00)	
MBLK	Molinate	ND				
MS	Molinate	2	2.00	100.0	(70.00 - 130.00)	
MSD	Molinate	2	2.00	100.0	(70.00 - 130.00)	0.00
MBLK	Metolachlor	ND				
LCS1	trans-Nonachlor	2	1.94	97.0	(70.00 - 130.00)	
MBLK	trans-Nonachlor	ND				
MS	trans-Nonachlor	2	2.00	100.0	(70.00 - 130.00)	
MSD	trans-Nonachlor	2	1.94	97.0	(70.00 - 130.00)	3.0
LCS1	Pentachlorophenol	8	8.76	109.5	(70.00 - 130.00)	
MBLK	Pentachlorophenol	ND				
MS	Pentachlorophenol	8	9.06	113.2	(70.00 - 130.00)	
MSD	Pentachlorophenol	8	8.86	110.8	(70.00 - 130.00)	2.2
LCS1	Phenanthrene	2	2.05	102.5	(70.00 - 130.00)	

Spikes which exceed Limits and Method Blanks with positive results are highlighted by Underlining. Criteria for MS and DUP are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

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Maui, County of, Department of
Water Supply
(continued)

MBLK	Phenanthrene	ND				
MS	Phenanthrene	2	2.10	105.0	(70.00 - 130.00)	
MSD	Phenanthrene	2	2.06	103.0	(70.00 - 130.00)	1.9
MBLK	Prometryn	ND				
MBLK	Propachlor	ND				
LCS1	Pyrene	2	2.06	103.0	(70.00 - 130.00)	
MBLK	Pyrene	ND				
MS	Pyrene	2	2.04	102.0	(70.00 - 130.00)	
MSD	Pyrene	2	2.04	102.0	(70.00 - 130.00)	0.00
LCS1	Simazine	2	2.11	105.5	(70.00 - 130.00)	
MBLK	Simazine	ND				
MS	Simazine	2	2.02	101.0	(70.00 - 130.00)	
MSD	Simazine	2	2.08	104.0	(70.00 - 130.00)	2.9
LCS1	Perylene-d12	100	93	93.0	(70.00 - 130.00)	
MBLK	Perylene-d12	100	99	99.0		
MS	Perylene-d12	100	72	72.0	(70.00 - 130.00)	
MSD	Perylene-d12	100	81	81.0	(70.00 - 130.00)	12
LCS1	Thiobencarb	2	2.12	106.0	(70.00 - 130.00)	
MBLK	Thiobencarb	ND				
MS	Thiobencarb	2	2.13	106.5	(70.00 - 130.00)	
MSD	Thiobencarb	2	2.09	104.5	(70.00 - 130.00)	1.9
MBLK	Trifluralin	ND				

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Pace Analytical™
www.pacelabs.com

2/25

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

MAUI
91594

DETERMINATION OF 2,3,7,8-TCDD

Prepared for:
MWH
Attn: Martha Frost
555 East Walnut Street
Pasadena, CA 91101

ACCREDITED IN ACCORDANCE WITH nelac

This report contains 4 pages.

The results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

REPORT OF LABORATORY ANALYSIS

Pace Analytical™
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

February 22, 2002

Attn: Martha Frost
MWH
555 East Walnut Street
Pasadena, CA 91101

MWL Project # 91594
MWL Sub PO # 99-7297
Pace Project # 1053896
HI State Cert. #: SLD
Expiration Date: 6/30/02

Dear Ms. Frost:

Enclosed are analytical results of one water sample analyzed for 2,3,7,8-TCDD content. This sample was analyzed according to Method 1613B by High Resolution Gas Chromatography/High Resolution Mass Spectrometry.

MWL Sample ID	Pace Sample ID	Date Collected	Date Received
2202060051	3312054	02/05/02	02/08/02

The results reported for this sample and the associated quality control samples were all within the criteria described in Method 1613B. If you have any questions or concerns regarding these results, please contact me at (612) 607-6383, by facsimile at (612) 607-6444 or by e-mail at Scott.Unze@pacelabs.com.

Sincerely,

Scott C. Unze, Project Manager
High Resolution Mass Spectrometry

Enclosure

MWH Laboratories
555 East Walnut Street
Pasadena, CA 91101
Ph (626) 568-6400 Fax (626) 568-6324

Date 02/07/02 **Submittal Form** PACE-MN

*REPORTING REQUIREMENTS: One report for this MWH Project Number: 91594
Do Not Combine Report with any other samples submitted under different MWH project numbers!
Report & Invoice must have the MWH Project Number and Sub PO#: 91594 99-7297
Report all quality control data according to Method. Include dates analyzed, date extracted (if extracted) and Method reference on the report. Fax results to 626-568-6324
Faxed results must have complete data & QC. Hardcopy report is due in hand on due date.
Please advise us immediately if Due Date will be missed.

ıip To **Scott Unze**
ıce Analytical

'00 Elm Street SE Suite 200
inneapolis, Minnesota 55414

ill Recipient FedEx Acct:1797-5692-7

12) 607-6383 Fax (612) 607-6444

HARDCOPY REPORT, FORMS, & INVOICE MUST BE SENT TO ATTENTION
Martha Frost, Sub-contracting Administrator
MWH Laboratories 555 East Walnut Street Pasadena, CA 91101
Phone (626) 568-6437 Fax (626) 568-6324

Provide in each Report the Specified State Certification # & Exp DAte for requested tests + matrix

Hawaii DW

1053896

MWH Project #	Report Due:	Sub PO#
91594	02/22/02	99-7297

Qty	Test Code	Use MWH Lab # for ID	Client Sample ID for reference only	Analysis Requested	Sample Date & Time	Matrix	Container
	TCDD-DW SUB	2202060051	EMWDP SEIS MONITOR WELL	2,3,7,8-Tcdd Dioxin in drinking water 1613b	02/05/02 0900	dw	1 1L amber glass / no pres

10331205Y

T=4°C

Relinquished by: [signature] Sample Control Date 02/07/02 Time 16:00 Page 1

Received by: [signature] Date 2/8/02 Time 850 An Acknowledgement of Receipt is requested to attn: Martha Frost

Pace Analytical™

Pace AnalyticalServices, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Drinking Water Analysis Results
2,3,7,8-TCDD -- USEPA Method 1613B
Montgomery Watson Harza

Sample ID..........2202060051	Source ID............EMWDP SEIS MONITOR WELL	
Project #...............91594	Date Collected.....02/05/2002	Spike.................... 200 pg
Sub PO #..............99-7297	Date Received......02/08/2002	IS Spike...............2000 pg
Lab Sample ID.....103312054	Date Extracted.....02/15/2002	CS Spike............. 400 pg

	Sample 2202060051	Method Blank	Lab Spike	Lab Spike Dup
[2,3,7,8-TCDD]	ND	ND	--	--
RL	5 pg/L	5 pg/L	--	--
2,3,7,8-TCDD Recovery	--	--	106%	118%
Spike Recovery Limit	--	--	73-146%	73-146%
RPD			10.8%	
IS Recovery	97%	73%	79%	75%
IS Recovery Limits	31-137%	31-137%	25-141%	25-141%
CS Recovery	101%	84%	87%	84%
CS Recovery Limits	42-164%	42-164%	37-158%	37-158%
Filename	X20222C_1	X20219C_15	X20219C_13	X20219C_14
Analysis Date	02/22/2002	02/19/2002	02/19/2002	02/19/2002
Analysis Time	13:04	23:09	21:57	22:33
Analyst	JAS	JAS	JAS	JAS
Volume	1.026L	0.941L	1.014L	1.023L
Dilution	NA	NA	NA	NA
ICAL Date	02/08/2002	02/08/2002	02/08/2002	02/08/2002
CCAL Filename	X20221A_22	X20219C_12	X20219C_12	X20219C_12

!	= Outside the Control Limits
ND	= Not Detected
RL	= Reporting Limit
Limits	= Control Limits from Method 1613 (10/94 Revision), Tables 6A and 7A
RPD	= Relative Percent Difference of Lab Spike Recoveries
IS	= Internal Standard [2,3,7,8-TCDD-$^{13}C_{12}$]
CS	= Cleanup Standard [2,3,7,8-TCDD-$^{37}Cl_4$]

Analyst: Jennifer Schindler

Project No.............02-1053896

19.7

PROPOSED DEEP MONITOR-OBSERVATION WELL

Proposed Deep Monitor-Observation Well

The Maui County Department of Water Supply is planning to drill a well through the depth of the freshwater lens in the Honomanu aquifer into the underlying transition and salt water zones. The well will be used to track the status of the aquifer and the reliability of the sustainable yield estimates after pumping starts. This well will be similar to the one located in the Iao Aquifer System and to many others in the Pearl Harbor Aquifer System in Oahu.

19.8

SETTLEMENT AGREEMENT

BOARD OF WATER SUPPLY OF THE COUNTY OF MAUI

V.

SHELL OIL COMPANY, ET AL.

SETTLEMENT AGREEMENT AND RELEASE OF ALL CLAIMS

This Settlement Agreement and Release of All Claims ("Agreement") is entered into by Plaintiff Board of Water Supply of the County of Maui ("Plaintiff"), on the one hand, and The Dow Chemical Company, Occidental Chemical Corporation, successor-in-interest to Occidental Chemical Company, Occidental Petroleum Corporation, Shell Oil Company, individually and dba Shell Chemical Company, AMVAC Chemical Corporation, American Vanguard Corporation, Brewer Environmental Industries LLC, Maui Pineapple Company, Ltd. and Maui Land and Pineapple Company, Inc. (collectively "Defendants"), on the other hand.

RECITALS

Case Name:

1. There is now pending in the Second Circuit Court of the State of Hawaii a civil action entitled "*Board of Water Supply of the County of Maui v. Shell Oil Company, et al.*," Civil Case No. 96-0370(1) (the "Action"). Complaint Filed 7/3/96

Intent:

2. Plaintiff and Defendants have entered into this Agreement to resolve with finality the Action, as well as all past, pending, potential, continuing and future DBCP claims between them and to avoid the expense of further litigation.

3. In consideration for this Agreement, Defendants agree to pay as tort damages $3,000,000 in settlement of the Action, consisting of the sums of $1,791,231 for the capital cost of GAC facilities for the Napili A well, $404,769 for certain past DBCP related costs, and $804,000 for the cost of the Hamakuapoko 1999 Drought Emergency GAC facility. Defendants also agree (subject to certain limitations) to pay certain sums for the installation and operation of carbon filtration systems (hereinafter "GAC") or alternative remedies to assist Plaintiff in complying with the Maximum Contaminant Level ("MCL") for DBCP on the Island of Maui until September 1, 2039 (a period of forty (40) years).

DEFINITIONS

4. The following definitions apply throughout this Agreement:

a. "Defendants", as the term is used throughout this Agreement, refers collectively to defendants The Dow Chemical Company, Occidental Chemical Corporation, successor- in-interest to Occidental Chemical Company, Occidental Petroleum Corporation, Shell Oil Company, individually and dba Shell Chemical Company, AMVAC Chemical Corporation, American Vanguard Corporation, and Brewer Environmental Industries, LLC, and third-party defendants Maui Land and Pineapple Company, Inc., and Maui Pineapple Company, Ltd. and each of them, and all of their predecessors and successors, their current and former parent and subsidiary companies, divisions and affiliates.

b. "DBCP" refers to 1,2-dibromo-3-chloropropane, and all products

containing said compound, including, without limitation, Dow "Fumazone," Occidental "DBC and "DBCP," Nematocide Granules 30, Nematocide 12.1 EM, Nematocide 15.1 EM, Nematocide Solution 17.1 and Shell "Nemagon".

c. The term "Maximum Contaminant Level" or "MCL" refers to a limit concerning the concentration of DBCP in drinking water supplies enforced by a public agency which applies to Plaintiff. At present, the MCL for DBCP enforced by the Hawaii Department of Health ("DOH") is 40 parts per trillion (ppt), or 0.04 parts per billion (ppb). The parties anticipate that during the period covered by this Agreement the name of the governmental entity enforcing the MCL, the numerical limit, and/or the terminology used to describe the limit may change. This Agreement is intended to secure compliance with whatever MCL is applicable and enforceable at the relevant time during the term of this Agreement.

d. The terms "Exceeds the MCL" or "Exceeded the MCL" refer to a potential situation where either: (1) Plaintiff's well exceeds the MCL for DBCP when tested for the applicable regulatory period; (2) a regulatory authority directs Plaintiff to stop using a well or refrain from connecting a well to its water system unless Plaintiff remediates DBCP in the well; or (3) the well is tested quarterly and the total of such quarterly test results exceeds the applicable MCL when divided by four (4).

e. "CPI" refers to the Consumer Price Index, all urban consumers, water and sewerage maintenance, issued by the U.S. Bureau of Labor Statistics, or its successor, as adjusted for projects in Hawaii.

f.
(i) "Napili A" refers to Plaintiff's well, Hawaii State No. 5838-01.
(ii) "Honokahua A" refers to Plaintiff's well, State No. 5838-03.
(iii) "Hamakuapoko 1" refers to Plaintiff's well, State No. 5420-02.
(iv) "Hamakuapoko 2" refers to Plaintiff's well, State No. 5320-01.
(v) "Haiku well" refers to Plaintiff's well, State No. 5419-01.

g. "Existing Wells" refers to all wells on the Island of Maui which were drilled, owned, and/or operated by Plaintiff before the effective date of this Agreement.

h. "Hamakuapoko 1999 Drought Emergency GAC" refers to the temporary installation of GAC on Hamakuapoko Wells Nos. 1 and 2 during the 1999 Upcountry Drought Emergency.

i. "Future Wells" refers to drinking water wells on the Island of Maui, which are drilled and/or acquired by Plaintiff after the effective date of this Agreement.

j. The term "GAC" refers to granular activated carbon facilities for removal of DBCP from water.

k. The term "O&M" refers to the cost of operation and maintenance of GAC or other method used to remove DBCP from water, including, but not limited to, vessel replacement due to age and/or wear and tear.

l. "Regularly Scheduled Well Test" currently means a quarterly raw water analysis conducted by or on behalf of Plaintiff, or for such other period as may be required by

any state or federal law or regulator.

m. The term "Regular Use" means a Plaintiff well that has a utilization rate of 10% or more, averaged over a year where water from the well is introduced into the water distribution system.

n. The term "In Operation" refers to that period of time (measured in days) when GAC is installed on an active Plaintiff well and: (1) it is actually removing DBCP from the water; (2) it is not removing DBCP because the well on which it is installed is not pumping due to regular water demand fluctuations; or (3) it is undergoing ordinary maintenance or carbon change-out.

o. "Defendants' Representative" refers to the law firm of Filice, Brown, Eassa & McLeod, LLP, 1999 Harrison Street, 18th Floor, Oakland, California 94612-3541, or such other successor, person or entity designated by Defendants in the future.

p. "Plaintiff's Representatives" refers to the Corporation Counsel, County of Maui, 200 South High Street, Wailuku, Maui, Hawaii, and Miller, Sher & Sawyer, A Professional Corporation, 7 Park Center, Suite 1, Sacramento, California 95825, or such other successor, person or entity designated by Plaintiff in the future.

q. The term "Notice to Proceed" refers to a notice from Plaintiff to a contractor to construct a GAC facility, or alternative technology facility.

r. "DOH" refers to the Hawaii Department of Health or any successor entity charged by the State of Hawaii with regulating water quality.

s. "Event of Default" refers to any of the following events:
(i) under the terms of paragraph 46, Defendants fail to pay Capital Costs within 30 days of receiving a Notice to Proceed;
(ii) under the terms of Paragraph 47, Defendants fail to make a timely payment for O&M Costs;
(iii) under the terms of Paragraph 48, Defendants fail to provide a replacement Letter of Credit.

GENERAL SUMMARY OF TERMS OF AGREEMENT

5. As more specifically described below, in consideration for this Agreement:

Past and Present Costs

6. On or before September 1, 1999, Defendants will make a cash payment as tort damages to Plaintiff and its attorneys of record, "Miller, Sher & Sawyer, a professional corporation," in the amount of Three Million Dollars ($3,000,000), provided Plaintiff has executed this Agreement. This represents a total of $1,791,231 for the capital cost of GAC facilities for the Napili A well, $804,000 for the cost of the Hamakuapoko 1999 Drought Emergency GAC, and $404,769 for other past DBCP-related costs.

7. Third-party defendant, Maui Land and Pineapple Company hereby releases any claim for past transfers of land to Plaintiff in West Maui. Plaintiff will participate in separate

negotiations with Maui Land and Pineapple Company to install, operate and maintain a 2.5 inch high density polyethylene (HDPE) pipeline, or its equivalent, and appurtenances, across Maui Land and Pineapple Company land, to connect with the nearest connection to Plaintiff's water system in the Honokahou Valley.

Capital Costs of GAC Facilities For Certain Wells

8. It is anticipated that during the term of this Agreement the concentration of DBCP in the Hamakuapoko 1 and 2, Honokahua A and Haiku wells may Exceed the MCL. Defendants will reimburse Plaintiff during the term of this Agreement for 100% of the capital costs of GAC for each such Well that Exceeds the MCL. Defendants have agreed to make specified payments, as set forth in subparagraphs (i) through (iv), to defray the expense of installing GAC on these wells.

i. Defendants shall pay 100% of the sum of One Million Eight Hundred Thousand Dollars ($1,800,000) for wells that can be treated with two (2) GAC vessels (that is, a well with a yield of 750 gallons per minute ("gpm") or less);

ii. Defendants shall pay 100% of the sum of $2,400,000 for well(s) which can be treated with three GAC vessels (that is, well(s) with a yield of more than 750 gpm and less than 1,500 gpm);

iii. Defendants shall pay 100% of the sum of $ 600,000 for each additional 750 gpm of yield in a well at or above 1,500 gpm, in addition to the base amount of $2.4 million;

iv. Defendants' obligations to pay capital costs under this paragraph shall be reduced by $100,000 for wells with no pump or a non oil-lubed pump;

v. Capital costs to be paid under this Agreement after January 1, 2000 shall be adjusted by the CPI annually, pursuant to Paragraph No. 29 (CPI Adjustment).

Capital Costs of GAC Facilities For Other Wells

9. It is anticipated during the term of this Agreement that the concentration of DBCP in some other Existing and Future Wells may Exceed the MCL. Defendants will reimburse Plaintiff during the term of this Agreement for the capital costs of GAC for each other Existing and Future Well that Exceeds the MCL. Defendants have agreed to make specified payments, as set forth in subparagraphs (i) through (iv), to defray the expense of installing GAC on these wells.

i. Defendants shall pay 90% of the sum of One Million Eight Hundred Thousand Dollars ($1,800,000) for wells that can be treated with two (2) GAC vessels (that is, a well with a yield of 750 gallons per minute ("gpm") or less);

ii. Defendants shall pay 90% of the sum of $2,400,000 for well(s) which can be treated with three GAC vessels (that is, well(s) with a yield of more than 750 gpm and less than 1,500 gpm);

iii. Defendants shall pay 90% of the sum of $600,000 for each additional 750 gpm of well capacity at or above 1,500 gpm, in addition to the base amount of $2.4 million.

iv. Defendants' obligations to pay capital costs under this paragraph shall be reduced by $100,000 for all future wells and existing wells with no pump or a non oil-lubed pump.

v. Capital costs to be paid under this Agreement after January 1, 2000 shall be adjusted by the CPI annually, pursuant to Paragraph No. 29 (CPI Adjustment)

Reimbursement For Operations and Maintenance ("O&M") Of GAC

10. Defendants will reimburse Plaintiff during the term of this Agreement for O&M of GAC for each Plaintiff well that Exceeds the MCL as follows: Napili A, Honokahua A, Hamakuapoko 1 and 2, and the Haiku Wells shall each qualify for 100% of O&M at the annual rate of $68,500 for a two-vessel facility, $74,500 for a three-vessel facility, and an additional $6,000 for O&M for each additional vessel, adjusted by the CPI as set forth in Paragraph No. 29 Existing and Future Wells which are treated with GAC under this Agreement shall qualify for O&M at 90% of the O&M per vessel rate set forth in this paragraph, adjusted by the CPI as set forth in Paragraph No. 29. The number of vessels for which Defendants will pay will be based on well yield and will be determined pursuant to Paragraph No. 20 (for the Honokahua A, Hamakuapoko 1 and 2, and Haiku wells) or Paragraph No. 23 (for other Existing or Future Wells).

i The O&M payments specified above shall be made on or before January 10, 2000, and each successive year thereafter. The payments made shall be adjusted by the CPI annually pursuant to Paragraph No. 29.

ii. Defendants' obligation to pay annual O&M under this Agreement ends on September 1, 2039.

Limitation on Number of Wells

11. The number of wells for which Defendants will be obligated to pay for the capital and O&M costs for GAC is limited to fifty (50) wells.

Termination Of Obligations

12. Any obligation of Defendants to make any payment under this Agreement will end on September 1, 2039, provided that all payments due as of that date have been made.

TERMS OF AGREEMENT

Dismissal of Actions

13. Plaintiff agrees to dismiss with prejudice Defendants and the Action in its entirety, and Plaintiff further agrees to release and waive all rights to bring any future DBCP claims, lawsuits or actions arising in whole or in part from the past, present, continuing or future presence of DBCP in Plaintiff's wells on the Island of Maui, subject to the exceptions set forth in Paragraph 42 (indemnity) and Paragraph 43 (claims related to the Islands of Molokai and/or Lanai).

Denial of Liability

14 This Agreement is not an admission of liability, nor an admission that any of the facts alleged by Plaintiff are true, nor an admission that the Action or any portion thereof asserted by Plaintiff are well-founded, and Defendants deny that they, or any of them, are liable to Plaintiff for any of the claims asserted in the Action.

Joint Tortfeasor Release

15 It is understood, agreed, and intended as follows.

a. The release contained in Paragraph 57 of this Agreement (the "Release") is intended to be and shall be construed as a joint tortfeasor release, and any damages otherwise recoverable by the Board against any other persons (natural, corporate, or otherwise) in connection with events and transactions which are the subject of the release shall be and hereby are reduced to the extent of (1) the consideration paid for this Release, or (2) the pro rata share that Defendants would be responsible to pay to the Board if it were determined that Defendants were jointly liable to the Board, whichever is greater.

b. The Release is given and taken pursuant to the provisions of the Uniform Contribution Among Tortfeasors Act, sections 663-11 through 663-17, Hawaii Revised Statutes, as amended ("UCATA"), and shall operate to release Defendants from any and all liability to make contribution for the Covered Claims (as that term is defined in the statute) to any person found to be a joint tortfeasor with Defendants.

c. The parties hereto intend that the Release and provisions of UCATA shall be applicable to all Covered Claims, whether asserted under federal statutes or under Hawaii statutes or under common law, including claims to which UCATA may not otherwise (in the absence of this Release) apply.

Payment for Past and Present Costs

16. Plaintiff agrees to release Defendants from all claims for DBCP-related costs incurred to date by Plaintiff, including, but not limited to, the capital costs of GAC on the Napili A well, the costs of the 1999 Hamakuapoko Drought Emergency GAC, and certain other costs, for which Defendants agree to pay Plaintiff as tort damages the amount of Three Million Dollars ($3,000,000), payable to "Board of Water Supply of the County of Maui and its attorneys of record, Miller, Sher & Sawyer, a professional corporation," on or before September 1, 1999, if Plaintiff has executed this Agreement.

Payment for O&M Costs

17. On or before January 10 of each year, Defendants will reimburse Plaintiff for O&M of GAC for the preceding year in conformity with this Agreement, if GAC was in place and In Operation during the preceding year. The first payment will be made on or before January 10, 2000, for the portion of 1999, if any, that such facilities were in operation. Defendants will reimburse Plaintiff for O&M on the Hamakuapoko 1999 Drought Emergency GAC for each month GAC was in place and in operation at least 10% of the month at a monthly rate of $5,708. Reimbursement for O&M costs will be requested and paid in accordance with the terms of paragraph 47.

18. The amounts payable for O&M for GAC will be adjusted by the CPI annually, pursuant to Paragraph No. 29.

CERTAIN WELLS THAT EXCEED THE MCL

19. If the concentration of DBCP in the Honokahua A, Hamakuapoko 1, Hamakuapoko 2, and/or the Haiku wells Exceeds the MCL, then upon issuance of a Notice to Proceed for installation of GAC facilities on any such well, Defendants will pay 100% of the capital costs and O&M for GAC on those wells.

Capital Costs

20. Capital costs associated with installation of GAC for the Honokahua A, Hamakuapoko 1, Hamakuapoko 2, and/or the Haiku wells are determined as follows:

a. Plaintiff will determine the number of GAC vessels to be installed for a well(s) that Exceeds the MCL based on actual peak well yield capacity as follows: Up to 750 gpm (two vessel), and 751-1,500 gpm (three vessels). One additional vessel will be installed for each additional 750 gpm increment, or fractions thereof, in actual peak well capacity. Plaintiff may locate vessels on a well site, a remote site or at a centralized site at its option.

b. The capital costs of which Defendants will pay 100% are as follows: two vessels -- $1, 800,000, three vessels -- $2, 400,000. Defendants will pay 100% of an additional $600,000 for each additional vessel above three. Defendants' obligations to pay capital costs under this paragraph shall be reduced by $100,000 for any of these wells with no pump or a non oil-lubed pump. The foregoing amounts are deemed to include, but are not limited to, the costs of land acquisition, design, and construction of GAC.

c. Subject to Defendants' obligation to reinstall GAC on previously treated wells from which GAC has been removed, capital costs of which Defendants will pay 100% do not include the costs of GAC vessel replacement, including due to age or wear and tear. (See Paragraph No. 4 k.) Such vessel replacement costs are included in, and/or to be paid by Plaintiff out of, O&M.

d. Reimbursement will be requested and paid in accordance with Paragraph No. 46.

O&M Costs

21. The O&M costs on the Honokahua A, Hamakuapoko 1, Hamakuapoko 2, and/or Haiku wells are determined as follows:

a. O&M costs will be based on well yield as follows: Up to 750 gpm (two vessels), $68,500/year; 751-1,500 gpm (three vessels), $74,500/year; and an additional $6,000/year for each additional 750 gpm of well yield.

b. On or before January 10 of each year, for each such well, Defendants will reimburse Plaintiff for 100 percent of the O&M of GAC for the preceding year if GAC was In Operation on such well during the preceding year.

c. For any such well for which GAC has been In Operation for less than one year, Defendants' obligation to reimburse Plaintiff for O&M will be limited to 100% of the monthly per vessel rate set forth in Paragraph No. 21 a. for O&M of GAC for each month GAC was In Operation.

d. Defendants' obligation to pay annual O&M on any such well, as set forth above, will be conditioned on Plaintiff's Regular Use of such well. For any such well with an average annual utilization rate of less than 10%, Defendants will pay O&M of $1,000 for such well for each month GAC was In Operation if GAC was not installed and In Operation for the entire year.

e. For any such well at which GAC was In Operation for less than one year, the payment will be a calculated amount for each month the GAC was In Operation for more than fifteen (15) days. The amount paid for each month under this paragraph will be calculated by dividing 12 into the annual rate for O&M payments set forth under subparagraph (a) above.

f. The amounts payable for capital costs for the Honokahua A, Hamakuapoko 1, Hamakuapoko 2, and/or Haiku wells under Paragraph 20 will be adjusted by the CPI annually, pursuant to Paragraph No. 29. The amounts payable for O&M for such wells under Paragraph No. 21 will be adjusted by the CPI annually, pursuant to Paragraph No. 29.

g. Reimbursement will be requested and paid in accordance with the terms of Paragraph No. 47.

OTHER WELLS THAT EXCEED THE MCL IN THE FUTURE

22. Where Existing or Future Wells Exceed the MCL, Defendants will pay 90% of the capital costs and O&M for GAC on those Wells, upon Plaintiff's issuance of a Notice to Proceed for installation of GAC facilities on any Existing or Future Wells.

Capital Costs

23. Capital costs associated with installation of GAC for Existing or Future Wells are determined as follows:

a. Plaintiff will determine the number of GAC vessels to be installed for a well(s) that Exceeds the MCL based on actual peak well yield capacity as follows: Up to 750 gpm (two vessel), and 751-1,500 gpm (three vessels). One additional vessel will be installed for each additional 750 gpm increment, or fractions thereof, in actual peak well capacity. Plaintiff may locate vessels on a well site, a remote site or at a centralized site at its option.

b. The capital costs of which Defendants will pay 90% are as follows: two vessels -- $1, 800,000, three vessels -- $2, 400,000. Defendants will pay 100% of an additional $600,000 for each additional vessel above three. Defendants' obligations to pay capital costs under this paragraph shall be reduced by ninety percent (90%) of $100,000 for all future wells and for existing wells with no pump or a non oil-lubed pump. The foregoing amounts are deemed to include, but are not limited to, the costs of land acquisition, design, and construction of GAC.

c. Subject to Defendants' obligation to reinstall GAC on previously treated wells from which GAC has been removed, capital costs of which Defendants will pay 90% do not include the costs of GAC vessel replacement, including due to age or wear and tear (See Paragraph No 4 k.) Such vessel replacement costs are included in, and/or to be paid by Plaintiff out of, O&M

d. Reimbursement will be requested and paid in accordance with Paragraph No 46

O&M Costs

24. The O&M costs on Existing and Future Wells are determined as follows:

a. O&M costs will be based on well yield as follows: Up to 750 gpm (two vessels), $68,500/year; 751-1,500 gpm (three vessels), $74,500/year; and an additional $6,000/year for each additional 750 gpm of well yield.

b. On or before January 10 of each year, for each Existing and/or Future Well, Defendants will reimburse Plaintiff for 90 percent of the O&M of GAC for the preceding calendar year, if GAC was In Operation on such Existing or Future Well for the entire year.

c. For any Existing and/or Future Well for which GAC has been In Operation for less than one year, Defendants' obligation to reimburse Plaintiff for O&M will be limited to 90% of the monthly per vessel rate set forth in Paragraph No. 24 a. for O&M of GAC for each month GAC was In Operation.

d. Defendants' obligation to pay annual O&M on any Existing or Future Well, as set forth above, will be conditioned on Plaintiff's Regular Use of such Well. For any Existing or Future Well with an average annual utilization rate of less than 10%, Defendants will pay O&M of $1,000 for such Well for each month GAC was in operation (if GAC was not installed and In Operation for the entire year).

e. For any Existing and/or Future Well at which GAC was In Operation for less than one year, the payment will be a calculated amount for each month the GAC was In Operation for more than fifteen (15) days. The amount paid for each month under this paragraph will be calculated by dividing 12 into the annual rate for O&M payments set forth under subparagraph (a) above.

f. Reimbursement will be requested and paid in accordance with the terms of Paragraph No. 47.

CPI

25. The amounts payable for capital costs for wells under Paragraphs 20 and 23 will be adjusted by the CPI annually, pursuant to Paragraph No. 29. The amounts payable for O&M for wells under Paragraphs 21 and 24 will also be adjusted by the CPI annually, pursuant to Paragraph No. 29.

Selection of Alternative Sites for Future Wells

26. Future Wells (other than wells under construction as of the date this Agreement is

fully executed) constructed by Plaintiff or contractors retained by Plaintiff, must be in substantial compliance with the following procedures before Plaintiff may obtain reimbursement from Defendants for the cost of constructing, operating or maintaining GAC on such well

a. Plaintiff shall select a proposed well site and notify Defendants' representative thereof, and provide Defendants with available relevant information concerning the presence of DBCP in groundwater underlying the site, including historic land use information, hydrogeologic characteristics and DBCP test results (if any).

b. Defendants shall have 21 days after receipt of said notice to notify Plaintiff that: (1) Defendants do not object to Plaintiff proceeding with the production well at that location, or (2) a pilot test well should be drilled and tested at that location (at defendants' sole expense), or (3) an alternative well site should be considered.

c. If Defendants request a pilot test well at the proposed well site, Defendants shall have 15 days after receipt of test results from that pilot test well to notify Plaintiff that Defendants do not object to Plaintiff proceeding with the production well at that location or that an alternative well site should be considered.

d. If Defendants notify Plaintiff to consider an alternative well site, Defendants' representative must meet and confer with Plaintiff's representative to select an alternative site at least one-half mile from any existing or planned Plaintiff well, and within one-half mile of the connection to Plaintiff's water system that would have been serviced by the original well site. After consideration of potential environmental issues, Plaintiff shall not unreasonably withhold consent for the selection of alternative well sites. If Plaintiff or a controlling regulatory entity determines that a proposed alternative well site is too environmentally sensitive to be used for a production well, Plaintiff shall promptly notify Defendants of that determination so that the parties may consider additional alternative well sites. Potential environmental issues may be identified through existing documents (if any) prepared pursuant to the Hawaii Environmental Policy Act, or otherwise, that assess the original well site and include the alternative well site as a project alternative. Nothing in this Agreement shall impose any additional environmental analysis obligations on Plaintiff under the Hawaii Environmental Policy Act or otherwise.

e. The parties shall also meet and confer regarding the estimated cost of constructing, operating, and maintaining the well at the alternative well site. The parties intend that should the construction of a well proceed at an alternative well site, any estimated increased costs (compared to the original well site) incurred in connection with constructing, connecting, operating and maintaining a well at the alternative site shall be borne exclusively by Defendants including, but not limited to:

(i) the cost of acquiring at least 20,000 square feet of land for the well site and any treatment facilities which may be required;
(ii) the cost of drilling, constructing, and connecting the well to Plaintiff's distribution system, all in conformance with Plaintiff's standard specifications and construction standards;
(iii) the cost of any electrical costs (see attached formula, Exhibit A) and/or pressure reducing facilities associated with the alternative site;
(iv) the cost of constructing and maintaining and/or obtaining easements for any access road to the replacement well;
(v) the cost of obtaining all necessary permits and authorizations,

including, but not limited to, those required by the Hawaii Environmental Policy Act and the Department of Land and Natural Resources and/or successor legislation;
(vi) the amount of increased allowance for change orders, based on a 10 percent allowance for such change orders; and
(vii) all other reasonably anticipated costs associated with the project.

In calculating any increased costs associated with the alternative well site, the parties will subtract the amount Plaintiff would have expended in constructing, connecting, operating and maintaining the well at the original well site from the costs of constructing, connecting, operating, and maintaining the well at the alternative site.

f. Upon completion of the meet and confer process, Plaintiff shall serve a written notice upon Defendants with Plaintiff's itemized comparison of the reasonably anticipated cost of constructing, connecting, operating, and maintaining a well at the original and alternative well sites. If the estimated costs at the alternative site are higher than those estimated at the original well site, Plaintiff may make a demand on Defendants for those increased costs ("Increased Cost Demand").

g. Within twenty-one (21) calendar days of receipt of said itemized comparison, Defendants shall: (1) inform Plaintiff that Defendants do not object to proceeding with construction of a well at the original well site; (2) inform Plaintiff that Defendants agree to pay the Increased Cost Demand; or (3) serve a written notice of specific objections to the Increased Cost Demand together with an estimate by a qualified contractor to perform the work at the alternative well site to Plaintiff's specifications for construction of a well.

h. If the parties are unable to agree on the selection and/or increased cost of the alternative well site, either party may elect to arbitrate the dispute as provided in Paragraph 34. In any such arbitration, Defendants shall bear the burden of proof.

i. In the event new or materially different environmental issues associated with the selection of the alternative well site ("New Issues") are a substantial factor leading to environmental litigation by a third party, then either: (1) Defendants shall assume the cost of defense of that litigation; or (2) if Defendants do not assume the cost of defense of that litigation, Plaintiff may proceed with construction at the original well site with reimbursement by Defendants if the well exceeds the MCL as specified in this Agreement.

j. If Defendants fail to serve Plaintiff with a timely objection to the Increased Cost Demand described above, Plaintiff may elect to proceed with construction at the original well site.

k. If the well constructed at an alternative site fails to yield water that meets all then applicable water quality standards, Defendants shall pay the full cost of installing treatment facilities to correct any such deficiency and shall reimburse Plaintiff for the full cost of operating and maintaining any such equipment. Defendants' obligation to reimburse Plaintiff for such treatment facilities shall not apply to disinfection facilities or any treatment or other water quality technology which Plaintiff is required to install on all Plaintiff wells In Operation, other than wells treated with GAC.

l. Any well constructed at an alternative site must yield at least eighty percent

(80%) as much water (gallons per minute ("gpm")) as the original site selected by Plaintiff.

m. If the well constructed at the alternative well site fails to operate as provided in the previous sub-paragraph, Defendants may elect to construct at their sole expense an additional well to Plaintiff's standards at another site approved by Plaintiff so that the combined flow from both wells equals or exceeds that anticipated at the original proposed site.

n. If Defendants pay the Increased Cost Demand or amount determined in Arbitration under this Agreement, then: (1) any increased capital costs will be paid within 30 days of Defendants' receipt of a notice to proceed to a contractor to construct a well at the alternative well site; and (2) any increased operations and maintenance costs will be adjusted by the CPI under Paragraph No. 29 and January 10 for each preceding year the well is operation during the term of this Agreement.

ADMINISTRATIVE APPEALS

27. If a regulatory authority incorrectly, mistakenly, or in excess of its authority directs Plaintiff to stop using a well or refrain from connecting a well to its water system unless Plaintiff remediates DBCP in the well, Plaintiff may, within 60 days of receipt of the directive, petition the regulatory authority for reconsideration of the directive. If Plaintiff chooses not to petition the regulatory authority for reconsideration of the directive, Plaintiff shall notify Defendants and Defendants, at their own expense, may choose to challenge the regulatory authority's decision. Plaintiff shall provide Defendants with information from its files concerning the status of the well in question

CESSATION OF O&M

28. For any Plaintiff well on which GAC or other remediation equipment to remove DBCP is installed, Defendants' obligation to pay O&M shall cease upon the occurrence of the following:

a. If any Regularly Scheduled Well Test for DBCP results in a concentration below the MCL, a second confirming sample will be taken within ten (10) days. If the average of those two samples is below the applicable DBCP MCL, the well is to be tested for the time period specified by the then applicable drinking water regulation. If the average of those tests is below the applicable MCL, Plaintiff may within sixty (60) days of receipt of the laboratory result for the last sample petition DOH for a permit amendment allowing removal of GAC or other DBCP remediation equipment. If the amendment is granted, Defendants' responsibility to pay O&M on the well is terminated thirty (30) days after notification to Plaintiff by DOH of the amendment approval. If Plaintiff chooses not to petition DOH for a permit amendment, Defendants' obligation to pay O&M on the well is terminated on the thirtieth day after the events described in this paragraph.

b. Within 90 days, either DOH will grant Plaintiff's petition, or Plaintiff must make a good faith effort to obtain such relief from DOH. If the petition is denied, Plaintiff shall again petition DOH in a good faith effort to persuade DOH to grant the petition. If the second petition is denied, Plaintiff shall notify Defendants and the parties shall cooperate should Defendants, at their own expense, choose to challenge the DOH decision in Plaintiff's name. Defendants' responsibility to pay O&M on the site or well in question will cease 30 days after DOH grants the petition.

c. Plaintiff is entitled to leave the GAC or other DBCP remediation equipment in place and/or operate same at its own expense for at least twelve (12) months after Defendants' obligation to pay O&M on the well has ceased

d. If GAC or other DBCP remediation equipment has been removed from a well which has previously been treated and which subsequently requires treatment, the cost of such treatment will be borne by Defendants to the same extent as it was when GAC or other DBCP remediation equipment was originally installed, and will not be counted twice against the well limits set forth in Paragraph No. 30

CPI ADJUSTMENT

29. This Agreement contains provisions for: (a) Defendants' payment of specified sums for the installation of GAC, which are expressed in 1999 dollars, and O&M, which are expressed in 1999 dollars; and (b) credits and offsets to Defendants, which are expressed in 1999 dollars. All payments of capital costs and O&M made by Defendants to Plaintiff and all credits and offsets to which Defendants are entitled under this Agreement for the year beginning January 1, 2000, and each year thereafter will be adjusted according to the CPI. The CPI adjustment shall operate as follows: The payments made, and credits and offsets applied, for the year 2000 shall be adjusted to reflect inflation or deflation pursuant to the CPI, except as limited by this Paragraph, with each successive year's payments being similarly adjusted according to the prior year's inflation or deflation pursuant to the CPI.

a. For the purpose of calculating inflation or deflation for capital costs, 1999 expressed dollars (as established by the June 1999 figure for the CPI) are to be used in this Agreement and are to be modified annually using the June CPI for subsequent years.

b. For the purpose of calculating inflation or deflation for O & M, 1999 expressed dollars (as established by the June 1999 figure for the CPI) are to be used in this Agreement and are to be modified annually using the June CPI for subsequent years. The first CPI adjustment to O&M shall commence with the January 10, 2001 payment using the June 2000 CPI.

LIMIT ON NUMBER OF WELLS FOR WHICH DEFENDANTS MAY BE RESPONSIBLE

30. The number of wells for which Defendants will be obligated to pay for the capital and O&M costs for GAC is limited to fifty (50) wells.

TERMINATION OF OBLIGATIONS

31. All obligations on the part of Defendants under this Agreement, including but not limited to payments of capital costs and O&M to Plaintiff, end on September 1, 2039, provided that all payments due as of that date have been paid.

RE-USE OF GAC VESSELS

32. As GAC vessels become available when they are taken out of service on wells that no longer require DBCP remediation, Defendants may choose to move these units to another well requiring DBCP remediation. If Defendants pay for the installation or reinstallation of

surplus GAC vessels, Defendants will receive a credit of $95,000 per vessel (adjusted by the CPI) to be applied to Defendants' portion of the capital cost of GAC on any well covered by this Agreement. Defendants will pay for the cost of moving, installing, inspecting, repairing and refilling these units, such activities to be performed by Plaintiff to Plaintiff's standards

33. If a GAC vessel is moved to another site, and the well on which it had previously been installed once again Exceeds the MCL, then Defendants shall pay the appropriate portion of capital costs and O&M (either 90% or 100%) required to install or reinstall and operate GAC on that well

ALTERNATIVE TECHNOLOGY AND/OR REMEDIES

34. Defendants may propose that Plaintiff utilize a less expensive wellhead treatment method approved by U.S. EPA or State of Hawaii for the remediation of DBCP. Defendants agree to pay the actual cost of designing, procuring, and installing all appropriate equipment and modifications to existing equipment, including capital and O&M costs under the conditions of this Agreement, on any well on which such equipment is installed. If any such less expensive wellhead treatment method is installed, then in lieu of O&M payments for GAC, Defendants will reimburse Plaintiff for the actual cost of O&M for the less expensive wellhead treatment method pursuant to Paragraph 47.

35. After meeting and conferring, Plaintiff's or Defendants' representatives may submit any disputed claim concerning the reliability, practicability, or efficacy, or actual cost, including capital and O&M costs, of employing any less expensive well-head treatment to binding arbitration pursuant to Paragraph 54 (Arbitration) of this Agreement. Notwithstanding any other provision of this Agreement, Plaintiff shall not be required to use any technology approved by the EPA, but disapproved by the DOH.

36. Plaintiff may elect to implement alternative remedies for DBCP. If Plaintiff elects to implement an alternative remedy, Defendants will only be obligated to pay the lesser of either: (a) 100% of the capital and O&M costs of the alternative remedy, or (b) 90% of the capital and O&M costs for the appropriately sized GAC facility, based on the capacity of the subject well(s), as appropriate. Plaintiff and Defendants shall submit any disputed claim concerning the actual cost, including capital and O&M costs, of any alternative remedy for DBCP to binding arbitration pursuant to Paragraph 54 (Arbitration) of this Agreement.

37. If EPA or DOH directs Plaintiff that modifications or additions to GAC (other than disinfection equipment) are required to continue use of GAC solely for the removal of DBCP, and Plaintiff and Defendants are unable to agree on the amount of the reasonably necessary expense of such treatment that should be borne by Defendants, Plaintiff and Defendants will submit Plaintiff's claim for the reasonably necessary expense of such treatment to binding arbitration pursuant to Paragraph 54 (Arbitration) of this Agreement.

38. The activities set forth in Paragraph Nos. 34 through 37 are subject to approval by both Plaintiff and Defendants; said approval will not be unreasonably withheld.

LABORATORY ANALYSIS AND REPORTING

39. Plaintiff and Defendants each retain the right to challenge any reported laboratory test result for DBCP and may take the steps necessary, at their own cost, to verify the result, including such steps as obtaining a confirming sample for analysis or requesting that the laboratory confirm its calculations or reanalyze the initial sample.

40. Plaintiff will provide Defendants' Representative with a complete report of all DBCP test results from Plaintiff production wells every six months throughout the duration of this Agreement on the first business days of May and December of each year. The report need only contain the DBCP results for the year preceding the date of the report.

41. Defendants may, at their own expense, participate in Plaintiff's regularly scheduled sampling, take split samples, and make reasonable site inspections upon request; said requests will not be unreasonably made by Defendants.

INDEMNITY

42. Plaintiff will retain its right, if any, to seek indemnity from Defendants if it is sued by a third party for personal injuries or property damage allegedly attributable to DBCP. Plaintiff certifies that it is presently unaware of any such claims.

LANAI AND MOLOKAI

43. Notwithstanding any other provision of this Agreement, Plaintiff will retain its right, if any, to bring any future DBCP claims, lawsuits, or actions, including but not limited to, claims for compensatory and/or punitive damages, arising in whole or in part from the past, present, continuing, or future presence of DBCP on the Islands of Lanai and Molokai.

COSTS

44. All parties will bear their own costs and attorney's fees incurred in the Action.

45. As to Plaintiff, Defendants will waive costs and attorneys' fees for all dismissed Defendants.

PAYMENT OF ANY FUTURE OBLIGATIONS

Capital Costs

46. In addition to the conditions that must be met under this Agreement before Defendants' obligations to pay future capital costs arise under this Agreement, Plaintiff must submit to Defendants' Representative and representatives for defendants AMVAC, Occidental, and Maui Land and Pineapple Company (the names and addresses of which will be provided and updated by Defendants' Representatives) a copy of a Notice to Proceed to a contractor to construct a GAC or alternative technology facility to treat a well that Exceeds the MCL. Within 30 days of Defendants' receipt of the Notice to Proceed, Defendants must pay Plaintiff the amount owed under the terms of this Agreement. In the event that Defendants fail to make timely payment, payment will be made under Paragraph 48 of this Agreement (Letter of Credit). Any disputed claims shall be submitted to arbitration pursuant to Paragraph 54, provided that Plaintiff shall be entitled to immediate payment pursuant to Paragraph 48, regardless of whether

the claim is disputed.

O&M

47. In addition to the conditions that must be met under this Agreement before Defendants' obligations to pay future O&M arise under this Agreement, Plaintiff must submit by December 1 of each year starting in 2000 a qualifying claim for O&M that provides sufficient information to evaluate whether and to what extent Plaintiff's well(s) qualify for O&M payment. This will include, but not be limited to, DBCP test results and information concerning whether the wells were In Operation and In Regular Use during the preceding twelve months. Provided Plaintiff's O&M claim is timely submitted, Defendants shall make payment in the amount claimed by the following January 10. In the event Defendants fail to make timely payment, payment will be made under Paragraph 48 of this Agreement (Letter of Credit). Any disputed claims shall be submitted to arbitration pursuant to Paragraph 54, provided that Plaintiff shall be entitled to immediate payment pursuant to Paragraph 48, regardless of whether the claim is disputed. If Plaintiff fails to submit a timely claim (i.e., by December 1), then Defendants' obligation to make a timely payment (i.e., by January 10) shall be extended one day for each day Plaintiff's claim is late.

LETTER OF CREDIT

48. To secure the obligations of Defendants under this Agreement, and as a condition precedent to the obligations of Plaintiff hereunder, Defendants shall, at their sole cost and expense, furnish to Plaintiff, on or prior to October 1, 1999, and thereafter maintain during the entire term of this Agreement, continuing to a date thirty (30) days after the later of (i) September 1, 2039 or (ii) satisfaction of all Defendants' obligations to Plaintiff under this Agreement, an irrevocable standby letter of credit ("Letter of Credit") in favor of Plaintiff in form and substance reasonably satisfactory to Plaintiff, issued or confirmed by a United States banking institution having capital and surplus of not less than One Billion United States Dollars (USD 1,000,000,000) and advised by a banking institution with a banking office in Honolulu, Hawaii.

a. The Letter of Credit shall have a principal amount of Twenty Million United States Dollars (USD 20,000,000), and shall provide for payment to Plaintiff under this Agreement by a draft at sight to which is attached Plaintiff's Signed Statement (as defined in the Letter of Credit). The draft at sight and the Signed Statement which shall be conclusive that there has occurred an event of default under this Agreement and any applicable cure period has lapsed. A draft at sight presented as the result of an Event of Default related to claims under either Paragraph 46 or 47 will be limited to the amount of the claim. A draft at sight presented as the result of an Event of default based on the failure of the Defendants to renew the Letter of Credit may be presented for the full amount of the Letter of Credit.

b. Should any Letter of Credit furnished by Defendants hereunder expire prior to the term of this Agreement, Defendants shall automatically provide Plaintiff with a replacement, in the same tenor, no later than sixty (60) days prior to the expiration of the then-current Letter of Credit. Failure to provide a replacement for a Letter of Credit shall be an Event of Default under this Agreement, and shall permit Plaintiff to draw on the then-current Letter of Credit as provided above. Plaintiff's realization of the amount payable under the Letter of Credit shall not affect Plaintiff's right to elect any other remedy on default available to Plaintiff under this Agreement, or under applicable law.

c. Where Plaintiff draws on a Letter of Credit because of the occurrence of an Event of Default based on the failure of the Defendants to renew the Letter of Credit, the amount drawn on the Letter of Credit shall first be applied to any then existing claims for Capital Costs and/or O&M Costs under this Agreement and thereafter the balance of the amount drawn shall be applied as credit against future claims under the Agreement or reconveyed to the banking institution that issued the Letter of Credit upon Defendants obtaining a new Letter of Credit.

d. The principal amount of the Letter of Credit may be adjusted upon agreement of all the parties at the time of any renewal or replacement of the Letter of Credit. In the absence of such agreement, the principal amount of the Letter of Credit shall remain Twenty Million United States Dollars (USD 20,000,000) so long as Defendants are required to maintain a Letter of Credit under this Paragraph 48.

CREDITS

49. a. Upon Defendants' initial payment of $3,000,000 pursuant to Paragraph 16 of this Agreement, Defendants shall be entitled to a one-time credit against the amount otherwise payable for installation of permanent GAC facilities at the Hamakuapoko Well Nos. 1 or 2 of $804,000, less the amount described in Paragraph 32 (Re Use of GAC Vessels), if, at Defendants' option, the vessels are used to treat any other well.

b. If any disputed claims under this Agreement are resolved in favor of Defendants, any amount determined to have been paid by Defendants in excess of the amount found to be due shall be credited to Defendants to offset future obligations under this Agreement.

c. Any credit or offset to which Defendants become entitled shall be applied to reduce the next occurring obligation of Defendants related to capital cost, and Defendants shall owe no additional amounts for capital costs until all credits and offsets to which Defendants are entitled have been applied and exhausted. Except as provided in this paragraph, and notwithstanding any other provision of this Agreement, Plaintiff shall not be obligated to pay Defendants cash on any accumulated credits or offsets. Except as otherwise set forth in this paragraph, any credits remaining as of September 1, 2039, shall be extinguished. Credits remaining as of September 1, 2039 that are the result of a claim made by Plaintiff after September 1, 2038 and disputed by Defendants thereafter, where the dispute is subsequently resolved in favor of Defendants, will be reimbursed to Defendants within thirty (30) days of such resolution.

50. If Plaintiff receives a payment under this Agreement for a GAC project that is not constructed, Defendants shall receive a credit in the amount of such payment toward the capital cost of the next GAC project that would otherwise trigger a further payment by Defendants.

DESIGNATED CONTACTS

51. Defendants' Representative and Plaintiff's Representatives are the parties' respective designated contacts for all reports, correspondence, and notices concerning the subject matter of

this Agreement. If another representative is substituted, Defendants or Plaintiff, as appropriate, must provide written notice of same within ten (10) days.

GOOD FAITH EFFORT

52. Consistent with this Agreement, the parties agree to make a good faith effort to mitigate both Defendants' obligations under this Agreement and any adverse impact on Plaintiff's water system.

ARBITRATION AGREEMENT

53. In the event of any dispute between Plaintiff and Defendants arising out of or relating to this Agreement, the parties agree to try in good faith to settle the dispute by negotiation and/or mediation.

54. If the dispute cannot be resolved to the parties' mutual satisfaction through negotiation and/or mediation within thirty (30) days, Plaintiff and/or Defendants' Representative may elect to seek arbitration, and the dispute shall be resolved through binding arbitration. It is the intent of the parties that the arbitration be structured in such a way as to minimize costs and delay. The arbitration shall be conducted in accordance with the Commercial Arbitration Rules of the American Arbitration Association (the "AAA Rules") with the following stipulations:

a. The arbitration hearing shall be held before Hon. Ret. Judge Weinstein at JAMS, San Francisco, or if he is not available or declines to serve, a single arbitrator if the parties agree upon a single arbitrator. If the parties cannot agree upon a single arbitrator, then each shall select an arbitrator, and those arbitrators shall select a third arbitrator. If they are unable to agree upon a third arbitrator within fifteen (15) days, the third arbitrator shall be selected as provided in the AAA Rules.

b. Unless otherwise ordered, each party's presentation at the arbitration hearing shall be limited to 14 hours, and the hearing shall be completed within ten (10) business days.

c. The arbitration decision shall be rendered not later than thirty (30) days after the final day of the hearing and shall be judicially enforceable, nonappealable and binding.

d. Summaries of any expert testimony, along with copies of all documents to be submitted as exhibits, shall be exchanged at least ten (10) business days before arbitration under procedures set up by the arbitrators.

e. Except as otherwise specified herein, there shall be no discovery or dispositive motion practice except as may be permitted by the arbitrators, who may authorize only such discovery as is shown to be necessary to ensure a fair hearing. No discovery or motions permitted by the arbitrators shall in any way alter the time limits specified herein.

f. Arbitration costs, arbitrators' fees, and attorneys' fees and costs shall be awarded to the prevailing party, if any, by the arbitrators.

g. The arbitration shall occur in San Francisco, California.

55. In the event of arbitration arising out of, or related to, this Agreement, the prevailing party shall be entitled to recover its costs, expenses, and reasonable attorneys' fees, in addition to any other relief to which it may be entitled.

RELEASE

NOW THEREFORE, in reliance on the recitals stated above and for consideration, Plaintiff agrees as follows:

56. The foregoing recitals are true and correct and by this reference incorporated herein.

57. Subject to the provisions of this Agreement, on behalf of itself, its assigns, Board representatives, and past, present or future agents, Plaintiff hereby releases Defendants, individually and collectively, and their respective predecessors, successors, assigns, present and potential indemnitees, insurers, subsidiaries, affiliates, attorneys, and past or present employees, directors, officers, agents, shareholders, and representatives from any and all DBCP claims, demands, Action, causes of action, obligations, liens, damages, and liabilities, of any nature whatsoever, whether or not known, suspected or claimed, present or future, relating to or arising out of any act, cause, matter or thing stated, claimed, or alleged, or that could have been stated, claimed, or alleged by Plaintiff in the Action. Plaintiff understands and acknowledges that it is releasing and waiving all past, present, continuing and future claims it has or may have against Defendants for the presence of DBCP, except as specifically set forth in this Agreement.

58. Plaintiff declares and warrants that no other person or entity has had nor now has any interest in the claims, demands, Action, causes of action, obligations, liens, damages, and liabilities released in Paragraph No. 57, above; and that it has not sold, assigned, transferred, conveyed, or otherwise disposed of any DBCP claim, demand, action, cause of action, obligation, lien, damage, or liability released in Paragraph No. 57, above.

59. Plaintiff declares that, prior to the execution of this Agreement, it has apprised itself of sufficient data, either through experts or other sources of its own selection, in order that it might intelligently exercise its judgment in deciding on the contents of this Agreement and in deciding whether to execute it. Plaintiff further declares that its decision to enter into this Agreement is not predicated on or influenced by any declarations or representations of Defendants, or any of them, or by Defendants' respective predecessors, successors, assigns, subsidiaries, affiliates, insurers or attorneys or past or present employees, officers, directors, agents, shareholders, or representatives. Plaintiff declares that this Agreement is executed voluntarily and with full knowledge of its significance.

60. The parties acknowledge that they have an understanding of the facts underlying the Action and have negotiated in good faith and that this Agreement represents a good faith settlement with regard to the interests of all parties to the Agreement.

61. Plaintiff authorizes and directs its counsel to execute appropriate Requests for Dismissal, with prejudice, of the entire Action as to all Defendants, and to deliver the executed Requests for Dismissal to Defendants' Representative. All parties authorize and direct their respective counsel to execute whatever documents are necessary to implement this Agreement.

62. This Agreement shall bind the parties and each successor and assign of each party.

63. This document embodies the entire terms and conditions of the Agreement between the parties, and supersedes any prior documents signed by the parties in the course of resolving the Action. All words, phrases, sentences, and paragraphs, including the recitals hereto, are material to the execution of this Agreement.

64. This Agreement shall be governed by, and interpreted and construed in accordance with, the laws of the State of Hawaii.

65. Upon the occurrence of an uncontrollable circumstance, the party affected shall be excused from any failure or delay in performance under this Agreement. For purposes of this Agreement, an "uncontrollable circumstance" includes, but is not limited to, acts of God, fire, flood, civil unrest, earthquake, declaration of a public emergency, injunction, and labor disputes. However, the parties recognize that delays in Defendants' performance under the terms of this Agreement could uniquely subject Plaintiff to third parties' disputes. Therefore, in the event Defendants' performance of any option or obligation described in Paragraph 26 and its subparts is delayed due to force majeure circumstances, Plaintiff may proceed with the construction of wells, notwithstanding any right of Defendants to construct replacement wells and select alternative well sites. Defendants shall promptly reimburse Plaintiff for the cost of well construction incurred under these circumstances.

66. In the event any of the terms, conditions or covenants contained in this Agreement are held to be invalid, then any such invalidity shall not affect any other terms, conditions or covenants contained herein which shall remain in full force and effect.

67. Plaintiff warrants that this Agreement has been approved by Plaintiff's Board of Water Supply, and each of the signatories to this Agreement warrants that he or she is fully authorized to enter into the terms and conditions stated herein and to execute this Agreement.

68. This Agreement will be effective whether or not executed in multiple counterparts.

Dated:________________ BOARD OF WATER SUPPLY
OF THE COUNTY OF MAUI
By________________________
Its:________________________

(signatures continued)

Approved as to form: MILLER, SHER & SAWYER
A Professional Corporation

Dated:________________ By________________________
DUANE C. MILLER
VICTOR M. SHER
Attorneys for Plaintiff, Board of
Water Supply of the County of Maui

60. The parties acknowledge that they have an understanding of the facts underlying the Action and have negotiated in good faith and that this Agreement represents a good faith settlement with regard to the interests of all parties to the Agreement.

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68. This Agreement will be effective whether or not executed in multiple counterparts

Dated: 8/31/99

BOARD OF WATER SUPPLY
OF THE COUNTY OF MAUI
By [signature]
Its: Chairman

(signatures continued)

Approved as to form:

MILLER, SHER & SAWYER
A Professional Corporation

Dated: Aug. 31, 1999

By [signature]
DUANE C. MILLER
VICTOR M. SHER
Attorneys for Plaintiff, Board of Water Supply of the County of Maui

Dated: ____________

THE DOW CHEMICAL COMPANY

By ____________
Its: ____________

Approved as to form:

FILICE, BROWN, EASSA & McLEOD, LLP

Dated: ____________

By ____________

Attorneys for Defendant
The Dow Chemical Company

Dated: ____________

OCCIDENTAL CHEMICAL COMPANY

By ____________
Its: ____________

Dated: ____________

OCCIDENTAL PETROLEUM CORPORATION

By ____________
Its: ____________

Dated: ____________

OCCIDENTAL CHEMICAL CORPORATION

By ____________
Its: ____________

(signatures continued)

Dated: ____________

MAUI LAND & PINEAPPLE COMPANY AND
MAUI PINEAPPLE COMPANY, LTD.

By ____________
Its: ____________

Approved as to form:

TOM & PETRUS

Dated: ____________

By ____________
STEPHEN M. TEVES
Attorneys for Third-Party Defendants, Maui Land & Pineapple Co. and Maui Pineapple Co., Ltd.

Dated: 30 Aug 1999

AMVAC CHEMICAL CORPORATION

By [signature]
Its: [signature]

Dated: 30 Aug 1999

AMERICAN VANGUARD CORPORATION

By [signature]
Its: [signature]

Approved as to form:

Dated: August 30, 1999

RUSH MOORE CRAVEN SUTTON MORRY & BEH

By [signature]
RICHARD C. SUTTON, JR.
Attorneys for Defendants
AMVAC CHEMICAL CORPORATION and
AMERICAN VANGUARD CORPORATION

Approved as to form:

MILLER, SHER & SAWYER
A Professional Corporation

Dated: ____________

By ____________
DUANE C. MILLER
VICTOR M. SHER
Attorneys for Plaintiff, Board of Water Supply of the County of Maui

Dated: August 31, 1999

THE DOW CHEMICAL COMPANY

By [signature]
Its: [signature]
Associate General Counsel

Approved as to form:

FILICE, BROWN, EASSA & McLEOD, LLP

Dated: ____________

By ____________

Attorneys for Defendant
The Dow Chemical Company

Dated: ____________

OCCIDENTAL CHEMICAL COMPANY

By ____________
Its: ____________

Dated: ____________

OCCIDENTAL PETROLEUM CORPORATION

By ____________
Its: ____________

Dated: ____________

OCCIDENTAL CHEMICAL CORPORATION

By ____________
Its: ____________

(signatures continued)

Dated: ____________ SHELL OIL COMPANY

By ____________
Its: ____________

Approved as to form: KOBAYASHI, SUGITA & GODA

By ____________
DALE W. LEE
Attorneys for Defendant
Shell Oil Company

Dated: ____________ MAUI LAND & PINEAPPLE COMPANY AND MAUI PINEAPPLE COMPANY, LTD.

By ____________
Its: Executive Vice President/Finance

Approved as to form: TOM & PETRUS

Dated: ____________ By ____________
STEPHEN M. TEVES
Attorneys for Third-Party
Defendants, Maui Land &
Pineapple Co. and Maui Pineapple
Co., Ltd.

Approved as to form: MILLER, [illegible] & SAWYER
A Professional Corporation

Dated: ____________ By ____________
DUANE C. MILLER
VICTOR M. [illegible]
Attorneys for Plaintiff, Board of
Water Supply of the County of Maui

Dated: ____________ THE DOW CHEMICAL COMPANY

By ____________
Its: ____________

Approved as to form: [illegible] BROWN, [illegible] & MCLEOD, LLP

Dated: ____________ By: ____________

Attorneys for Defendant
The Dow Chemical Company

Dated: 9/1/99 OCCIDENTAL CHEMICAL COMPANY

By: ____________
Its: Senior Vice President & General Counsel

Dated: 9/1/99 OCCIDENTAL PETROLEUM CORPORATION

By: ____________
Its: [illegible]

Dated: 9/1/99 OCCIDENTAL CHEMICAL CORPORATION

By: ____________
Its: Senior Vice President & General Counsel

(signatures continued)

Approved as to form: LANDELS, RIPLEY & DIAMOND, LLP

Date ____________ By ____________
STEPHEN C. LEWIS
Attorneys for Defendants
Occidental Chemical Company,
Occidental Petroleum Corporation, and
Occidental Chemical Corporation

Date ____________ AMVAC CHEMICAL CORPORATION

By ____________
Its: ____________

Date ____________ AMERICAN VANGUARD CORPORATION

By ____________
Its: ____________

Approved as to form: RUSH, MOORE, CRAVEN, SUTTON, MORRY & BEH

Date: ____________ By ____________
RICHARD C. SUTTON, JR.
Attorneys for Defendants
AMVAC Chemical Corp. and
American Vanguard Corp.

Date: Sept 1, 1999 BREWER ENVIRONMENTAL INDUSTRY, FKA BREWER CHEMICAL COMPANY

By ____________
Its ____________

Approved as to form: MANCINI, ROWLAND & WELCH

Date: September 1, 1999 By ____________
PAUL R. MANCINI
Attorneys for Defendants
Brewer Environmental Industry, fka
Brewer Chemical Company

(signatures continued)

Dated: 9/1/99 SHELL OIL COMPANY

By: ____________
Its: ____________

Approved as to form: KOBAYASHI, SUGITA & GODA

By ____________
DALE W. LEE
Attorneys for Defendant
Shell Oil Company

Dated: ____________ MAUI LAND & PINEAPPLE COMPANY AND MAUI PINEAPPLE COMPANY, LTD.

By ____________
Its: ____________

Approved as to form: TOM & PETRUS

Dated: ____________ By ____________
STEPHEN M. TEVES
Attorneys for Third-Party
Defendants, Maui Land &
Pineapple Co. and Maui Pineapple
Co., Ltd.

Dated: ____________ SHELL OIL COMPANY

By ____________
Its: ____________

Approved as to form: KOBAYASHI, SUGITA & GODA

By ____________
DALE W. LEE
Attorneys for Defendant
Shell Oil Company

Date: ____________ MAUI LAND & PINEAPPLE COMPANY AND MAUI PINEAPPLE COMPANY, LTD.

By ____________
Its: Executive Vice President/Finance

Approved as to form: TOM & PETRUS

Dated: ____________ By ____________
STEPHEN M. TEVES
Attorneys for Third-Party
Defendants, Maui Land &
Pineapple Co. and Maui Pineapple
Co., Ltd.

19.9

ASSESSMENT OF IMPACTS TO WATER QUALITY AND MARINE COMMUNITY STRUCTURE FROM THE PROPOSED EAST MAUI DEVELOPMENT PLAN

PHASE 1

ASSESSMENT OF IMPACTS TO WATER QUALITY AND
MARINE COMMUNITY STRUCTURE
FROM THE PROPOSED EAST MAUI
DEVELOPMENT PLAN, PHASE I

Prepared for:

Tom Nance Water Resource Engineering
680 Ala Moana Blvd., Suite 406
Honolulu, HI 96813

By:

Marine Research Consultants
4467 Sierra Dr.
Honolulu, HI 96816

October 1998

I. PROJECT BACKGROUND

The first phase of the East Maui Development Plan (EMDP) includes testing of two data collection wells, referred to as Hamakuapoko test Wells I and II and a transmission pipeline to the Central Maui distribution system. The intent of this report is to determine the potential for changes to the marine environment that might occur as a result of reduction of groundwater efflux at the shoreline owing to pumping of potable water from these wells located to the west of Maliko Gulch in Haiku, East Maui.

The investigation establishes the interrelationship between the present conditions of marine water chemistry related to groundwater input and biological community structure in the coastal segment directly downslope from the proposed wells. The coastal segment that is potentially affected is bounded by Kuau Point to the east and Pauwela Point to the west (Figure 1). For comparative purposes, the field assessment also included the coastal segment adjacent to this site, which is directly downslope from two HC&S wells that have been pumping relatively large quantities of groundwater for irrigation use for a substantial time.

Comparing adjacent coastal segments will provide information on the variation of effects in similar coastal settings that are subjected to different levels of groundwater removal. With this comparison, it is possible to evaluate the potential changes to the area downslope of the proposed well sites should the East Maui Water Development Plan, Phase I be completed. If it is determined that the present input of groundwater to the ocean is altering water quality to the extent that biotic community structure is affected at either the primary or alternate site, it will be possible to evaluate what might happen with the change in pumping (e.g. decrease in input to the ocean). However, if it is determined that groundwater is not affecting ocean water quality to the degree that there is an effect to community structure, there is justification to conclude that altering the input of groundwater will not result in changes to the marine communities.

II WATER CHEMISTRY

A. METHODS

The primary result of the proposed activity will be alteration of the present scenario of groundwater efflux to the coastal ocean; efflux to the nearshore ocean will be reduced by the amount of pumping. In order to determine the potential effect of such alterations, a baseline of pre-project water chemistry conditions was established. The sampling rationale of the study was designed to evaluate input of groundwater to the coastal ocean from the shoreline, and the fate of this groundwater once it enters the ocean. Based on the results of these evaluations, as well as estimates of alteration of groundwater discharge resulting from the project, it is possible to predict what the changes to nearshore water chemistry will be with the project in effect.

Water samples were collected at the surface and near the bottom at 5 sites; three of the sites (EMW-1-3) were located off the East Maui shoreline downslope from the proposed locations of Wells 1 and 2 and the Haiku Well; two of the sites (EMW-4-5) were located downslope of the existing HC&S Wells.

Sites were selected off in coastal areas consisting of coves or embayments, as these geographical features appear to have higher groundwater input and more protection from wave-induced mixing processes than exposed rocky points. Sample Site EMW-1 was located inside of Pauwela Point; EMW-2 was located off Maliko Gulch; EMW-3 was located between two points east of Hookipa Beach Park at a surf break locally known as "Turtles"; EMW-4 was located to the east of Kuau Point and EMW-5 was located off of Baldwin Park in Paia.

Water sampling was conducted on October 26, 1996. Because the emphasis of the present studies is to determine the effects of alteration of groundwater efflux from pumpage of wells in specific areas, sampling was conducted during a dry period with no influence from streamflow. Sea conditions during the sampling at both locations consisted of light and variable winds and a north swell of 1-2 feet. Such wind conditions are clearly atypical for East Maui. As a result of direct exposure to tradewinds and

tradewind generated seas, typical marine conditions off East Maui are high winds and pounding surf on the shoreline. During the winter months these extreme conditions are amplified further by breaking surf emanating from storms in the North Pacific. These conditions obviously result in very vigorous mixing of land-derived freshwater and oceanic water in the coastal zone. Thus, the day selected for sampling with mild winds and small swell represents conditions of minimal mixing where dilution of effluxing freshwater with seawater is substantially lower than during typical tradewind conditions. As a result, these survey results provide a representative estimate of what can be considered "end-point" conditions revealing maximum gradients of freshwater-seawater mixing. During typical tradewind weather gradients between freshwater and seawater will be far less pronounced.

Sampling was conducted using a 26-foot boat, and by divers swimming from the boat to the shoreline. Water samples were collected from the boat using a 1.8 liter Niskin-type oceanographic sampling bottle. The bottle was lowered to the desired sampling depth with endcaps cocked in an open position so that water flowed freely through the bottle. At the desired depth a weighted messenger released from the surface tripped the endcaps closed, isolating a volume of water from the desired sampling depth. At all sampling stations, two water samples were collected; a surface sample from within 10 centimeters (cm) of the air-sea interface, and a deep sample within 50 cm of the ocean floor. Inshore samples were collected by swimmers who filled 1-liter polyethylene bottles at the desired locations.

Water quality constituents that were evaluated include the 10 specific criteria designated for open coastal waters in Chapter 11-54, Section 06 (Pearl Harbor waters) of the Water Quality Standards, Department of Health, State of Hawaii. These criteria include: total dissolved nitrogen (TDN), nitrate + nitrite nitrogen ($NO_3^- + NO_2^-$), ammonium (NH_4^+), total dissolved phosphorus (TDP), chlorophyll a (Chl a), turbidity, salinity and pH. In addition, orthophosphate phosphorus (PO_4^{3-}) and silica (Si) are also reported because these constituents can be indicators of biological activity and the degree of groundwater or stream water mixing.

Subsamples for nutrient analyses were immediately passed through sub-micron filters (GF-F) into 125-milliliter (ml) acid-washed, triple rinsed, polyethylene bottles and stored on ice until returned to the laboratory. Analyses for NH_4^+, PO_4^{3-}, NO_3^-, and Si were performed using a Technicon autoanalyzer according to standard methods for seawater analysis (Strickland and Parsons 1968, Grasshoff 1983). TDN and TDP were analyzed in a similar fashion following oxidative digestion. Dissolved organic nitrogen (DON) and dissolved organic phosphorus (DOP) were calculated as the difference between TDN and dissolved inorganic N, and TDP and dissolved inorganic P, respectively. The level of detection for the dissolved nutrients is 0.2 µM for TDN and Si, 0.02 µM for TDP, and 0.01 µM for PO_4^{3-}, NO_3^- and NH_4^+.

Water for other analyses was subsampled from 1-liter polyethylene bottles and kept chilled until analysis. Turbidity was determined on 60-ml subsamples fixed with $HgCl_2$ to terminate biological activity. Fixed samples were kept refrigerated until turbidity was measured on a Monitek Model 21 90-degree nephelometer, and reported in nephelometric turbidity units (ntu) (level of detection 0.01 ntu). Chl a was measured by filtering 300 ml of water through glass fiber filters; pigments on filters were extracted in 90% acetone in the dark at -5° C for 12-24 hours, and the fluorescence before and after acidification of the extract was measured with a Turner Designs fluorometer (level of detection 0.01 µg/L). Salinity was determined using an AGE Model 2100 laboratory salinometer with a precision of 0.0003‰.

pH was determined using a field meter with a combination electrode with precision of 0.01 pH units. Nutrient, turbidity, Chl a and salinity analyses were conducted by Marine Analytical Specialists (Laboratory Certification NO: HI-0009) of Honolulu, HI.

B. RESULTS OF WATER CHEMISTRY ANALYSES

1. Horizontal and Vertical Stratification

Tables 1 and 2 show results of all water chemistry analyses for samples collected at the five sites off East Maui. Table 1 shows concentrations of nutrients in micromolar units (µM), while Table 2 shows the same data in units of micrograms per liter (µg/L). Also

shown in Tables 1 and 2 are the concentrations of State of Hawaii Department of Health water quality criteria for open coastal waters under "wet" conditions

Concentrations of eight dissolved nutrient constituents, salinity, turbidity and Chl a in surface and deep samples are plotted as functions of distance from shore in Figures 2 and 3. It can be seen in Tables 1 and 2, and Figures 2 and 3 that Si and NO_3^- decrease with distance from the shoreline, while salinity shows corresponding increases. These gradients are smallest at Site 1 (Pauwela), with a difference of only about 2.0 µM for Si, 0.6 µM for NO_3^- and 0.06‰ salinity between the samples collected at the shoreline, and those collected farthest from shore. At the other end of the spectrum, the horizontal gradients at Site 4 (Kuau) were the greatest with differences of about 185 µM for Si, 48 µM for NO_3^- and 6‰ salinity between the samples collected at the shoreline, and those collected farthest from shore. Horizontal gradients at the other three sites fell between these extremes. Thus, it is important to note that the smallest gradients (with virtually no apparent input of groundwater) occur at one of the sites directly downslope from the proposed well sites, while the largest gradients occur downslope from an area presently experiencing relatively high rates of well pumping.

Because the sampling was conducted during a period of negligible stream flow, these horizontal gradients in water composition are a result of mixing of low salinity groundwater (typically 0.1-0.3‰) with saline oceanic water (typically 34-35‰). Low salinity groundwater, which contains high concentrations of the inorganic nutrients Si, NO_3^-, and PO_4^{3-}, percolates to the ocean at the shoreline resulting in a nearshore area of mixing. Groundwater input appears greatest (and mixing least) at Sites 4, 2 and 5, and substantially lower at Sites 1 and 3. It can also be seen in Tables 1-2 and Figures 2-3 that the seaward extension of the zone of mixing is greatest at Sites 4, 2 and 5, extending to at least a distance of 100 m from shore. As described above, calm sea conditions occurred during the period of sampling. Such calm conditions minimize turbulent mixing, resulting in maximization of horizontal and vertical gradients of groundwater nutrients and salinity.

The patterns of distribution of other dissolved nutrients which are not found in high concentrations in groundwater do not display the same tendencies with respect to

distance from shore as the nutrients found in groundwater (TN and TP reflect concentrations of NO_3^- and PO_4^{3-}, respectively). Horizontal distributions of DON and DOP do not show the same patterns of increased values in the nearshore water as Si and NO_3^-. While NH_4^+ is generally low in concentration in groundwater, there is an indication of elevated concentrations in the near shore zone (less than 100 m from shore) at Sites 2 and 4.

Turbidity at the East Maui sites showed little as a function of distance from shore at Sites 1, 3 and 5. At Sites 2 and 4 turbidity was highest in the samples collected nearest the shoreline and decreased with distance from shore. As groundwater does not contribute to increased turbidity, the gradients at these two sites appears to be a result of factors other than groundwater efflux. Similarly, concentrations of Chl a were elevated within 5 m of the shoreline at Site 2, but showed little horizontal gradation at the other four transects (Figure 3).

Also shown in Figures 2 and 3 are values of water chemistry constituents collected in deep water. In all cases where elevated concentrations of dissolved nutrients occurred in surface waters, the value of the deep sample was lower; conversely, where salinity was depressed in surface samples, it was elevated in deep water. Such vertical stratification indicates that in areas where lower density groundwater percolates to the nearshore ocean, a region of mixing of groundwater and ocean water is often characterized by a surface lens with lower salinity and higher nutrient content relative to subsurface water.

4. Compliance with DOH Criteria

Tables 1 and 2 show State of Hawaii Department of Health (DOH) water quality standards for the "not to exceed 2% and 10% of the time" criteria for open coastal waters under "wet" conditions, which is the category most applicable to the East Maui region of study. While the 2% and 10% criteria are not technically meaningful with only a single sampling at each location, comparison of the data with these limits is useful for gaining a general understanding of the water quality of the area.

Inspection of Tables 1 and 2 indicates that at Site 1 none of the samples exceeds any of the water quality standards. At Site 2-5 most of the samples exceed the DOH limits for NO_3^-. At Site 2, samples within 50 m of the shoreline exceed the limits for NH_4^+; and samples within 5 m of the shoreline exceed the limits for Chl a. Thus, it can be seen that under present conditions, water quality in samples collected during a single survey off East Maui exceed values that have been established water quality standards.

As noted above, NO_3^- is a natural component of groundwater. In areas that receive substantial input of groundwater there is typically a zone of mixing near the shoreline where NO_3^- concentrations may consistently exceed DOH criteria as long as salinity remains low. Thus, it appears that natural processes can result in water quality that exceeds specified DOH limits.

5. Effects to Water Chemistry from the East Maui Development Plan

Based on estimated removal of groundwater from well pumping, it is possible to estimate the change in groundwater discharge, in terms of mass emission and nutrient content, to the ocean resulting from the East Maui Development Plan. Nance estimates that groundwater discharge in the East Maui region is 3-7 mgd per coastal mile. This range is relatively large as a result uncertainty associated with recharge of the aquifer through irrigation return. Potential removal of groundwater from pumping is 0.7-1.4 mgd along a 2 mile section of coastline, or 0.35-0.7 mgd per coastal mile. Hence, it can be estimated that the reduction in groundwater reaching the ocean will range from 5-23%.

As mentioned above, the data from the present water chemistry assessment represents the most conservative conditions of groundwater mixing yielding the maximum gradients under conditions of low mixing. The maximum gradients observed on the East Maui transects downslope from the sites of Phase I wells (Site 2 off of Maliko Gulch) were about 3‰, 10 µM NO_3^- and 0.3 µM PO_4^{3-}, with the majority of the gradient occurring within 10 m of the shoreline. During typical tradewind weather, it is likely that these gradients would not be detectable owing to intense mixing. Reducing input of groundwater by 20% during atypical conditions of light tradewind weather would likely result in gradients of about 2‰, 8 μM NO_3^- and 0.2 μM PO_4^{3-}. These projected gradients of reduced input are still larger than the existing gradients measured at Sites 1 and 3 of the present study. Hence, reducing groundwater flux would not appear to change the overall character of the nearshore zone beyond present conditions. In addition, at Site 1 there is virtually no gradient in groundwater constituents in the nearshore zone. Hence, reduction in groundwater discharge would not have any effect in this, or similar, areas. Thus, it does not appear that the proposed project will have any effect on nearshore water chemistry off East Maui.

IV. BIOTIC COMMUNITY ASSESSMENT

A. INTRODUCTION

When considering environmental changes caused by altered land use, benthic (bottom-dwelling) communities are probably the most useful biological assemblages for direct evaluation of marine environmental impacts. For the present consideration, benthic communities can be divided into two groups: reef-building corals and benthic macroalgae, locally known as limu. Each group is considered below.

1. Reef Corals

In Hawaiian nearshore communities, hermatypic (stony corals) are considered "keystone species" as they provide the framework for the physical structure of the reef, as well as the basis of the food web for many associated reef organisms. In turn, coral communities are structured in response to the predominant physical and chemical conditions of the environment. Concussive force from wave stress is probably the major natural determinant in shaping coral community structure by causing breakage of adult colonies and prevention of planular settlement on empty substrata. Suspended sediment loading is another important natural factor in defining coral community structure, as sediment accumulation can bury living corals, and prevent settlement on shifting substrata. Moving sediment, such as shifting sands can cause abrasion and mortality of adult colonies.

The entire area of study off the East Maui coastline is exposed to long period swells from winter storms in the north Pacific. As a result, on a regular basis (several times each winter) the nearshore area is impacted by large breaking waves with the potential to break or abrade living coral colonies, or prevent settlement of coral planular. As a result, the areas of study were characterized by sparse coral community development. Corals, primarily of the species *Porites lobata, Montipora verrucosa, M. patula, M. flabellata and Pocillopora meandrina* were observed spread sparsely in the nearshore zone at depths generally greater than 3 m. At shallower depths, corals were essentially absent.

In considering the East Maui Development Plan, the only physical/chemical factor that may be altered is input of groundwater in the nearshore ocean. It is accepted knowledge that reef corals typically occur in oceanic water without necessary influence from land. In fact, in some situations, input from land has resulted in negative effects to coral reefs from such factors as sediment and freshwater. As discussed above, increases of groundwater input can result in a zone of mixing where salinity is lowered and inorganic nutrient concentration is elevated over open coastal oceanic conditions. Pumping groundwater from the aquifer could only result in decreased input to the nearshore ocean, hence potentially reducing the size of the zone of mixing. As corals are adapted to grow in open ocean conditions, lowering the input of groundwater by pumping from wells could, therefore, have no effect on corals.

2. Benthic Algae

Another concern regarding the East Maui Development Plan is that a decrease in groundwater that reaches the nearshore ocean will reduce the nutrient efflux to the ocean to a point where macroalgae (limu) will be reduced in abundance. The reason for concern is based on the premise that these algae rely primarily on nutrients from groundwater for growth. Inspection of the nearshore areas downslope from the development site revealed the occurrence of several genera of algae, primarily Dictyota, Hypnea, Padina, and Galaxaura. Algae were observed growing on rocks or solid surfaces beyond the zone of direct impact of breaking waves.

Macroalgae take up nitrogen and phosphorus compounds dissolved in the water surrounding their tissues. Algae do not discriminate whether these nutrients come from land (groundwater or stream water) or oceanic water. It is important to emphasize that the availability of nutrients to marine algae is a function of the delivery rates of nutrients from the various sources to the algae. Thus, in areas of vigorous mixing where the exchange of water is rapid, the relatively low concentration of nutrients in oceanic water is often sufficient to supply adequate nutrients to plants for optimal growth.

An estimate of the relative availability of groundwater nutrients versus ocean water nutrients can be made by estimating the delivery rates of nutrients to the coastline. According to Nance, flux of groundwater to the ocean in the East Maui region ranges from approximately 3-7 mgd per coastal mile. This range is relatively large owing to substantial irrigation return of groundwater to the aquifer. Based on the composition of well water, nitrogen delivery by groundwater is 3.5-8 mol N per meter of coast per day. An estimate of N uptake by a macroalgal community is 0.1-0.5 mol N per meter of coast per day (Bilger and Atkinson 1995, Atkinson et al. 1995), or roughly 1-15% of the delivery of N by groundwater (assuming the community has an area of 10-50 meter squared per meter of coast). The proposed pumping from Phase 1 wells is estimated at 0.7 to 1.4 mgd along a two mile stretch of coastline. Thus, the maximum reduction in groundwater from pumping from the wells is about 25% of groundwater flow to the coastline. If the maximum potential uptake by plants is approximately 15% of the delivery of groundwater, and the maximum potential decrease in delivery is 25%, there would still be abundant supply of groundwater N to support the algal community with the maximum rate of pumping.

For a project on the North Kohala Coast with a similar objective as the East Maui Development Plan, Marine Research Consultants (1995) also assessed the potential alteration to standing stocks of benthic algae as a result of pumping of groundwater from upland wells. As the East Maui and North Kohala areas are geographically similar in terms of exposure to wind and swell, as well as structural composition of the nearshore area, the findings of the North Kohala work would appear to also be relevant to the East Maui area. Noteworthy findings from the Kohala study were as follows:

- water in the nearshore groundwater mixing zones had higher nutrient concentrations than offshore oceanic water;
- there are sufficient dissolved nutrients in typical coastal ocean water to support vigorous, and abundant stocks of marine algae, as long as the physical conditions (habitat and mixing) are suitable.
- Based on measurements of stable isotopes of nitrogen, only a small percentage of N in marine algae originated from terrestrial sources. The only algae samples with more than 10% N from land were collected from rocks that were on the beach and immediately in the flow of freshwater from the a stream, or a groundwater seep. Algae (limu kohu) collected beyond the shoreline had no contribution of land-derived N.

It was concluded that macroalgae, including the species harvested as food, rely very little on nutrients in groundwater. In fact, the densest growth of limu *kohu* was observed in areas of North Kohala exposed only to oceanic water with virtually no input from terrestrial sources. It was readily apparent that areas where the dissolved nitrogen is a mixture of terrestrial and oceanic sources were limited to nearshore zone of mixing. In North Kohala, as in East Maui, this zone generally does not extend far from the shoreline owing to the very high rates of mixing that occur along the coast. The North Kohala study predicted that a 10% decrease in the delivery rate of groundwater to the coast would probably only decrease the available N by about 1%. In addition, there will be no decrease in surface water delivery (streamflow) to the coastal zone, which is much more concentrated with respect to area of input than diffuse groundwater seepage. From these results, there are no indications that the reduction in groundwater input from the proposed project would have any effect on growth or abundance of algae in the coastal zone. Such a conclusion can also be reached regarding the East Maui area.

Parenthetically, it was also a concern in the North Kohala area that the proposed project might have an adverse effect on populations of opihi (*Patella sandvicensis*) that are collected from rocky shorelines. Dr. Alison Kay, leading expert on Hawaiian mollusks states that these organisms are capable of withstanding little variation from oceanic salinity. Thus, lowering the input of groundwater would have no adverse effect on opihi populations. Such a conclusion can also be reached regarding the East Maui area

VI. CONCLUSIONS

The proposed East Maui Development Plan (Phase 1) will result in decreased flow of groundwater to the ocean of 0.7-1.4 mgd along a two mile stretch of coastal area (5-20% of present discharge). Studies conducted to determine the potential effect of the proposed project on water chemistry and marine community structure revealed that there appears to be no potential for negative impacts to marine ecosystems in the nearshore region of East Maui. The primary reasons for this conclusion stem from the physical properties of the marine environment in this district. Direct exposure to tradewind generated wind and swells, as well as long period swells from the north result in extremely well-mixed nearshore environment in East Maui. As a result, groundwater diffusing to the ocean is rapidly diluted by the infinitely large reservoir of ocean water to background oceanic concentrations. Measurements made during rare conditions when seas were relatively calm showed only relatively small horizontal and vertical gradients of groundwater constituents (freshwater, NO_3^- and PO_4^{3-}). Reducing these gradients by the amount of groundwater that is proposed to be pumped would likely have virtually no qualitative effect on nearshore water chemistry. During typical conditions, the effect of such pumpage would likely not even be measurable. In addition, the effects of the project will be insignificant because the primary input of freshwater to the coastal region of East Maui is likely by surface flow (streams) which will not be affected by the alteration in groundwater flow.

Results of water chemistry analyses also revealed that the largest detectable gradients of salinity and nutrients occurred in the nearshore region directly downslope from the active HC&S wells, rather from the area that would be affected by the proposed pumping. Hence, it appears that removal of groundwater by well pumpage is not the only factor that affects groundwater flux to the ocean.

As reef corals typically grow in oceanic water, there should be no effects to reef corals or associated communities in East Maui where groundwater input to the ocean will be decreased. Results from similar studies in nearshore Hawaiian environments similar to East Maui indicate that marine waters without influence from land contain sufficient nutrients for growth of limu that is used as a food source. Owing to the intense mixing that characterizes the nearshore area of East Maui, groundwater is rapidly diluted to oceanic concentrations within the zone that most algae grows. In addition, because of the diffuse discharge characteristics of groundwater in the East Maui area, algae responding to freshwater are generally growing as a result of input from point source stream discharge which will not be affected by the proposed project. These results indicate that changes in groundwater discharge will not have any affect on marine algae.

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N=14
O=16
Si=28

$mg/l = \frac{[1000][Fw][\mu M]}{1 \times 10^6} = \frac{[Fw][\mu M]}{1000}$

TABLE 1. Water chemistry measurements from ocean samples collected at five sites along the East Maui coastline between Kuiau Point and Pauwela Point on October 26, 1996. Well data is averaged measurements collected from two potable wells in August 1997. Abbreviations as follows: GPS = global positioning system, DFS = distance from shore, S = surface, D = deep, BDL = below detection limit, NA = not available. Shaded and boxed values exceed DOH criteria for open coastal waters under "wet" conditions. For sampling site locations see Figure 1.

NO_3 [Fw]: 14 + (16)(3) = 62

SITE	GPS	NO	DFS (m)	PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	DOP (µM)	DON (µM)	TP (µM)	TN (µM)	TURB (ntu)	SALT (ppt)	CHL a (µg/l)	pH
EMW-1	20°56'30" N	1-S	0.1	0.09	0.73	0.13	4.63	0.24	4.66	0.33	5.73	0.09	34.661	0.09	8.09
	156°10'40" W	2-S	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		2-D	5	0.10	0.73	0.14	3.40	0.23	5.22	0.33	6.10	0.11	34.888	0.07	8.09
		3-S	10	0.07	0.56	0.29	4.80	0.26	5.10	0.33	5.96	0.09	34.834	0.08	8.09
		3-D	10	0.09	0.71	0.06	3.47	0.34	5.00	0.33	5.80	0.10	34.846	0.07	8.09
		4-S	50	0.12	0.66	0.07	3.86	0.23	5.31	0.34	5.93	0.11	34.804	0.07	8.10
		4-D	50	0.10	0.67	0.10	4.06	0.21	5.06	0.31	5.82	0.10	34.820	0.09	8.09
		5-S	100	0.09	0.38	0.05	3.66	0.26	6.02	0.33	6.43	0.10	34.866	0.07	8.12
		5-D	100	0.09	0.11	BDL	2.07	0.24	5.10	0.32	6.28	0.10	34.925	0.06	8.12
		6-S	250	0.09	0.07	0.06	2.10	0.28	5.14	0.34	5.28	0.09	34.926	0.06	8.15
		6-D	250	0.07	0.06	0.01	2.70	0.28	5.72	0.33	5.81	0.07	34.977	0.06	8.13
EMW-2	20°56'24" N	1-S	0.1	0.28	10.74	0.77	78.48	0.26	6.06	0.64	17.66	0.81	31.264	1.08	8.11
	156°20'32" W	2-S	5	0.23	6.37	0.83	46.44	0.26	6.41	0.58	12.71	0.36	32.744	1.51	8.11
		2-D	5	0.26	3.08	0.83	30.14	0.26	6.34	0.53	8.11	0.47	33.757	1.43	8.11
		3-S	10	0.20	3.02	0.45	24.60	0.27	6.43	0.47	6.80	0.28	33.776	0.33	8.09
		3-D	10	0.20	1.38	0.16	16.78	0.29	6.20	0.40	10.03	0.28	34.210	0.30	8.10
		4-S	50	0.26	6.76	0.74	36.12	0.26	6.33	0.51	11.82	0.16	33.342	0.13	8.11
		4-D	50	0.10	0.37	0.19	7.62	0.23	5.00	0.39	6.15	0.13	34.666	0.16	8.13
		5-S	100	0.26	5.43	0.33	36.48	0.28	6.13	0.52	11.60	0.22	33.231	0.13	8.13
		5-D	100	0.13	0.37	0.10	5.34	0.23	5.06	0.36	5.66	0.11	34.636	0.14	8.13
		6-S	250	0.17	4.39	0.26	20.66	0.26	4.70	0.42	9.37	0.13	34.138	0.09	8.14
		6-D	250	0.07	0.31	0.01	3.34	0.27	5.06	0.34	5.77	0.13	34.918	0.13	8.16
		7-S	500	0.08	0.77	0.07	5.66	0.26	5.71	0.37	6.86	0.07	34.787	0.13	8.16
		7-D	500	0.07	0.11	0.07	3.83	0.27	5.66	0.34	5.86	0.07	34.974	0.17	8.17
EMW-3	20°56'27" N	1-S	50	0.12	4.43	0.21	13.82	0.34	5.00	0.36	9.64	0.21	34.461	0.11	8.16
	156°21'27" W	1-D	50	0.15	3.50	0.14	12.56	0.23	5.36	0.38	9.43	0.13	34.617	0.10	8.16
		2-S	100	0.10	3.43	0.08	7.86	0.27	4.96	0.37	7.20	0.09	34.686	0.20	8.13
		2-D	100	0.13	2.06	0.26	6.90	0.24	5.08	0.37	7.26	0.13	34.750	0.10	8.13
		3-S	250	0.11	1.86	0.14	5.63	0.24	4.93	0.36	6.72	0.12	34.800	0.10	8.12
		3-D	250	0.11	0.83	0.07	3.30	0.24	5.03	0.36	6.79	0.14	34.966	0.09	8.13
EMW-4	20°56'34" N	1-S	0.1	0.47	40.67	0.96	180.82	0.26	5.53	0.66	46.67	1.96	28.766	0.13	8.08
	156°22'36" W	2-S	5	0.47	31.22	0.29	122.91	0.26	5.11	0.66	36.67	0.81	30.679	0.09	8.10
		2-D	5	0.26	21.66	0.40	81.10	0.27	5.47	0.63	26.91	0.47	32.284	0.07	8.13
		3-S	10	0.20	15.60	0.21	63.62	0.26	6.17	0.56	21.56	0.36	32.036	0.08	8.15
		3-D	10	0.16	15.77	0.36	56.62	0.26	6.44	0.44	22.54	0.37	33.044	0.10	8.14
		4-S	50	0.10	4.72	0.30	21.77	0.27	5.71	0.37	10.63	0.27	34.320	0.40	8.12
		4-D	50	0.08	1.36	0.24	7.62	0.31	6.26	0.30	7.76	0.13	34.666	0.36	8.12
		5-S	100	0.11	6.05	0.15	26.12	0.26	6.74	0.37	12.80	0.15	34.083	0.17	8.12
		5-D	100	0.06	1.34	0.10	7.23	0.26	5.66	0.36	7.36	0.10	34.707	0.34	8.12
		6-S	250	0.09	1.46	0.21	5.64	0.30	5.74	0.38	7.41	0.16	34.673	0.17	8.10
		6-D	250	0.11	0.86	0.19	5.60	0.28	6.34	0.30	7.40	0.12	34.790	0.17	8.11
EMW-5	20°56'17" N	1-S	0.1	0.33	17.58	0.26	78.43	0.27	6.23	0.60	24.07	0.17	32.391	0.18	8.34
	156°23'08" W	2-S	5	0.37	12.51	0.36	54.60	0.27	6.66	0.64	19.53	0.37	33.153	0.09	8.27
		2-D	5	0.34	11.65	0.41	53.79	0.26	6.73	0.60	18.77	0.30	33.313	0.06	8.20
		3-S	10	0.22	12.46	0.56	56.44	0.29	6.63	0.52	19.63	0.19	33.004	0.09	8.19
		3-D	10	0.22	12.36	0.37	56.56	0.27	6.10	0.48	20.65	0.23	33.018	0.09	8.18
		4-S	50	0.22	8.13	0.12	33.26	0.26	6.86	0.47	15.21	0.14	33.922	0.57	8.13
		4-D	50	0.10	1.38	0.16	6.42	0.26	5.96	0.36	7.30	0.13	34.785	0.16	8.15
		5-S	100	0.22	10.06	0.26	44.11	0.26	6.30	0.40	16.60	0.40	33.611	0.10	8.10
		5-D	100	0.11	0.78	0.12	4.79	0.29	6.41	0.40	7.29	0.14	34.663	0.23	8.13
		6-S	250	0.11	1.38	0.31	6.90	0.26	5.81	0.37	7.30	0.12	34.761	0.29	8.13
		6-D	250	0.10	0.78	0.24	4.09	0.29	6.44	0.39	6.47	0.16	34.867	0.13	8.14
Homogeneous Well				2.11	386	1.26	830	1.83	56.54	3.75	442		0.777		
DOH WATER QUAL. STDS															
NOT TO EXCEED 10%					1.00	0.60				1.30	17.86	1.36		0.90	
NOT TO EXCEED 2%					1.78	1.07				1.93	25.00	2.00		1.75	

TABLE 2. Water chemistry measurements (in µg/L) from ocean samples collected at five sites along the East Maui coastline between Kuiau Point and Pauwela Point on October 26, 1996. Well data is averaged measurements collected from two potable wells in August 1997. Abbreviations as follows: GPS = global positioning system, DFS = distance from shore, S = surface, D = deep, BDL = below detection limit, NA = not available. Shaded and boxed values exceed DOH criteria for open coastal waters under "wet" conditions. For sampling site locations see Figure 1.

~ 62 N NO_3 = 62 µg/l × 14/62 = 14 µM

SITE	GPS	NO	DFS (m)	PO4 (µg/l)	NO3 (µg/l)	NH4 (µg/l)	Si (µg/l)	DOP (µg/l)	DON (µg/l)	TP (µg/l)	TN (µg/l)	TURB (ntu)	SALT (ppt)	CHL a (µg/l)
EMW-1	20°56'30" N	1-S	0.1	2.79	<10.23	1.60	127.0	7.44	66.33	10.23	80.23	0.09	34.661	0.09
	156°10'40" W	2-S	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		2-D	5	3.10	10.23	1.96	96.5	7.13	74.46	10.23	86.86	0.11	34.888	
		3-S	10	2.17	7.64	4.08	130.3	7.75	66.40	9.93	87.30	0.09	34.834	
		3-D	10	2.48	9.94	0.84	97.5	7.44	70.42	9.93	81.30	0.10	34.846	
		4-S	50	3.72	9.10	0.98	80.4	6.82	72.94	10.54	83.02	0.11	34.804	
		4-D	50	3.10	9.38	1.40	120.0	6.51	70.70	9.61	81.46	0.10	34.820	0.09
		5-S	100	2.48	5.04	0.70	80.9	7.75	84.38	10.23	90.02	0.10	34.866	0.07
		5-D	100	2.48	1.54	BDL	58.3	7.44	72.57	9.93	74.06	0.10	34.925	0.06
		6-S	250	2.79	0.98	0.70	61.5	7.75	71.96	10.54	73.64	0.09	34.926	0.06
		6-D	250	2.17	1.17	0.14	75.9	6.98	80.08	10.23	81.34	0.07	34.977	
EMW-2	20°56'24" N	1-S	0.1	12.09	150.36	10.78	2204.4	7.75	84.84	19.84	246.78	0.81	31.264	
	156°20'32" W	2-S	5	10.23	89.18	11.67	1301.2	8.06	78.74	18.29	177.94	0.36	32.744	
		2-D	5	8.06	43.12	11.67	734.5	7.75	74.76	16.43	127.84	0.47	33.757	
		3-S	10	6.20	42.28	6.30	690.4	8.37	75.86	14.57	124.46	0.28	33.776	0.33
		3-D	10	6.20	19.32	2.10	443.4	8.98	118.87	15.19	140.28	0.28	34.210	0.30
		4-S	50	8.06	95.64	10.36	1016.9	7.75	74.46	15.81	165.46	0.16	33.342	0.13
		4-D	50	4.96	5.18	2.66	210.7	7.13	71.36	12.09	86.18	0.13	34.666	0.16
		5-S	100	8.06	76.07	4.62	1060.4	8.06	71.87	16.12	166.46	0.22	33.231	
		5-D	100	4.03	5.18	1.40	180.1	7.13	71.12	11.16	77.78	0.11	34.636	
		6-S	250	5.27	61.46	3.92	580.3	7.75	66.80	13.02	131.16	0.13	34.138	
		6-D	250	2.17	4.34	0.14	93.8	8.37	70.70	10.54	72.76	0.13	34.918	
		7-S	500	2.79	10.78	0.98	158.9	6.66	79.84	11.47	91.70	0.07	34.787	
		7-D	500	2.17	1.54	0.98	107.6	8.37	79.52	10.54	87.04	0.07	34.974	0.17
EMW-3	20°56'27" N	1-S	50	3.72	62.07	2.94	362.7	7.44	70.00	11.16	134.86	0.21	34.461	0.11
	156°21'27" W	1-D	50	4.65	54.62	1.96	353.8	7.13	75.46	11.78	122.02	0.13	34.617	0.10
		2-S	100	3.10	34.77	0.84	221.7	8.37	68.44	11.47	105.00	0.09	34.686	
		2-D	100	4.03	28.70	3.30	193.8	7.44	71.12	11.47	103.22	0.13	34.750	
		3-S	250	3.41	21.10	1.86	158.2	7.44	68.82	10.86	94.06	0.13	34.800	
		3-D	250	3.41	11.18	0.98	92.4	7.44	70.42	10.86	80.80	0.14	34.966	
EMW-4	20°56'34" N	1-S	0.1	13.02	664.60	9.97	5311.8	8.06	77.28	21.08	751.46	1.96	28.766	0.13
	156°22'36" W	2-S	5	13.02	437.06	4.06	3453.8	8.06	71.84	21.08	511.92	0.81	30.679	0.06
		2-D	5	8.06	301.32	5.60	2281.4	8.37	76.86	16.43	375.74	0.47	32.284	0.07
		3-S	10	6.20	211.40	4.34	1786.6	7.75	73.30	17.05	301.17	0.36	32.036	
		3-D	10	5.58	220.78	5.32	1647.2	8.06	80.10	13.64	311.56	0.37	33.044	
		4-S	50	3.10	66.08	7.00	611.7	8.37	79.94	11.47	152.00	0.27	34.320	
		4-D	50	2.48	17.64	3.36	222.0	9.61	87.02	13.09	108.07	0.13	34.666	
		5-S	100	3.41	84.70	2.10	734.0	8.06	84.36	11.47	180.46	0.15	34.083	
		5-D	100	3.44	17.36	2.34	203.3	8.44	82.32	11.16	101.87	0.10	34.707	0.34
		6-S	250	3.79	20.44	2.94	246.4	9.30	80.36	12.09	102.74	0.15	34.673	0.17
		6-D	250	3.41	11.64	2.66	158.2	7.75	84.75	11.16	104.96	0.12	34.790	0.17
EMW-5	20°56'17" N	1-S	0.1	9.92	246.12	3.64	2203.2	8.37	87.23	18.30	336.96	0.17	32.391	
	156°23'08" W	2-S	5	8.37	175.14	5.04	1530.9	8.37	83.10	18.74	273.70	0.37	33.153	
		2-D	5	7.44	163.17	5.74	1511.6	8.06	84.22	15.80	257.10	0.30	33.313	
		3-S	10	7.13	174.44	7.84	1587.1	8.99	88.82	15.13	277.20	0.19	33.004	
		3-D	10	6.82	173.17	3.78	1561.2	8.37	113.40	15.19	289.10	0.23	33.018	
		4-S	50	6.82	113.82	1.68	936.2	7.75	87.44	14.57	212.84	0.14	33.922	0.57
		4-D	50	3.10	19.32	2.24	180.4	7.75	83.44	10.86	108.00	0.13	34.785	0.16
		5-S	100	6.82	140.84	3.64	1238.8	8.06	91.00	14.88	236.30	0.40	33.611	0.10
		5-D	100	3.41	10.64	1.88	134.8	8.99	86.74	12.40	102.06	0.14	34.663	
		6-S	250	3.41	19.32	4.34	185.4	8.06	81.34	11.47	106.00	0.12	34.761	
		6-D	250	3.10	11.06	3.36	114.9	8.06	79.16	11.16	90.80	0.13	34.867	
Homogeneous Well				65.69	5132	17.65	72047	41.19	126	111.75	6450		0.777	
DOH WATER QUAL. STDS														
NOT TO EXCEED 10%					14.00	6.50				40.00	250.00	1.25		0.50
NOT TO EXCEED 2%					25.00	11.00				60.00	350.00	2.00		1.75

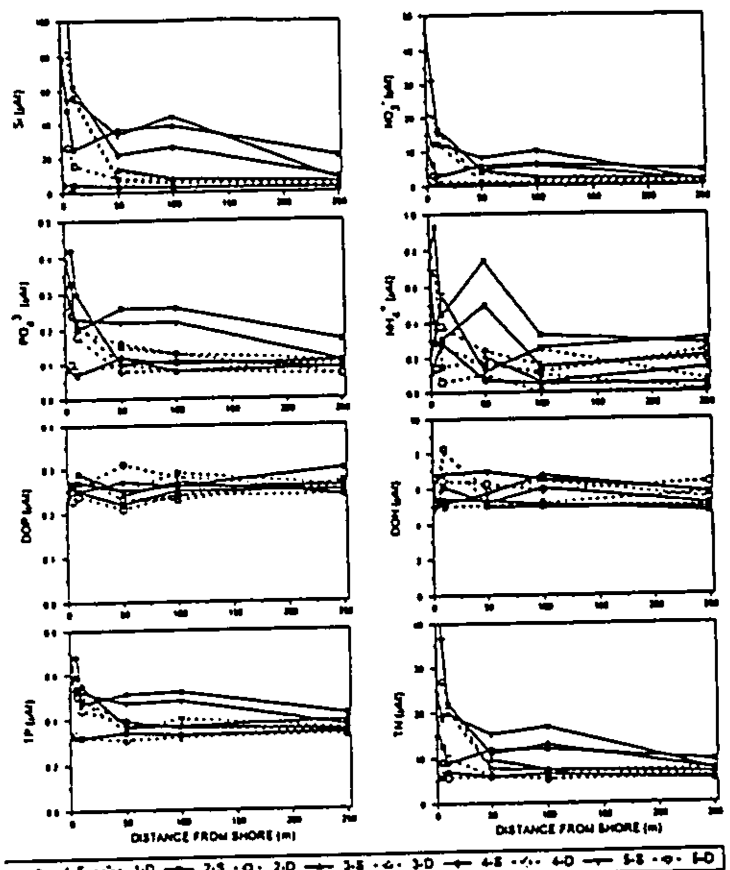

FIGURE 2. Plots of dissolved nutrients in surface (S) and deep (D) samples collected on October 26, 1996 as a function of distance from the shoreline at five sites offshore of the East Maui Coastline.

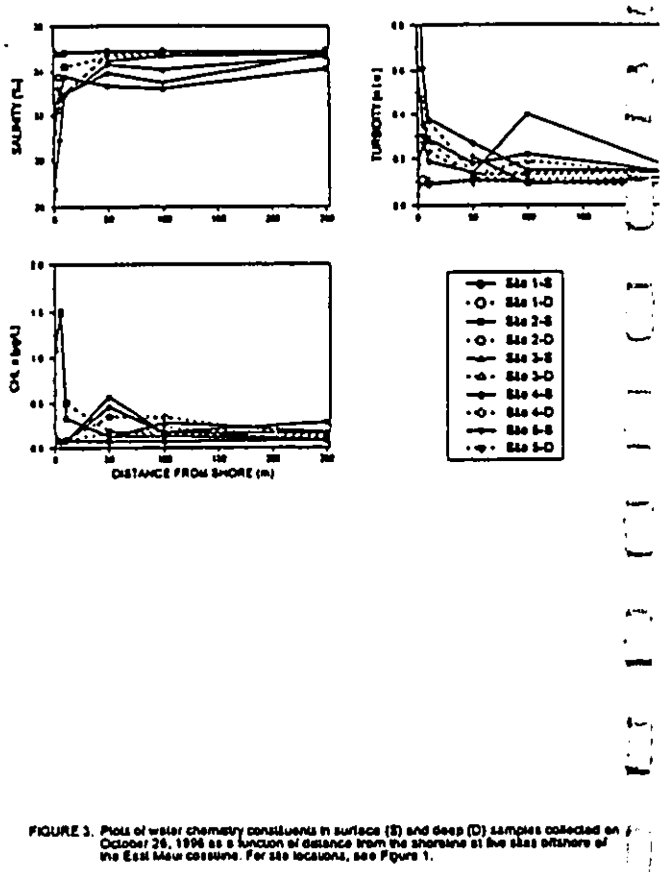

FIGURE 3. Plots of water chemistry constituents in surface (S) and deep (D) samples collected on October 26, 1996 as a function of distance from the shoreline at five sites offshore of the East Maui coastline. For site locations, see Figure 1.

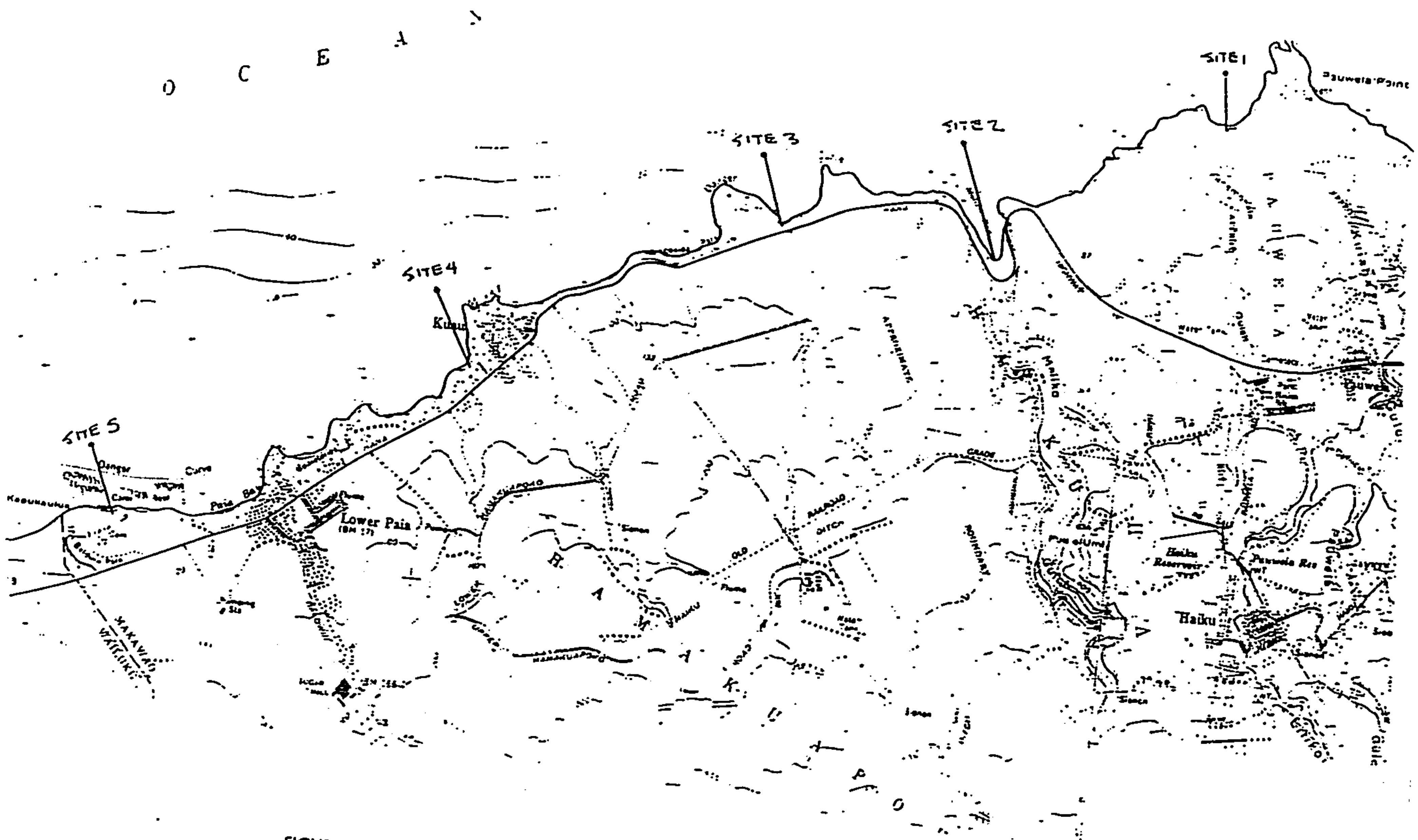

FIGURE 1. Map of East Maui area showing locations of 5 water sampling transects.

19.10

TESTIMONY, LETTERS, AND RESPONSES TO COMMENTS ON THE DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

TESTIMONY, LETTERS AND RESPONSES TO COMMENTS RECEIVED ON THE DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

NAME OF PARTY	REPRESENTING
D. Goode	Maui Department of Public Works and Waste Management
James Pennaz	U.S. Army Corps f Engineers
Gordon Tribble	U.S. Geological Survey
A. Ching	State Land Use Commission
John Min	Maui Department of Planning
Glenn Okimoto	State Department of Accounting and General Services
Michael Buck	Division of Forestry (State DLNR)
John Harrison	University of Hawaii Environmental Center
G.S. Holaday	HC&S
Gregory Westcott	Valley Farm
G. Salmonson	Office of Environmental Quality Control
J. Keala	Office of Hawaiian Affairs
Jeffrey Parker	Tropical Orchid Farm
P. Hamamoto	State Department of Education
Gary Gill	State Department of Health
Chris Reickert	Individual
Mark Sheehan	Individual
Don Hibbard	Historic Preservation Division (State DLNR)
Dan Grantham	Maui Sierra Club
Lucienne deNaie	Maui Tomorrow
Isaac Hall	Attorney, Plaintiffs
William Meyer	Individual (retired, USGS)

070102

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

Eric T. Hirano
DEPUTY

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT
WATER RESOURCES MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

June 25, 2002

Mr. David R. Craddick
Director, Department of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Hawaii 96793

Dear Mr. Craddick:

Subject: **Draft Supplemental Environmental Impact Statement (DSEIS) for East Maui Water Development Plan**

We have reviewed the subject DSEIS relating to impacts the project may have on endangered species. Based on the information provided in the subject document that no threatened or endangered species are present at the project sites, we have no further objections or comments to offer on the DSEIS. Thank you for the opportunity to comment on your project.

Very truly yours,

Paul J Conry

Michael G. Buck
Administrator

C: DOFAW, Maui Branch
OEQC
Mink & Yuen, Inc.

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

September 4, 2002

Mr. Michael G. Buck, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Buck:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your letter of June 25, 2002 with your comments regarding the above-referenced document.

We note, based on the information provided, that no threatened or endangered species are present at the project sites, and that you have no objections or comments to offer at this time.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

"By Water All Things Find Life"

Printed on recycled paper

JAMES "KIMO" APANA
Mayor

DAVID C. GOODE
Director

MILTON M. ARAKAWA, A.I.C.P.
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7955

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

TRACY TAKAMINE, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

JOHN D. HARDER
Solid Waste Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

August 5, 2002

MEMO TO: DAVID CRADDICK, DIRECTOR
DEPARTMENT OF WATER SUPPLY

FROM: for DAVID GOODE, DIRECTOR Milton Arakawa
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT

SUBJECT: DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (EIS)
EAST MAUI WATER DEVELOPMENT PLAN

We have reviewed the subject Supplemental EIS and have the following comment:

1. Section 12.2.4 (page 69), Maui County Code is proactive in the use of recycled water for irrigation and other purposes. The Kahului/Wailuku Wastewater Reclamation Facility currently produces an extremely high quality R-2 effluent that is suitable for irrigation purposes. Relatively minor modifications of the treatment process would result in an R-1 effluent. This source of water is available and suitable for irrigation of landscaping, parks, golf courses and agriculture areas in the East Maui area.

If you have any questions regarding this memorandum, please call Milton Arakawa at Ext. 7845.

DG:RGM:msc
xc: Mink & Yuen, Inc.
Office of Environmental Quality Control
S:\LUCA\Czm\eastmaui2 wpd

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
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September 4, 2002

Mr. David Goode, Director
Department of Public Works
and Waste Management
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Goode:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments regarding the Draft SEIS.

We note your positive position on the use of recycled wastewater for irrigation and other uses, and we will take that under consideration in our planning and conservation programs.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

"By Water All Things Find Life"

BENJAMIN J. CAYETANO
GOVERNOR

PATRICIA HAMAMOTO
SUPERINTENDENT

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

OFFICE OF THE SUPERINTENDENT

August 6, 2002

Mr. David R. Craddick, Director
Department of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Hawai`i 96793

Dear Mr. Craddick:

Subject: Draft Supplemental Environmental Impact Statement (DSEIS) for the East Maui Water Development Plan

The Department of Education (DOE) has reviewed the DSEIS for the East Maui Water Development Plan.

The DOE has no comment on the DSEIS and appreciates the opportunity to review the plans.

Should you have any questions, please call Ms. Heidi Meeker of the Facilities and Support Services Branch at 733-4862.

Very truly yours,

Patricia Hamamoto

Patricia Hamamoto
Superintendent

PH:hy

cc: Alfred K. Suga, OBS
Genevieve Salmonson, OEQC
George Yuen, Mink & Yuen

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
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TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

September 4, 2002

Ms. Patricia Hamamoto
Superintendent
Department of Education
State of Hawaii
P. O. Box 2360
Honolulu, Hawaii 96804

Dear Ms. Hamamoto:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your response of August 6, 2002 to the above-referenced document.

We note that you have no comment to make at this time.

Sincerely,

David R. Craddick, Director
M&Y/DRC

"By Water All Things Find Life"

BENJAMIN J. CAYETANO
GOVERNOR

0708 02

GLENN M. OKIMOTO
COMPTROLLER

MARY ALICE EVANS
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. PWD02.P361

JUL 2 2002

COUNTY OF MAUI

Mr. David R. Craddick, Director
Department of Water Supply
County of Maui
P O Box 1109
Wailuku, Maui, Hawaii 96793

Dear Mr. Craddick:

Subject: East Maui Water Development Plan
Draft Supplement Environmental Impact Statement (EIS)

Thank you for the opportunity to review the East Maui Water Development Plan Draft Supplement EIS for the subject project.

This project does not impact any of the Department of Accounting and General Services projects or existing facilities. Therefore, we have no comments to offer.

Should you have any questions, please have your staff call Mr. Allen Yamanoha of the Public Works Division at 586-0488.

Very truly yours,

GLENN M. OKIMOTO
Stat Comptroller

c: Mr. George Yuen, Mink & Yuen, Inc.
Ms. Genevieve Salmonson, Office of Environmental Quality Control

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

September 4, 2002

Mr. Glenn M. Okimoto, Comptroller
Department of Accounting & General Services
State of Hawaii
P. O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Okimoto:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments regarding the above-referenced document.

We note that the proposed project will not impact any of your projects or existing facilities and that you have no further comments to offer at this time.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

"By Water All Things Find Life"

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

070302

REPLY TO
ATTENTION OF

July 1, 2002

DEPT. OF WATER SUPPLY
COUNTY OF MAUI

Civil Works Technical Branch

Mr. David R. Craddick, Director
Department of Water Supply
County of Maui
PO Box 1109
Wailuku, Maui 96793

Dear Mr. Craddick:

Thank you for the opportunity to review and comment on the Draft Supplemental Environmental Impact Statement for the East Maui Water Development Plan. Our comments provided in our previous letter dated June 6, 2001 are still valid. However, the next iteration of the report should contain information about the planned transmission pipe lines and the streams and gulches which will be crossed.

Should you require additional information, please contact Ms. Jessie Dobinchick of my staff at (808) 438-8876.

Sincerely,

James Pennaz

James Pennaz, P.E.
Chief, Civil Works
Technical Branch

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

September 4, 2002

James Pennaz, P.E., Chief
Civil Works Technical Branch
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858

Dear Mr. Pennaz:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your letter of July 1, 2002 with your comments on the above-referenced document.

The matter of the transmission line crossing gulches and streams was considered when the final EIS was prepared in 1993. It was noted that the crossing of Maliko Gulch will require special attention and will be handled in the engineering design phase of the project.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

08090~

BENJAMIN J. CAYETANO
GOVERNOR

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENT QUALITY CONTROL

235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

August 7, 2002

Mr. David Craddick, Director
Department of Water Supply
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Craddick:

Subject: Draft Supplemental Environmental Impact Statement for the East Maui Water Development Plan, Maui

Thank you for the opportunity to review the subject document. We have the following comments and questions.

1. Please include a brief discussion of the following in the executive summary
   a) project description
   b) significant beneficial and adverse impacts
   c) proposed mitigation measures
   d) alternatives considered
   e) unresolved issues
   f) compatibility with land use plans and policies
   g) listing of permits and approvals.

2. Please describe the construction impacts and discuss mitigation measures to minimize the impacts.

3. Please illustrate the visual impacts of the proposed water tanks from public places such as roads and lookouts. Photos of existing conditions taken from public viewpoints are helpful in evaluating visual impacts. Please provide renderings of the tank superimposed on photos of existing views.

4. Please describe the impacts on cultural resources in the project area.

5. Please include a summary of unresolved issues and a discussion of how such issues will be resolved.

6. Please include a summary statement that addresses the following:
   a. relationship between local short-term uses of humanity's environment and the maintenance of long-term productivity.

   b. description of irreversible and irretrievable commitments of resources.

   c. list of all probable adverse environmental effects which cannot be avoided.

7. Please list all permits and approvals that are required for this project.

8. Please identify all firms or persons who prepared the EIS.

9. Please sign and date the original copy of the final EIS and indicate that "the statement and all ancillary documents were prepared under the signatory's direction or supervision and that the information submitted, to the best of the signatory's knowledge fully addresses EIS content requirements as set forth in sections 11-200-17 and 11-200-18, Hawai'i Revised Statutes."

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Genevieve Salmonson

Genevieve Salmonson
Director

c: Maui Board of Water Supply
Mink & Yuen

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

September 4, 2002

Ms. Genevieve Salmonson, Director
Office of Environment Quality Control
State of Hawaii
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Re: Draft Supplemental Impact Statement for the East Maui Water Development Plan

Thank you for your letter of August 7, 2002 with your comments on the above document.

Your comments and recommendations were discussed with Mr. Jeyan Thirugnanam of your staff and we will make changes in the SEIS as applicable.

The matter of visual impact of the proposed water tanks and the need for additional environmental and cultural studies in the project are discussed in the section on unresolved issues.

We appreciate your assistance and helpful suggestions.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

"By Water All Things Find Life"

Printed on recycled paper

August 7, 2002

Mr. David Craddick, Director
Maui County Dept. of Water Supply
200 S. High St.
Wailuku, HI 96793

Re: Comment on the Draft SEIS
East Maui Water Development Plan (EMPLAN)

Dear Mr. Craddick:

As one of Isaac Hall's clients in challenging the EMPLAN and as a Haiku property owner with a stream running through two of my properties, I find significant deficiencies in the report: I have owned 14 acres in Kuiaha gulch (TMK 2-2-7-12-173&174) since **1987.** My makai neighbor, Richard Lopes, has 25 acres below me (TMK 2-2-7-8-28). He has owned his land since **1954.** Another neighbor, Fredrick Heiman, owns property mauka on Kaupakalua Rd. (TMK 2-2-7-12-47).

- Specifically, it is claimed that the pumping from the proposed wells will have no significant impact on existing streams. I have owned my property since 1987. I check my spring-fed stream almost daily. The previous owners claim that they never saw the stream dry. In 15 years I have never seen it dry. Since the pumping from the Dowling Well, however, my stream has dwindled to approximately 20-30% of the stream flow I saw over the previous 12 years. This past year we had more than average rainfall for the Haiku area. Still my stream was at very low levels. It is clear to me that **the pumping from the Dowling well is the cause of the dramatic loss of stream flow in Kuiaha stream.** Both Mr. Lopes and Mr. Heiman have found the same result and reached the same conclusion.
- I have 14 acres with timber, bamboo, coffee, many fruit trees, and elaborate flowering plants. I have relied on stream flow to supplement rainfall in maintaining my farm. The SEIS authors contend that it is impossible to show that pumping ground water affects stream flow. **Anyone living in the district knows that is false. There is obvious evidence that the current pumping has had a huge effect. Any further pumping will only further deplete my stream and cause me greater harm.** Both Mr. Lopes and Mr. Heiman emphatically agree.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

August 7, 2002

Mr. David Craddick, Director
Maui County Dept. of Water Supply
200 S. High St.
Wailuku, HI 96793

Re: Comment on the Draft SEIS
East Maui Water Development Plan (EMPLAN)

Dear Mr. Craddick:

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- Specifically, it is claimed that the pumping from the proposed wells will have no significant impact on existing streams. I have owned my property since 1987. I check my spring-fed stream almost daily. The previous owners claim that they never saw the stream dry. In 15 years I have never seen it dry. Since the pumping from the Dowling Well, however, my stream has dwindled to approximately 20-30% of the stream flow I saw over the previous 12 years. This past year we had more than average rainfall for the Haiku area. Still my stream was at very low levels. It is clear to me that **the pumping from the Dowling well is the cause of the dramatic loss of stream flow in Kuiaha stream.** Both Mr. Lopes and Mr. Heiman have found the same result and reached the same conclusion.
- I have 14 acres with timber, bamboo, coffee, many fruit trees, and elaborate flowering plants. I have relied on stream flow to supplement rainfall in maintaining my farm. The SEIS authors contend that it is impossible to show that pumping ground water affects stream flow. **Anyone living in the district knows that is false. There is obvious evidence that the current pumping has had a huge effect. Any further pumping will only further deplete my stream and cause me greater harm.** Both Mr. Lopes and Mr. Heiman emphatically agree.

The SEIS concludes, **9.5**: that "the wells proposed in the EMPLAN will be sealed from Kula and will extract pumpage only from the basal lens in the Honomanu Basalt." And that, **9.6**: "Pumpage from the proposed wells would not infringe upon the correlative rights of landowners involved." **This conclusion is incorrect. Mr. Lopes, Mr. Heiman and myself feel that our water rights would be compromised. Each of us relies on water from the stream during dry months.**

- Also in **9.6**, the authors claim that the Waiahole case is silent regarding transfer of water out of district "thereby lending credence to the view that such transfers are valid because of the absence of explicit prohibition." **This is a fortuitous interpretation by the authors and is not supported by a close reading of the Waiahole decision.**
- At **10.1** the report claims: "The potential effects of pumpage on stream flow will be limited to the mouths of streams within a few hundred feet of the coast where the basal water table is exposed. The probable effects will be so small as to be unmeasureable." **Hello! Have the authors visited the area?** The springs that feed my property originate both just above my land and on my land. The springs always run, though not as they used to. The stream on my property is at 750 feet; on Lopes', it is at 600 feet; on Heimans', it is at 1000 feet. **In each of these sites there have been dramatic reductions in stream flows.** Mr. Lopes, Mr. Heiman and myself have paid close attention to stream levels over many years because of the importance of these streams to our farms.

On the basis of my 15 years of daily observation of my land (as well as that of farmers who have worked on my land), and similar observations by my neighbors, Richard Lopes and Fredrick Heiman, **I/we find the report to be inaccurate and inadequate.**

Sincerely,

Mark Sheehan

Mark Sheehan, Owner	Richard Lopes, Owner	Fredrick Heiman, Owner
Haiku Springs	Kuiaha Farm	1850 W. Kuiaha Rd.
630 E. Kuiaha Rd.	350 E. Kuiaha Rd.	Haiku, HI 96708
Haiku, HI 96708	Haiku, HI 96708	

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
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September 4, 2002

Mr. Mark Sheehan
Haiku Springs
630 East Kuiaha Road
Haiku, HI 96708

Dear Mr. Sheehan:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments of August 7, 2002 regarding the subject project. Our response is as follows:

Pumpage from the Honomanu Basalt basal aquifer will not affect stream flow in Kuiaha Gulch.

Pumping from the Dowling well (Kulamalu) has not affected stream flow. The Dowling well penetrates to the basal aquifer and is sealed off from the perched water in the Kula formation. Rainfall and the perched water are the sources of flow in Kuiaha Stream.

The springs on properties at elevations above sea level of 600, 750 and 1,000 feet discharge from perched water in the Kula formation. The basal aquifer in the Honomanu Basalt, where the water table lies less than about 10 feet above sea level, is not connected to these springs.

Your allusion to the Waiahole case may be a confusion with the authority of the State Water Code. Our interpretation is that the Code permits the transfer of water from designated areas. However, because East Maui is not designated, one may draw the erroneous conclusion that water may not be transferred from it. We also explained that a permit is not required from the State Commission on Water Resources Management to transfer groundwater from undesignated areas.

Sincerely,

David R. Craddick

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

"By Water All Things Find Life"

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
File:
02-164/epo

August 9, 2002

Mr. David R. Craddick, Director
Department of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Hawaii 96793-6109

Dear Mr. Craddick:

Subject: Draft Supplemental Environmental Impact Assessment (DSEIS)
East Maui Water Development Plan
Maui, Hawaii

Thank you for the opportunity to review and comment on the subject proposal. The DSEIS was routed to the various branches of the Environmental Health Administration. We have the following comments.

Environmental Planning Office (EPO)

The Total Maximum Daily Load program reviews projects involving water bodies currently listed as "impaired" under section 303(d) of the Clean Water Act. The impaired status of these waters requires that the Department of Health establish Total Maximum Daily Loads (TMDLs) suggesting how much the existing pollutant loads should be reduced in order to attain water quality standards.

Although the proposed project does not involve impaired waters, please note the following concerns about the Draft Supplemental Environmental Impact Statement (DSEIS):

1. Numerous references cited in the text do not appear in the Chapter 15 list of references (e.g. Gingerich 1999 cited on pages 22, 26, 48; Shade 1999 cited on p. 26; Mink 1980 cited on p. 27; U.S. Geological Survey 1999 cited on p. 99). Other references are not cited at all (e.g. Mink and Yuen, Inc. fieldwork noted on p. 22; Mink and Yuen, Inc. calculation noted on p. 25; and U.S. Geological Survey report on p. 49) or the format of a citation and its relationship with references listed in Chapter 15 is confusing (e.g. Nance, WRE on p. 29). We suggest that the Supplemental Environmental Impact Statement (SEIS) be carefully edited for consistency and completeness of citations and references; and

2. Page 58 of the DSEIS states, "According to studies done by the USGS and Consultant Tom Nance, no perennial streams are flowing through the project area." However, page 48 of the DSEIS states, "All of these streams are intermittent in flow but are perennial at low rates over limited distances under prevailing conditions of diversion to the EMI ditches." To properly evaluate these streams within the context of Hawaii Administrative Rules Title 11 Chapter 54 (Water Quality Standards), we suggest that the SEIS clarify where each stream fits within the definitions of "Intermittent streams" and "Perennial streams" provided by §11-54-01 of these rules. Based upon the information presented on pages 48 and 54 of the DSEIS, they appear to be "artificially and naturally interrupted perennial streams," not "intermittent streams."

If you have any questions about these comments or the Total Maximum Daily Load program, please contact David Penn at 586-4337.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

c: Maui District Health Office
EPO

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

September 4, 2002

Mr. Gary Gill, Deputy Director
Environmental Health Administration
State of Hawaii
Department of Health
P. O. Box 3378
Honolulu HI 96801

Dear Mr. Gill:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments of August 9, 2002 regarding the subject project. Our response is as follows:

1. The references in Chapter 15 will be edited for completeness.

2. Page 58: A correction will be made to state "no perennial streams throughout their channel lengths flow through the area."

The distinction between "intermittent" and "perennial" over limited distances is not definable from the data base. The term "intermittent" refers to inconstancy of flow over time, ranging from zero to measurable flow. "Perennial" indicates constant flow, but not necessarily at a constant rate.

All of the stream measurements included in the DSEIS are one time measurements made during dry weather as explained in the text, page 48.

Sincerely,

David R. Craddick, Director
M&Y/DRC
copy: Mink & Yuen, Inc.

"By Water All Things Find Life"

JAMES "KIMO" APANA
Mayor

JOHN E. MIN
Director

CLAYTON I. YOSHIDA
Deputy Director

070702

COUNTY OF MAUI
DEPARTMENT OF PLANNING

June 28, 2002

Mr. David R. Craddick, Director
Department of Water Supply
County of Maui
P. O. Box 1109
Wailuku, Hawaii 96793

Dear Mr. Craddick:

Re: **Draft Supplemental Environmental Impact Statement (DEIS) For the East Maui Water Development Plan**

Thank you for this opportunity to comment on the Draft Supplemental Environmental Impact Statement which has been prepared for the East Maui Water Development Plan. My comments will be limited to current and prospective land use issues.

The County of Maui has initiated its decennial review of the General Plan as required by the Revised Charter of the County of Maui. This review has involved updating socio-economic data relating to population projections in the various regions of Maui island. In particular, the Central, South and Paia areas will be of particular interest as these areas obtain water service from the Iao aquifer source.

The East Maui Water Development Plan (EMPLAN) developed in 1992 had planned to provide a pump capacity of 16mgd (average 10mgd) to meet the growing needs of the Central Maui Water District for the ensuing 20 years. The implementation of the EMPLAN has been in litigation ever since. Demands on the Iao source have continued to grow and have been supplemented through sources in the Waihee aquifer and by tapping surface water. The supplemental Waihee groundwater source has or will reach its safe yield very shortly and the surface water source is, at best, temporary. There is no question there is a need to develop other sources outside of the Iao aquifer.

Our recently completed population projections show the Central Maui service area to grow from a current 67,000 persons to 90,000 by the year 2020. Although it is our intention to introduce a variety of tools which will allow managed and directed growth, the growth, nonetheless, is inevitable. Development in the Central Maui service area will be encouraged by employment availability, natural amenities such as beaches and other essential municipal services which are currently available. Supplying this growth with an assured water source will be mandated by the natural progression of the land development continuum.

The supply of domestic water should not be used as a land management constraint. Good long range planning should dictate what land is developed, for what purposes and when and, when this is done, municipal services should be supplied to implement those plans. With the indicated potential in the EMPLAN, it would appear this source will provide for the current and projected demands.

Given proper care and attention to environmental issues, the Department of Planning encourages the Department of Water Supply to develop this source in accordance with land use policies adopted by the County of Maui.

Should you require anything further in this regard, please do not hesitate to contact Mr. Brian W. Miskae, Planning Program Administrator, Long Range Division at 270-7214.

Very truly yours,

JOHN E. MIN
Planning Director

JEM:BWM:tlm
cc: Office of Environmental Quality Control
Brian W. Miskae, Planning Program Administrator
Patsy Mink
George Yuen
General File
S:\ALL\Brian\Respons2.wpd

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
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September 4, 2002

Mr. John E. Min, Director
Department of Planning
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Min:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments in support of the East Maui Water Development Plan. In consonance with the Maui County General Plan and Community Plan, along with your planning policies, the East Maui Water Development Plan is designed to meet the water needs as you described.

We remain hopeful of its eventual approval.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

PHONE (808) 594-1888 FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

August 8, 2002 HRD02/652

George Yuen, President
Mink & Yuen
1670 Kalakaua Avenue Ste 605
Honolulu, HI 96826

RE: Supplemental Environmental Impact Statement for East Maui Water Development Plan.

Dear Mr. Yuen,

Thank you for the opportunity to comment on the preparation notice for the above referenced project. The Office of Hawaiian Affairs offers the following comments.

Applicability of HRS 174C-49 (c)

In our response to the SEISPN dated May 18, 2001, OHA suggested that the applicability of HRS174C-49 (c)
be explored as part of the this EIS. Your review of Federal, State and County Law (p. 17-19) is cursory at best. Additionally, the Statement that you are in compliance with the Haiku-Paia Community plan does not address their long-term concerns about moving water out of the Haiku Water Shed to West Maui.

Department of Hawaiian Homelands Priority on Water Rights.

OHA had also requested that the SEIS explore the extent to which this proposed use is subject to State and Federal law enacted to ensure that the Department of Hawaiian Home Lands receive sufficient water to support current and foreseeable needs. There is no such discussion in the SEIS.

Archaeological and Cultural Resources

OHA looks forward to a full cultural impact assessment once actual sites are chosen, should this project receive approval.

If you have any further questions, please contact Pua Aiu, Acting Assistant Director, Hawaiian Rights Division at 594-1931 or e-mail her at paiu@oha.org.

Sincerely,

Jalna S. Keala
Acting Director, Hawaiian Rights Division

C: ADM
BOT
Genevieve Salmonson, OEQC

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

September 4, 2002

Ms. Jalma S. Keala, Acting Director
Hawaiian Rights Division
Office of Hawaiian Affairs
711 Kapiolani Blvd., Suite 500
Honolulu, Hawaii 96813

Dear Ms. Keala:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments on the Draft Supplemental EIS for the East Maui Water Development Plan.

The Department is currently in the process of updating the Water Use and Development Plan for Maui County, which will include consideration of the current and foreseeable needs of the Department of Hawaiian Home Lands.

As we stated previously, once the proposed relocated well sites are finally approved, a cultural impact assessment will be conducted. Copies of this assessment will be available for public review.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCES MANAGEMENT

DEPUTIES
ERIC T. HIRANO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

COUNTY OF

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
601 KAMOKILA BOULEVARD
KAPOLEI, HAWAII 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

July 26, 2002

MEMORANDUM

LOG NO: 30384 ✓
DOC NO: 0207CD45

To: Dierdre S. Mamiya, Administrator
Land Division

FROM: Don Hibbard, Administrator
Historic Preservation Division

SUBJECT: **Chapter 6E-42 Historic Preservation Review Pertaining to the Draft Supplemental Environmental Impact Statement for the Proposed East Maui Water Development Plan Various Ahupua'a, Wailuku and Makawao Districts, Island of Maui**
TMK: Zones 2 and 3

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (Draft EIS) for the proposed East Maui Water Development Plan, which was received by our staff 20 June 2002.

We note the portion of the Draft EA which discusses archaeological and historical properties refers to the negative findings of an archaeological inventory survey which was conducted of the proposed project area and recommends full-time archaeological monitoring for areas have the potential for historic sites or site remnants in the subsurface deposits (p. 64). The EA fails to note that our office reviewed the survey report (Sinoto and Pantaleo 1992) and concluded that the report needed to be revised (SHPD DOC NO.: 9907RC15/LOG NO.: 23784). However, given the emergency nature of this project, we agreed that the proposed undertaking could proceed with the following conditions to ensure impacts to any significant historic sites are appropriately mitigated:

1. The archaeological inventory survey report shall be revised to address the State Historic Preservation Division's Concerns. (See SHPD DOC NO.: 9907RC15/LOG NO.: 23784 for detailed comments). The project may proceed with the understanding that the requested revisions will be made.
2. We agree that some coastal areas to be impacted by this project may possibly have significant subsurface archaeological sites (such as habitation deposits and associated burials).

These areas do need full-time archaeological monitoring in order to document any sites that are found and to properly treat such sites. However, the archaeological survey report is not clear where these areas are. The archaeological consultant shall meet with the State Historic Preservation Division's staff as soon as possible to clearly identify these areas. A brief monitoring scope of work shall also be clarified in that meeting. The monitoring can then proceed for these areas of the project.

3. For the other areas of the project where sites are unlikely, we agree that having an archaeological monitor on-call is a good idea, just in case a site is identified (e.g., a burial) in order to expedite documentation and treatment and reduce construction slow-downs. We disagree that spot checks by an archaeological monitor are necessary for these areas.

Should this undertaking take place, the above conditions must be fulfilled to ensure that any impacts to significant historic sites are acceptably mitigated. Otherwise this project would not be in compliance with Chapter 6E, HRS.

If you have any questions, please call Cathleen Dagher at (808) 692-8023.

c. Dept. Water Supply, County of Maui
A. Sinoto Consulting

CD:amk

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
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WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

September 4, 2002

Mr. Don Hibbard, Administrator
Historic Preservation Division
Department of Land & Natural Resources
State of Hawaii
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

Dear Mr. Hibbard:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for sending us a copy of your memo dated July 26, 2002 to Ms. Diedre Mamiya, Administrator of the Land Division, DLNR, describing your suggested revisions to the original archaeological inventory survey report which was prepared in 1992.

As you probably are aware, an environmental survey will be made when the Maui Department of Water Supply decides on the final location of the new well sites prior to proceeding with the project. The survey will address the concerns as expressed in your memo. We will also take the necessary steps to comply with the three conditions listed.

We appreciate your agreeing to allow the project to proceed under the conditions stated in your memo.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

"By Water All Things Find Life"

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[illegible]

HC&S

G. Stephen Holaday
Plantation General Manager, HC&S
Vice President, Alexander & Baldwin, Inc.

RECEIVED
2002 AUG -7 AM 10:20
DEPT. OF [illegible]
COUNTY OF MAUI

August 7, 2002

Mr. David R. Craddick, Director
Department of Water Supply
County of Maui
P. O. Box 1109
Wailuku, HI 96793

Dear Mr. Craddick:

RE: Draft Supplemental EIS For The East Maui Water Development Plan

Thank you for this opportunity to provide comments on the subject document that was transmitted to us on June 24, 2002. We have the following comments to offer:

1. Page 9, Section 4.2 Relocation of Well Sites:

   In your June 3, 2002 response to our comments on the SEIS preparation notice, you state that the proposed well sites will not be on lands owned by A&B. From the map on page 10A, it does appear that the wells are not sited on A&B land, and just wanted confirmation of this fact.

2. Page 55, Section 10.3 Existing Water Developments:

   A statement is made at the end of the first paragraph that the anticipated production from the two Hamakuapoko wells is not expected to affect either the yield or quality of groundwater developed at the pre-existing HC&S wells in the Paia aquifer. While we hope this is true, we submit that this statement needs to be verified through more testing. We have observed that some of our wells in the Paia aquifer have experienced low sump levels and increasing salinity during the past three years, which may be related to the pumping of the Hamakuapoko wells and/or the dry weather.

HAWAIIAN COMMERCIAL & SUGAR COMPANY A DIVISION OF ALEXANDER & BALDWIN, INC.
P.O. BOX 266 PUUNENE, MAUI, HAWAII 96784 TEL 808-877-6902 FAX 808-871-2149

3. Page 67, Section 12.1.7 (Iao Stream Ditches):

   Please note that the agreement with the two landowners regarding the DWS' use of water from the Iao Ditch system expired on March 31, 1999. Another agreement was subsequently transmitted to the DWS but is pending BWS approval.

We would also like to point out that construction phase of the project will have major impacts on HC&S operations and that we trust that we can work together to minimize disruptions of HC&S' operations. In addition, easements and other land transactions still need to be worked out regarding the pipelines and well sites for this project.

We look forward to further communications with your department on this project and thank you for keeping us informed.

Sincerely,

fr G. Stephen Holaday
Plantation General Manager

cc: OEQC
Mink & Yuen
M. J. Ching, A&B
G. Hew, EMI

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
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September 4, 2002

Mr. G. Stephen Holaday
Plantation General Manager
HC&S
P. O. Box 266
Puunene, HI 96784

Dear Mr. Holaday:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments of August 7, 2002 regarding the subject project. Our response is as follows:

Section 4.2, Existing Water Developments

The rate and amount of extraction from the two DWS Hamakuapoko wells (5420-02; 5320-01) is very small relative to the size of the Paia Aquifer System and the quantity of groundwater pumped by HC&S. Pumpage from the Hamakuapoko wells is not likely to produce a measurable effect on the level of the water table at HC&S pumping stations or on salinity of the pumped water.

The observed reduction in water levels and increase in salinity at HC&S wells most likely has resulted from reduction in recharge from surplus irrigation due to conversion from furrow to drip irrigation.

Also, the drought of the last four years has diminished natural recharge to the aquifer system.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

070802 [illegible]
070804

BENJAMIN J. CAYETANO
GOVERNOR

ANTHONY J.H. CHING
EXECUTIVE OFFICER

RECEIVED

2002 JUL -3 PM 12: 13

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION

COUNTY OF MAUI

P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

July2, 2002

Mr. David R. Craddick, Director
Department of Water Supply
County of Maui
P. O. Box 1109
Wailuku, Hawaii 96793

Dear Mr. Craddick:

Subject: Draft Supplemental Environmental Impact Statement (DSEIS) for the East Maui Water Development Plan

We have reviewed the subject DSEIS forwarded by your letter dated June 24, 2002, and have the following comments:

1) We reaffirm our previous comments on the DSEIS Preparation Notice that the original well sites are designated within the boundary of the State Land Use Rural and Agricultural Districts and that the proposed relocated well sites are designated within the boundary of the State Land Use Agricultural District. We would like to reiterate our suggestion that a map be included to show the original and proposed well sites in relation to the State land use districts.

2) On page 18, section 5.4 entitled "State Land Use Law," the DSEIS states that "[f]or uses that are non-conforming to the land use designation, State Land Use Commission Rules require a boundary amendment application. However, this rule does not apply to this project since it was intended for public use (Rule 205-5)." We would like to clarify that wells are generally permitted within the Rural and Agricultural Districts regardless of whether they are for

Mr. David R. Craddick, Director
July 2, 2002
Page 2

> private or public use. To the extent that the need for these wells is generated, in part, by the increased water demand from the diversified agricultural industry, the wells would appear to be consistent with the permissible uses within the Rural and Agricultural Districts.

We have no further comments to offer at this time. Thank you for the opportunity to comment on the subject DSEIS.

Please feel free to contact Bert Saruwatari of my office at 587-3822, should you require clarification or any further assistance.

Sincerely,

Anthony J H Ching

ANTHONY J. H. CHING
Executive Officer

c: Office of Environmental Quality Control
Mr. George Yuen, Mink & Yuen

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
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WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

September 4, 2002

Mr. Anthony J.H. Ching
Executive Officer
Land Use Commission
Department of Business, Economic
Development and Tourism
State of Hawaii
P. O. Box 2359
Honolulu, Hawaii 96804-2359

Dear Mr. Ching:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your letter of July 2, 2002 with your comments on the above-referenced document.

Please note that the map we used to show the original and proposed well sites is a Land Use Commission map that has been revised to more clearly define the state land use districts relative to the original and proposed well sites.

Sincerely,

David R. Craddick

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

Chris Reickert
11 Lino Place
Pukalani, Hawaii 96768

July 26, 2002

Maui County
Department of Water Supply
P.O. Box 1109
Wailuku, Maui, Hawaii 96793

Re: Comments on the Draft Environmental Impact Statement for the East Maui Water Development Plan

Attn: David Craddick, Director

I would like to begin by addressing the quality of the draft SEIS document as a separate issue from its contents. I do not have extensive experience reviewing EIS documents and I am uncertain of the legal requirements (the draft SEIS would certainly fail to meet federal government accessibility standards) but purely from the standpoint of an engineering or business document I must say that I expected much more. What is provided is sub par for a professionally prepared document in nearly any industry. I suggest that the DWS make it a contractual obligation in the future to require its agents and consultants to provide quality electronic documents to insure flexible distribution and publishing. The quality of the printed copies is atrocious and the electronic version prepared by the DWS is devoid of any of the true value of electronic media (they can't be printed well, are difficult to distribute because of their size and are not "searchable"). A cursory review of USGS documents illustrates the dramatic difference between a well prepared document and the draft SEIS as submitted. The draft is not a modern document in any sense of the word. It fails to provide its readers with even the status quo for a modern publication, costs the DWS more on several levels and provides less usefulness to the community it is intended to serve.

Regarding the approach to the material, it is hard to miss that Mink & Yuen approached the document not to explore the issues and educate the requesting agency principals but rather to justify their own, pre-existing opinions. This is quite unfortunate and robs the DWS and other interested parties of valuable knowledge useful in the assessment of the EMPLAN, its ability to achieve its goals and the costs and impacts associated with those goals. The draft is, in fact, full of unsupported assumptions questioned by many knowledgeable sources including the USGS.

I am concerned on a fundamental level about this supplemental document. How can any timely and valid findings from the original EIS still exist, given that it has taken 9 years to arrive at a draft supplement? The Draft document is supposed to address a court order from 1994 as well as supposed additional concerns. I don't see how a 9 year old EIS and a supplemental EIS, based on a 8 year old court order is valid regardless of its findings. The EIS is supposed to assess the impact of the EMPLAN, a document authored in 1992, and is also substantially out of date and likely in need of revision. The draft does not adequately state, nor does it analyze the EMPLANs ability to meet its goal of providing for the water needs of Maui through 2010 through this project. It does not express in detail what those needs are (including the legally required support for the riparian ecosystems).

The draft provides little or no explanation of funding sources and economic benefit analysis is weak or non-existent. The simple fact that a approximately $50M project is still going to cost $50M 10 years

.ater leads me to the conclusion that the project has either changed substantially and needs to be reconsidered or the cost analysis is inaccurate.

It would seem that the EMPLAN is itself growth inducing (a topic which would seem pertinent to any impact assessment) and that the county of Maui is now 10 years into the period which the plan was supposed to provide for. It is difficult to escape the conclusion that the reason why we are still able to meet our water needs (albeit with challenge) without this project is precisely because the project has not produced any water to consume. It would, therefore, seem that the draft must incorporate a discussion of its own growth inducing character and the impact of that growth.

The impact of the project on the Haiku community and the relationship to the Haiku community plan have also not been adequately addressed and documented. I find it unlikely that the Haiku community plan supports removing water from the community to support development in South Maui when individuals within the Haiku community have had difficulty securing water for their own needs.

The executive summary explains the Mink & Yuen opinion, based on data from a test well and other unnamed research that drilling wells will not affect stream flow. Based on John Mink's comments on several occasions in DWS meeting minutes he has stressed that changes to ground water systems take place very slowly. I believe it is fair to assume that interactions between surface water and ground water also take place slowly. The EIS has not explained or accounted for how such a limited amount of data from a single point/location in a complex system can be extrapolated to support such an opinion when the effects may not be felt for years. The USGS and many other state and local water authorities also support the scientific conclusion that ground water withdrawal is closely related to surface water flow. I would think a far more substantial proof would be needed to contradict what seems to be commonly accepted reality.

According to the USGS the RAM modeling technique employed for the purposes of estimating certain aspects of the aquifer's response to well based withdrawal is incapable of assessing localized effects surrounding the wells themselves. The weakness of the RAM technique would seem to indicate the potential for localized blind-spots in the assessment. The draft fails to state this weakness and fails to adequately address concerns regarding the possibility for the water "potential syncs" surrounding the wells to draw water from the more questionable Kula Volcanics based sources.

Mink & Yuen has not adequately explored the stream flow issue and the lack of baseline stream flow data instead they have relied on the unproven opinion that baseline stream flow data is irrelevant if the well withdrawals have no effect on them. If the streams are already substantially below their unknown baseline requirements (which isn't hard to imagine given the volume of surface water diversion) how can a one year study possibly determine effect? The SEIS refers frequently to "perennial" streams giving the impression that they are somehow less valuable to the riparian environment and users than steams that flow year round. Even labeling a stream perennial however assumes a knowledge of baseline flow that simply does not exist given that these streams (and the recharge system that supports them) have seen environmentally devastating artificial diversion at higher elevations for over 100 years. How can one judge the condition and health of the stream flow / ground water interaction if the natural state of that system hasn't been seen for so long? There is no study that I'm aware of that provides a long-term understanding of the condition of the riparian environments in the area in question and the minimal legal requirements necessary to maintain them. Given the possibility that diverted water needs to be returned to the streams to restore their legal (and unknown) base flow requirements is it not possible that this would raise the potential impact on stream flow from drilling because of the additional ground water increases? If this relationship is valid then it would seem that the well withdrawal would be counterbalanced by diverted water returned to the system and that the $50M project was drilling to access water already available in the ditches. Without an adequate exploration of baseline stream flow data (including the diversions) none of this will be known.

On a related topic Mink & Yuen states many times that the wells will have no effect on stream flow (although they fail to adequately justify this position). They continuously contradict this statement by stating that there is an effect on stream flow when one gets within a few hundred feet of the ocean. Why is this impact discounted? Why is it not studied in more detail? Is this zone not valuable? What are the impacts to the riparian environments?

I find it difficult to not challenge the (unsupported) "research" done on the impact to coastal waters. The exploration of this impact is entirely inadequate. Why is this research not included in the draft SEIS? I have a good deal of personal experience in and under the water on the coast in question and can state undeniably that the fresh water discharge into the ocean is regular and is not limited to the actual coastal interface but also takes place along the ocean floor to some depth. Even if, as the referenced but not included "research" suggests, the fresh water discharge has limited large scale impact on the chemistry of the sea water, a great many valuable ecosystems have been shown to be highly influenced by even small changes in local sea water composition and point source discharges. Without including the research these and other related questions cannot be understood or addressed.

Thank you for your honest interest in providing for the future needs of Maui county residents and the protection of our unique and valuable cultural and environmental resources.

Regards,

Matthew (Chris) Reickert

Matthew C. Reickert

DEPARTMENT OF WATER SUPPLY
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September 4, 2002

Mr. Chris Reickert
11 Lino Place
Pukalani HI 96768

Dear Mr. Reickert:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments of July 26, 2002 regarding the subject project. Our response is as follows:

Mink and Yuen, Inc. has a long history of conducting scientific investigations in hydrology. The purpose of the monitor well was to provide data and that is what was relied upon. Previous opinions only serve to reinforce the information.

The scientific proof that the Honomanu basal aquifer is not connected to stream flow above a ground elevation of 3 feet or so is irrefutable based upon data collected and reviewed. To propose otherwise is unprovable speculation.

The use of RAM (Robust Analytical Model) to predict changes induced by pumping is discussed in detail in the responses to the USGS comments. Local changes in groundwater behavior are not exactly predictable by any type of model.

The relationship between stream flow in the Haiku region and diversion by ditches, which have been altered in the past, is not proposed to be changed. This project takes steps to avoid future impact by sealing the annulus of its wells above the basal Honomanu aquifer. Neither ditch nor stream flows in the region originate from the Honomanu basal aquifer, which is the aquifer proposed for pumping.

The effect of the diminution of coastal outflow from the basal lens is discussed in Chapter 10.

You raise an interesting point regarding the cost of the project. The ultimate cost depends largely on when the contract is let. When cost was computed in 1992, it took into account inflation on projection to the year 2002. If the contract is let before 2004, the total projected cost may not be out of line. Cost may also be affected by the terms of the contract regarding cost adjustments.

Sincerely,

David Craddick

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

UNIVERSITY OF HAWAI'I
ENVIRONMENTAL CENTER

August 7, 2002
RE: 0728

David Craddick
County of Maui
Depatment of Water Supply
P.O Box 1109
Wailuku, Hawai'i 96793

Dear Mr. Craddick:

Draft Supplemental Environmental Impact Statement
East Maui Water Development Plan
Makawao, Wailuku, Maui

In 1992, the Maui County Board of Water Supply accepted an EIS prepared for the proposed East Maui Water Development project. The project provides for the development of an average of 10 mgd of potable water in east Maui for transmission to Central Maui. The EIS was challenged by community groups and individuals charging that it was inadequate. In 1994, the circuit court in Maui issued an order to the Maui County Water Department to prepare a supplemental EIS to address specifically the issues of the effects on stream flows due to pumping from the proposed wells and the significance of water contamination. Other matters not specified in the Court order but made known through correspondence and checking of records were water rights, in-stream flow values, alternative measures, effects of pumping on the marine environment, and the relocation of wells to preclude contamination.

This review was conducted with the assistance of Paul Ekern, Agronomy and Soil Science (Emeritus); Doax Cox, Environmental Center (Emeritus), Dave Sims, Environmental Center.

General Comments

In general, our reviewers found a great deal of useful information presented in this draft SEIS. However, we note that some of the discussion is disjointed, leading to confusion regarding which aquifer is being discussed. For example, on page 12 the document reports that two existing wells in the Paia Aquifer are contaminated with Volatile Organic Compounds (VOC) to a level that requires treatment, yet there is no mention of what VOC's are present. Later in Chapter 7 Aquifer Contamination there is mention of more contamination in the Haiku Aquifer System. What is the relationship, if any, between these two aquifers?

Although there is discussion of regional relationships between areas of pineapple cultivation and VOC contamination, the map in Figure 6 is virtually indecipherable to anyone

UNIVERSITY OF HAWAI'I
ENVIRONMENTAL CENTER

August 7, 2002
RE: 0728

David Craddick
County of Maui
Depatment of Water Supply
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Draft Supplemental Environmental Impact Statement
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Makawao, Wailuku, Maui

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Although there is discussion of regional relationships between areas of pineapple cultivation and VOC contamination, the map in Figure 6 is virtually indecipherable to anyone unfamiliar with the area. What is being shown? Which direction is north? Where are the proposed well fields located?

In the discussion of septic tank and cesspool impacts (Section 7.5), cesspool infiltrates are apparently dismissed in terms of potential sources of aquifer contamination. However, in the same section, there appears an extended discussion of agricultural nitrogen concentrations related to sugar cane irrigation and fertilization. Our reviewers found this type of subject skipping distracting. In addition, we note that fertilizer impacts from sugar cane are discussed, but there is no mention of the rates of N-application on pineapple fields.

We suggest that the document be revised, with more descriptive headings, and that sections be ordered in such a manner as to provide a more logical sequence to the overall presentation in order to avoid such confusion.

Monitor Test Well

There seems to be much confusion regarding the location of the test well. Where is it located relative to other wells? Given the importance of regional relationships derived from study of this well, a separate map showing its location should be provided.

There also seems to be confusion over the concept test well and monitor well given the multitude of responses to prior reviews a careful editing and re-summarization might help bring sense to the current confusion.

Groundwater Heads

Our reviewers had comments regarding the estimation of the groundwater head at the inland wells that have not yet been drilled from the head at present wells closer to the coast. In the last paragraph on p. 10, for example, a gradient of 2 ft./mi. is calculated from the head at a monitor well, the distance between that well and the coast, (and implicitly the zero head at the coast). That gradient is then assumed to apply in the area between the monitor well and a well to be drilled a mile farther inland. However, the head in a Herzberg lens does not vary linearly with distance in the direction of flow but more nearly with the square root of the distance, even with uniform permeability. If the permeability is lower close to the coast than it is inland, as will be the case wherever Kula lavas lie between the Honomanu lavas and the sea, the departure from non-linearity will be greater.

The heads actually found at the wells yet to be drilled may, therefore, be expected to be lower than the values estimated by extrapolation from heads at wells closer to the sea. The error of estimation may not be serious because the EIS presents evidence that the sustainable capacities of the wells yet to be drilled and tested are subject to some uncertainty, that those capacities may have been estimated conservatively, and that the actual water development program can proceed on a gradual "try as you go".

One reviewer suspected that one-time measurements of the depth to water in wells have been combined with well-collar elevations based directly or indirectly on USGS benchmarks whose elevations were determined in relationship to mean sea level many decades ago have been regarded as determining mean groundwater heads above present mean sea level. The errors resulting from disregard of the variation in groundwater level resulting from the diurnal and semidiurnal (astronomic) tides and the annual (non-astronomic) tide in the ocean and disregard of the difference between the present mean sea level and that at the time of tide gauging that served as a base for the leveling system are of borderline significance.

The presentation of the several different estimates of groundwater and well-performance parameters and the recognition of the differences among them should be commended.

Future Planning Considerations for the Relocation Well Sites

The document reports on page 16 that "the inland location poses the need to connect the four phases to the 30-inch transmission main in an area with sparse road network…Connecting phases 3,4, and 6 will involve crossing the intervening gulches…These engineering problems can best be addressed when the various phases come up for development." We note that the connecting phase of this project is certainly more than just an engineering problem. It will most likely involve transmission pipe, pump, and road construction, to name just some activities, that will have an impact on the project area. The purpose of the EIS system is to address these potential problems comprehensively and plan procedures to mitigate them.

Correction

Page 10: "primal reasons" should read "principal reasons."

Thank you for the opportunity to comment on this Draft Environmental Impact Statement.

Sincerely,

John T. Harrison
Environmental Coordinator
Environmental Center

cc: OEQC
Deax Cox
Paul Ekern
James Moncur
Dave Sims

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September 4, 2002

Mr. John T. Harrison
Environmental Coordinator
University of Hawaii - Environmental Center
2500 Dole Street
Krauss Annex 19
Honolulu, HI 96822

Dear Mr. Harrison:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments of August 7, 2002 regarding the subject project. Our response is as follows:

General Comments

The VOCs under discussion are Ethylene dibromide (EDB), Dibromo chloro propane (DBCP) and Tri chloro propane (TCP). The history of their occurrence in groundwater is discussed in the chapter Aquifer Contamination.

Aquifer Systems have been drawn to standardize terminology for the management of groundwater resources. Systems are usually hydraulically connected but have distinguishing attributes. The Paia Aquifer System is continuous with and generally down-gradient of the Haiku Aquifer System, but movement of groundwater from the Haiku System to the Paia System is retarded by the north rift zone of Haleakala. In the Paia Aquifer System sugar cane is the dominant crop and much pineapple is also grown while in the Haiku Aquifer System no sugar is planted and only a small acreage of pineapple remains planted. Thus irrigation plays virtually no role in the groundwater hydrology of the Haiku Aquifer System whereas in the Paia Aquifer System it dominates recharge.

Mention in Chapter 7 of contamination in the Haiku Aquifer System at the Upper Haiku well (5419-01) is for completeness in reporting the history of contamination. Nowhere else in the Haiku Aquifer System do wells that extract water from the Honomanu Basalt basal aquifer show VOC contamination in excess of the MCLs (allowable Maximum Concentration Levels).

The map (Figure 6) is a copy of the only map that could be found which locates the pineapple fields before the first survey for VOC contamination in groundwater was conducted in 1979. Although not an easily read map, it shows the concentration of pineapple fields, the source of VOC contamination, to the west of Maliko Gulch in the Paia Aquifer System and the less numerous acreage to the east of the gulch in the Haiku Aquifer System. A north-south arrow and the proposed re-location of the EMPLAN wells will be added.

The purpose of discussing nitrogen (N) concentrations in groundwater as a result of fertilization and irrigation of sugar cane is to present a comparison with the potential N concentration derived from cesspools and septic tanks, which is likely to be small and indeterminate. Because the conclusion is that septic tanks and cesspools will not drive N concentrations in Honomanu aquifer groundwater to measurable levels, it is not necessary to expand further on N concentrations derived from sugar cane fertilization, which does not take place in the Haiku Aquifer System, nor pineapple cultivation, which acreage is small and not up-gradient of the proposed well sites.

Monitor Test Well

The monitor well will be located on the map of Figure 3, which shows the locations of the originally proposed wells and the locations of the proposed re-located wells.

Section 8.1 (General Description and Purpose) of Chapter 8 (The Monitor Well) adequately describes the monitor well as designed and constructed.

Groundwater Heads

The Honomanu Basalt is exposed along the entire length of coastline in the Haiku Aquifer System, and thus outflow of the basal lens is not impeded by a covering of Kula lavas. The assumed head at the coast is zero. Employing a straight line change in head with distance inland is common practice in Hawaii, although the head as a function of distance is indeed theoretically parabolic. Thus by using a linear gradient the calculated head is higher than a head at the same distance inland calculated by the parabolic gradient. Much uncertainty exists about the direction of flow, aquifer characteristics, recharge and other variables so that the calculated presumed heads are approximations.

Acquiring an elevation above mean sea level for the monitor well was a demanding task. Transects were run from standard benchmarks twice in order to verify the elevation because the measured head in the well appeared to be about a foot too low based on other heads in the region listed in CWRM files and USGS reports. Depth to water was repeatedly measured to assure accuracy.

Future Planning Considerations for the Relocation Well Sites

The environmental problems caused by construction activities in the general project area were discussed in the Final EIS prepared in 1993. For the Supplemental EIS, environmental studies in the area affected by the proposed re-location of the well field have not been done pending final approval by the Maui County Board of Water Supply to proceed with the project. The studies will indicate potential problems which will be addressed during preparation of the environmental report. Mitigation will be accomplished largely through the combined efforts of the Maui Water Department and State and County agencies.

Correction

The use of "primal" rather than "principal" is the writer's choice. Primal means (Webster) "of first importance, primary."

Sincerely,

David R. Craddick, Director
M&Y/DRC
copy: Mink & Yuen, Inc.

County of Maui
Department of Water Supply
P.O. Box 1109
Wailuku, HI 96793
Attn: David Craddick, Director

Aug 6, 2001

Re: Comments on EMPLAN SEIS

Maui Tomorrow is a citizen's group advocating sustainable planning solutions. A number of our 1,500 supporters live in the Ha'iku area and will be directly affected by this plan. We have requested to be a consulted party on this matter. Our comments upon the scope of the proposed SEIS are as follows:

Project Costs/Benefits/Alternative Sources
The projected 15 year cost of the EMPLAN is given as $48.5 as of 2004. This is the same cost estimated 10 years ago in the 1992 EIS. It is not clear if this cost reflects the additional $3. 7 million estimated to relocate the wells to a higher elevation, although it appears clear that unless the wells are relocated to a higher elevation, the expected yields of 10 mgd are not possible. In short, this section is very hazy about specific costs of additional pipelines, right of ways, access roads, electrical transmission lines, additional drilling costs etc that would be expected to accompany such a shift in planning.

It is stated on p.11 of the DSEIS that "the proposed installed pumping capacity of 700gpm (1mgd) at each of the eight wells as originally located (at the 700' elevation) are too high to sustain production at acceptable salinity levels."

This statement and the hazy budgetary figures lead us to the following observations:
1. The original 1992 EMPLAN was not completely researched and set unreasonable pump expectations, which may also be a factor in the currently proposed plan as well
2. The real costs of the EMPLAN may not be completely portrayed in the DSEIS and accurate comparisons to alternative sources of water for central/south Maui system and their costs only lightly discussed in chapter 12.
3. No specific cost comparisons are made between costs of treating and utilizing Waihe'e-Spreckels or Waiehu ditch water (whose minimum flow is listed a t14-15mgd) vs. the cost of developing and paying ongoing pumping and perhaps treatment costs of an extensive well and transmission system in an area such as Ha'iku that has very little reliable data on long term sustainable water yields.
4. It is not mentioned that the County DWS has a 1.5 mgd capacity water treatment plant the 'Iao aquifer region, that is near existing ditch systems and currently unused.

Head Levels:
The DSEIS discussion of head levels appears to overlook a variety of factors that could influence such levels. Unless those factors are accurately researched and added to the equation it is likely that estimations of sustainable yield in Ha'iku aquifer will suffer from the same discrepencies that have caused difficulties in management of the 'Iao and Waihu aquifers. One of those factors is the hydrological conductivity of rocks in the Ha'iku aquifer area. Significant rainfall will not become part of a productive and dependable basal water

supply if geological conditions are not favorable. The recent USGS study (Ground Water . Surface Water in the Ha'iku Area, East Maui, Hawaii, S. Gingerich, 1998) stated on p. 8: " published estimates are available of hydraulic conductivity for rocks in the study area (Ha'iku aquifer) and few are available for Maui in general." This would indicate that predictions of available water in Ha'iku aquifer are based upon unresearched assumption

Nevertheless, the EMPLAN DSEIS appears eager to justify the idea of up to 10mgd of water being sustainably available from a portion (the so called " Kuiaha sector") of the Ha'iku aquifer based on higher static heads in a few locations in the eastern part of the aquifer. One of the wells cited to prove this theory (5417-01- Edington's Ulumalu well) is a 6" diameter well only a few years old and doesn't even have a pumping history listed in the state CWRM data base. It would seem important to learn from the miscalculations that have impacted "iao aquifer wells The DSEIS analyses uses the RAM model that has had a tendency to consistently predict more water than is actually available. This in turn sets up conditions ground water overpumping that eventually cause chloride levels to rise in the well field. would seem incaustious of the DSEIS to avaoid any discussion of the possiblity that the consultatants estimates may not be accurate, since there is an apparent lack of information about just how much potable water would be reliably and consistently available from Ha'iku aquifer over an extended period of high volume pumping proposed.

Effects on Ha'iku Well and Spring Users

One of the chief questions posed bv citizens whose legal intervention resulted in this DSEIS has still not been adequately answered. That question : What would be the effect of long term pumping of the 8 proposed wells at levels of 10mgd upon the wells and springs of Ha'iku and those residents who depend upon them? In the intervening time since this DSEIS was begun, 14 private wells in Ha'iku Aquifer and 22 in nearby Honopou aquifer have also been drilled. In the State's 1990 Water Resources Protection Plan conditions in the Honopou Aquifer are analyzed on p. V-22 "for about a mile inland, basal water is likely to saturate underlying Honomanu basalt" it states. Currently, approximately 22 wells operate in the coastal area of Honopou aquifer, most of which are accessing the basal lens of water found the Honomanu levels. The DSEIS offers no discussion of effects of the 8 proposed Ha'iku wells on the 36 private water sources that potentially draw from the same lens within a 3 mile radius. The DSEIS offers no analyses of how the productivity of these sites will be affected by pumping from wells that are sited three miles mauka of the shoreline. No analyses is offered to prove that the Honopou and Ha'iku aquifers have geological barrier that would keep the basal water supply of each unaffected by pumping of the other. This seems a considerable oversight since each well has been drilled at a considerable personal cost (average price of $30,000) by families who have no access to county water services.

Haiku Aquifer: An Overview of Current and Proposed Users

There is no comprehensive discussion in the DSEIS of the scope of present and proposed of Ha'iku aquifer waters and how accurate sustainable yield figures may be.

The Ha'iku aquifer was estimated to have a sustainable yield of 31Mgd in the 1980s. Subsequently, George Yuen & Associates re-evaluated that sustainable yield considerably downward to **15mgd** (Source: State Water Resource Protection Plan, George Yuen & Associates, June 1990, p. V-21) to conclude:

Yuen's report also emphasizes that sustainable yield figures are only an estimate and shoul never be used to set actual withdrawal amounts from an aquifer (that's how the DWS has run into difficulties in 'Iao aquifer). Actual withdrawals should be no more than 80% of sustainable yield. In the case of Ha'iku aquifer that would mean **12mgd** of water may be available if the sustainable yield value of 15mgd is accurate. If not, less water would have be withdrawn.

At the Western (Maliko Gulch) end of the aquifer is an HC&S well that is reported to withdraw 2.8 Mgd of water from Ha'iku's basal aquifer. Located at 30' elevation near the ocean, fluctuations in chloride levels in the well's output would indicate that it is drawing from the fresh/saltwater transition zone. The Hamakuapoko wells that are situated across Maliko gulch at around 700' elevation also experienced rising chloride levels when they were pumped at their original estimated capacity of 1 Mgd. They have since been reevalua to .72 Mgd each.

In the USGS study "Ground Water and Surface Water in the Ha'iku Area, East Maui, Hawaii" (S. Gingerich, 1998) it was noted that:

"nearly all the water currently withdrawn in the (Haiku Aquifer) study area is from well 5520-01 (Pump 11) in Maliko Gulch. The well which consists of 10 vertical borings as deep 90' below sea level connected with two lateral tunnels and two pumps (Pumps 11a 7 11B) drilled during 1897-99 into Honomanu Basalt (Stearns & McDonald , p.217.)

Water from this system is pumped to Ha'iku ditch for irrigation. The records of yearly or monthly pumpage show that annual ground water withdrawal averaged 2.8Mgd during 1913-96 which includes the period 1954-60 when pumps in the well were not in operation. Monthly pumpage from the well has varied seasonally from zero to as much as 17Mgd." chloride levels have ranged from 270ppm-over 1,668ppm.

Actually the USGS report was not entirely aware of the range of other wells that were bein developed in Ha'iku over the past few years. A summary follows below.

If 12mgd is available from Ha'iku aquifer if would seem that the County is already using Mgd (see attachment). If the Dowling (Kulamalu-Kaupakalua) well expands its pumping full capacity (2 Mgd) and the County's Ha'iku well on Kokomo Rd operates at past capacity (.35 Mgd) that figure could be as high as 2.35 Mgd. Existing private well systems are curren using an additional **.557 Mgd.**

This means that, at a minimum, with no changes in pumping from the Dowling or Ha'ik well 1.467 Mgd of potable water will be withdrawn from Ha'iku aquifer. However an additional 4 property owners are in the process of permitting 6 wells which will withdraw an additional **.61 Mgd** of potable water. If these are completed and put into use over the ne year, Ha'iku aquifer will have **2.07 Mgd** withdrawn each day.

If use is expanded at either county well, that figure will rise to 3.52Mgd. If demand for water in Ha'iku forces the new Hogback observation well to become a production well, use could hit 4.52 Mgd. Meanwhile, the HC&S Maliko Gulch well and numerous coastal springs have likelihood of drawing from the same basal aquifer. If the Ha'iku aquifer proves to be a "saturated" system even more springs and streams will be affected by any increased pumping.
Will there really be 10 Mgd available from Ha'iku aquifer for the EMPLAN wells to tap and take to South Maui by the time they may be built? Since the people of Ha'iku need water their own community , it likely that something closer to 5-6 Mgd may be available for any future EMPLAN wells. It must be noted however, that if County policy makers do not base approval of entitlements in South and Central Maui on a realistic water development model and schedule, any wells developed in Ha'iku as part of EMPLAN have a high likelihood of being over pumped, just to try to keep up with the demands of South Maui expansion.

The one question this DSEIS should be answering it this: Does the Ha'iku Aquifer have a reliable supply of water that can be harvested at a reasonable cost with minimal impact to existing users, the watershed environment and near shore waters? After reviewing this document, we would conclude that the truthful answer is "No one really knows." Thank for this opportunity to comment

Lucienne deNaie

Lucienne de Naie
Vice President
Maui Tomorrow

ATTACHMENT:

A Review of Water Users in Ha'iku Aquifer (basal aquifer depth)
County Dept Water supply:

County's Haiku Well.	26 Mgd (2002 pumping- amount varies up to .35)
Kulumalu (Dowling) well	.65 Mgd (2002 pumping- actual tested capacity 2 Mgd)
Hogback observation well	1.0 Mgd capacity if converted to production- 12" dian
DWS Pauwela Well (Haiku School)	.5 Mgd capacity (currently unused- used in 1980's m. have unacceptable DBCP levels)

actual use (2002): .91 Mgd
Potential use (3 existing county wells) 3.3 mgd

Private well systems:

Kent Smith (serves 30 houses)	.03 Mgd
Mike Robertson (existing)	.01 Mgd
Baldwin Manor	.5 Mgd
additional wells (total):	.017 Mgd

Total existing private use: .557mgd

Permits pending:

Kent Smith (new permit)	.5 Mgd
(5615-06) Mike Robertson new	.05 Mgd
(5419-02 &03) Gomes (2 wells)	.03 Mgd (combined)
5620-05 & 06)Moretti (2 wells)	.03Mgd (combined)
total proposed private wells:	**.61 Mgd**

4 additional wells with no pumping data in CWRM files;
5417-01 (Edington)/5515-01 (Nunes)/5616-03 (Clark) /5616-04 (Honig)

Springs:
Silveno Spring (5319-01) upstream of Wailoa ditch in Maliko gulch (1000' elevation) in K volcanics)

Maliko Tunnel 50' altitude Maliko Gulch 130' long tunnel emerges from layer between hkula & honomanu flows 10,000gpd or more. 5620-01 maliko Tunnel (50' elev.) potable water 10,000/gpd to Godfrey Mau- Maliko Gardens- 6 acres/ Teens on Call Taro project. emerges from between kula & Honomanu flows.

Kanemoeala Spring: supplies a watercress farm on what appears to be former lo'i kalo at stream mouth adjacent to the ocean also provides water for a small papaya & banana farr just mauka of watercress operation.

Lilikoi Gulch near Haiku School, late Stephen Pitt used spring for agricultural

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September 4, 2002

Ms. Lucienne de Naie
Vice President
Maui Tomorrow
P. O. Box 429
Makawao, HI 96768

Dear Ms. de Naie:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments of August 6, 2002 regarding the subject project. Our response is as follows:

The pump test results for the monitor well indicate a very high hydraulic conductivity, considerably in excess of 1,000 ft/day. The prevalence of high conductivity in the Honomanu Basalt was also indicated from analyses of the test results in the Hamakuapoko DWS wells on the west side of Maliko Gulch.

The conclusions reached in the DSEIS with regard to the condition of the Honomanu basal lens and the potential effects of pumping an average of 10 mgd from the Kuiaha Aquifer Unit of the Haiku Aquifer System is based on best data and knowledge available. From the investigations and analyses the DSEIS concludes that 10 mgd can be safely withdrawn from the Kuiaha Aquifer Unit.

The locations of the EMPLAN wells are in the Kuiaha Aquifer Unit, which is defined as the region between the two rift zone traces within the Haiku Aquifer System. The action area of the DSEIS does not include the Honopou Aquifer System. The computation of allowable sustainable yield is by the standard method employed by the Commission on Water Resources Management (CWRM). The USGS report by Gingerich (1999) estimated groundwater flux of 97 mgd in the Haiku Aquifer System. Of this total, based on coastal length, an apportion of 55 mgd can be assigned to the Kuiaha Unit. For the computation of sustainable yield the Mink and Yuen, Inc. value is just 34 mgd.

The sustainable yield value for the Haiku Aquifer System given in the State Water Resources Protection Plan Vol. 1 (CWRM, 1990) is a conservative 31 mgd. The much more conservative estimate of 15 mgd had been suggested because good water balances had not yet been calculated for the System. Subsequent studies by the USGS and Mink and Yuen, Inc. give water balances that support higher sustainable yields.

The Maliko Gulch HC&S well (5520-01) is on the western margin of the Kuiaha Aquifer Unit and draws most of its groundwater from the Paia Aquifer System.

The springs and tunnels are at elevations far above the basal water table (elevation above sea level generally less than 10 feet) and will not be affected by the proposed pumping. The effects of pumping from the proposed wells on wells down gradient will be small and probably not detectable.

The cost of the EMPLAN projected to the year 2004 was estimated at $48.5 million. This took into account inflation costs, so if the contract is let before 2004 the total cost figure is not out of line. The additional cost of re-locating the wells must be taken into account. Added costs of rights-of-way, access roads, electrical transmission line, etc., were not included because they would be required in either case and are not additive.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

Aug 6, 2002

Dept of Water Supply
P.O. Box 1190
Wailuku, HI 96793
Attention: Mr. David Craddick

Comments on DSEIS East Maui Water Development Plan
Submitted by Sierra Club Maui
P.O. Box 791180, Pa'ia, HI 96779

Thank you for this opportunity to comment upon the proposed EMPLAN. Sierra Club Maui has over 800 members, many of whom live in the Ha'iku/East Maui area. We have requested to be a consulted party on this proposed project. It is good to note that the process of developing this supplemental EIS, although it was forced upon the County Water Department through legal action, has brought out a great deal of information that is crucial to the decision making process. A number of key objections to the DWS's original EMPLAN have been discussed in this DSEIS. However, it appears that the discussion is primarily aimed at defending the project rather than honestly evaluating if it is the best solution for Maui's future water needs.

Consistency with State and Local Planning Policies:

The DSEIS claims EMPLAN is consistent with all applicable state and local planning policies and regulations. It states that the "proposed project will be consistent with a number of objectives and policies of the Maui County General Plan. It lists some of those objectives as providing an adequate supply of potable and irrigation water to "meet the needs of residents of Maui County.." In truth, this project is designed to take millions of gallons of water away from the residents of Ha'iku and deliver it to large development projects planned for the future from Ma'alaea to Makena. It will mainly benefit not the existing residents of those areas. but the resort home investors, which statistics show, will purchase those future properties.

There is very limited water capacity offered by Maui County DWS to the Ha'iku area and no County water provided to communities East of Kakipi gulch. Small developers and individual homeowners are left with little choice except to develop wells at their own expense in the same aquifer that the County is proposing to tap to meet central and south Maui needs. Fire protection in much of the area is also substandard and requires residents to fund expensive. locally based water storage systems and pay higher insurance rates.

Pa'ia-Haiku Community Plan clearly identifies (p.11) "Water Use Allocation" as a major concern and specifically states: "The development of new ground water resources in Ha'iku to service Central Maui area of Wailuku-Kahului and Kihei-Makena raises a concern over the allocation of water resources to these other regions, if and when the present and future needs of Pa'ia -Ha'iku are not met."

Not only does EMPLAN fail to met the needs of Ha'iku residents, but according to the Implementation timetable on p. 7 & 8 of the DSEIS, it appears that the majority of the water proposed for development (phases 4 and 6, pumping capacity of 8Mgd) will be withdrawn from the Eastern end of the Ha'iku aquifer. This portion of the aquifer is also where the majority of private wells in Ha'iku (12) and Honopou Aquifers (12) are located.

Many farming families in the area also depend upon coastal springs, which if the analyses in the DSEIS is correct, will be affected by pumping from the basal aquifer. The private wells tend to be near the coast where the aquifer lens is theorized to be thinnest. With no studies or proof cited, the SEIS concludes that there will be no impacts to these individual well user's water quality. At least one coastal water user in the Ha'iku area (Mr. Hokoana) has already expressed concern to the County DWS over impacts to his water source should the EMPLAN wells become a reality.

Aquifer Contamination

The discussion of aquifer contamination in chapter 7 is especially useful in light of the very confusing reports that have been given over the years as to the extent of groundwater contamination by agricultural chemicals in both the Pa'ia and Ha'iku aquifer. It is good to see the costs of cleaning up any potentially contaminated water included in budgetary discussions on page 13.

A more in depth analyses of both nitrate and aluminum levels in private and public wells in this region would seem to be useful as well. The few withdrawal sites that have had some form of chemical analyses seem to exhibit indications that these substances are present in the groundwater in higher concentrations than expected and this may pose a need for remediation. Any such need could add to the costs of the proposed project.

Streams, Groundwater and Nearshore Waters

Citizens regularly testify that Ha'iku watersheds need restoration, not further exploitation. Local residents feel that the entire nature of Ha'iku's hydrology has been degraded gradually over time by the massive stream diversions which withdraw millions of gallons of surface and ground water recharge from the streams. Ha'iku residents see the long term health of their watershed. stream life and shorelines as dependent upon restoration of stream flows and protection of ground waters from massive pumping projects such as the proposed EMPLAN.

Drilling records from the Ha'iku monitor well presented on p. 43 of the DSEIS indicated moist areas along much of well shaft as it transverses the Kula and Honomanu formation at various depths. It would appear that the presence of saturated stratum between Kula and Honomanu flows and the actual affect of any future pumping on streams, springs should be investigated further, rather than being dismissed.

The Aquatic Resources report also dismissed any connection between fresh water entering into the near shore environment and the health of marine life. The consultant for this report is well known for inadequate research done on other proposed Maui projects. It appears that he chose to briefly investigate one site along the Ha'iku coast and conclude that the potential withdrawal of millions of gallons of fresh water every day that would end up in sewage treatment plants in South Maui would have no effect on near shore waters that had been receiving a portion of these flows for nearly one million years. No substantial proof was given to verify this conclusion and it was stated that other studies in the state indicated no beneficial connection between fresh water and the aquatic environment. This statement is simply not true and various researchers have reported as to the important function fresh water seepage plays in the marine environment.

Hai'ku Streams had Tradition Perennial Flows

Page 58 of the DSEIS dismisses the notion of any of Ha'iku's 12 major streams being "perennial" except in a narrow coastal zone. The USGS study (Ground Water and Surface Water in the Ha'iku Area, East Maui, Hawaii, S. Gingerich, 1998) takes a very different view based upon long-term gaging station records.

The major streams of Haiku once had abundant perennial flows. This is very clear from the archaeological remains of extensive lo'i kalo along such streams as Halehaku, Papalua, and Opana, Maliko and others. Many Ha'iku streams were probably perennial over most of their length at one time. Steams noted Ha'iku's Kuiaha stream as perennial in his 1939 evaluation. Other Haiku streams regarded historically as perennial are Manawai'io, Kakipi, Papalua, Opana and Halehaku. The SEIS notice for EMPLAN does not mention the topic of stream and watershed restoration for the subject area. It seems primarily concerned with exploiting, not sustaining the area's water resources.

Some Ha'iku streams are not only supplying water to HC&S and ML&P ag lands, but are also being used by the County BWS for domestic water. Opana stream (which flows into Kakipi Gulch on the Eastern border of the Haiku aquifer) is tapped by the Upper Kula pipeline at the 4,2000 elevation. It is also drained by the Opana tunnel (2,200ft), Wailoa Ditch (1,200ft), Kauhikoa/New Hamakua Ditch (1,000ft), Lowrie Ditch (600ft), and Haiku Ditch (400ft.)

A USGS gaging station at 3,1000 ft along Opana stream recorded peak flows between 13 and 32 mgd in the period between 1933-35 (a time of high rainfall). Flows recorded at 2,400ft along the same stream in the period 1966-96 averaged 1.1Mgd consistently over a 30 year span.

On nearby Halehaku stream a USGS gaging station at 2,300ft flows measured a base flow (1966-71) of .3 Mgd. At a 1,200 ft gaging station records from 1910-12 showed flows from .3 to 13Mgd. Today, the flows in both these heavily diverted streams barely exist in the lower valleys where ancient Hawaiians once used their abundant waters for crops (source: Ground Water and Surface Water in the Ha'iku Area, East Maui, Hawaii, S. Gingerich. 1998. p. 14 & 21)

Awalau Stream, which is part of the system that flows into Uaoa bay is supplying 1.9 mgd to the County water system as well as being tapped by both the Wailoa and Kauhikoa ditches. The last phase of EMPLAN wells are proposed in an area adjacent to Awalau stream.
(Source: EMPLAN DSEIS)

Viability of Haiku Watershed

There is a common myth: Haiku has abundant rain and millions of gallons of "wasted' water runs to the sea every day. For residents there is another reality: Ha'iku has heavy rainfall in a few areas (more towards its eastern edge where it meets Honopou Aquifer). There is no comprehensive data to affirm exactly how much of what rainfall actually finds its way back into the aquifer or how long it takes for rain to make its way through the layers of lava flow to become part of the aquifer.

Highest rainfall recorded by USGS is in Kailili area (2,500ft elevation from 57- to 201 mean annual rainfall (between 1945-50) highest elevation with best preserved watersheds (7,000' elevation only received 18-111 inches mean annual rainfall with only two years 1980 & 82 being at 100 inches and most years being closer to 75 inches. Coastal rainfall was even lower (36-94 inches) an average of 96 in/year over entire study area was set by USGS (p. 4) with 22 mgd of fog drip.

How much of this rainfall actually becomes part of the aquifer? Two hundred years ago. the percentage was like much higher. Why? Haiku watershed area form 800' to 6,000'was once Koa and 'Ohia forest with the accompanying understory plants ferns and mosses. The majority of Koa & 'Ohia was logged off in the late nineteenth century. The watershed today is introduced tracts of eucalyptus, pine , christmas berry, guava and acres of deforested meadows. Only in deep gulches do native watershed plants remain. What effect will this have on the Ha'iku aquifer and its ability to consistently supply 10 Mgd to the proposed EMPLAN wells? Responsible planning would suggest: do more research before committing millions in ratepayers funds.

Daniel Grantham

Daniel Grantham
Chair, Sierra Club Maui Group

DEPARTMENT OF WATER SUPPLY
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September 4, 2002

Mr. Daniel Grantham, Chair
Sierra Club Maui Group
P. O. Box 791180
Paia, HI 96779

Dear Mr. Grantham:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments of August 6, 2002 regarding the subject project. Our response is as follows:

The investigations and analyses on which the conclusions in the Draft Supplemental Environmental Impact Statement (DSEIS) are based were performed in an objective and scientific manner.

The coastal outflow of the basal lens is diffuse and restricted to elevations of less than about two feet above sea level. Springs at higher elevations will not be impacted by pumpage from the basal lens.

The discussion of nitrate-nitrogen is based on available chemical analyses of groundwater. Aluminum has not been a problem in Hawaiian groundwaters.

The diversion of streams by East Maui Irrigation Co. (EMI) collection ditches started nearly 150 years ago. Discussion of the effects of these diversions is beyond the scope of the DSEIS. Pumpage of basal water will not exacerbate the consequences of the diversions.

The presence of fugitive moisture in a well bore where the rock is unsaturated is common in Hawaiian wells. For saturation to occur the water table must be at the uppermost level of moisture presence. The uppermost level in the monitor well is 4.7 feet above sea level.

September 4, 2002
Mr. Daniel Grantham
Page 2

Discussion of the interaction between fresh water outflow at the coast and sea water is derived from the report titled "Assessment of Impacts to Water Quality and Marine Community Structure from the Proposed East Maui Development Plan, Phase I," prepared by Marine Research Consultants, 1998.

The term "perennial" stream will be amended to "perennial throughout the stream channel length." The flow diagrams in Figures 9 and 10 illustrate the lack of perennial flow throughout stream courses. These measurements were made by the USGS during dry weather.

Streams in the Haiku region may have been perennial throughout their lengths before construction of the EMI diversion ditches. However, this issue needs to be addressed separately from the DSEIS. The DSEIS is restricted to the effects of pumping from the Honomanu basal aquifer on stream flow under current conditions of diversion by the collection ditches. Streams above the elevation of the basal water table will not be affected by pumping.

Rainfall maps are based on rain gage measurements which are given in State and Federal reports. They are the starting point for computing water balances.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

Valley Farm

P. O. Box 485 Ha'ikū, Hawai'i 96708 808-572-1609

August 5, 2002

Department of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Maui, Hawaii 96793-6109

Re: Comments on the Draft Supplemental Environmental Impact Statement for the East Maui Water Development Plan

This DSEIS fails to make the rigorous critical examination, as required by law, of one of the largest public works projects iN Maui's history. No supporting studies are included in this document.

The EM Plan provides for well fields that would eventually be connected by a 36 inch diameter pipeline 16+ miles long to the Central Maui transmission system. The 36" pipeline is the main component of the EM Plan. It is the size of the pipeline, not the number of wells that determines the true magnitude of the EM Plan.

"The number of wells will be determined as the sites are drilled and become developed." David Craddick, DSEIS Response to Comments.

The BWS has already entered into an MOU with A+B and others to allow the drilling of private wells along Maui's windward northeast coast with waters entering the public system to be traded for credits elsewhere. Excess capacity in the pipeline invites the drilling of more "Dowling" type wells along the Hamakua and Ko'olau coasts.

There is no data in the DSEIS justifying a 36" diameter pipeline. Engineering data on the proposed pipeline must be available for independent review and included in the final EIS.

The pipeline is to be built in phases—first to Paia then to Kahului then Pu'unene then to the Central TRansmission line at Kuihelani. Who is to receive this water in Paia, in Pu'unene, Kahului and Kihei?

The executive summary states (page 2) "Results of research and studies on the possible negative impacts on coastal waters due to pumping indicate that such a possibility is negligible." The research and studies referred to are not included in the DSEIS. Reference is made to a study by Marine Research Consultants (MRC) that covers the EMPLAN phase one only.

It is preposterous to conclude from a study based on research done at Kohala, Hawaii and one sampling at Pa'uwela that the extraction of 10 to 30 million gallons of water per day will not affect marine life. MRC suggests (page 62) that the outflow of groundwater may be reduced by one third due to pumping. Groundwater has been flowing into these coastal waters for millions of years. To dismiss the importance of this water on the marine environment is unacceptable. Furthermore, any study of the marine environment along this coast must recognize that this coastline has lost all of the streams that once flowed into the sea and that groundwater is the only uninterrupted source of fresh water for marine life.

MRC selected coral and benthic algae as indicator biota to determine the effects of fresh water on ocean life—there is no mention of fish.
To learn about the effects of fresh water on ocean life within the project area I spoke with two well known Maui fishermen. Mark Hobson has been a full time commercial fisherman for 25 years. Melcolm K. "Hawaiian Man" Park has fished this coastline for 40 years and says, "I grew up in these waters."

Both Mark and Melcolm are expert at deep sea trolling, bottom fishing, spear fishing, throw net and opihi picking and have an intimate knowledge of the coastline from Maliko to Kipahulu.

Both men say they know of lots and lots and lots of underwater springs, from the shore to at least 40 feet deep along the coastline between Maliko and Uaoa.

"You can see the fresh water coming out of the rocks. It has a certain look and you can feel it—it's colder. A special limu grows there that fish eat. That is where we see certain fishes...the adults and especially the babies need this fresh water. We see Aholehole, 'Ama'ama, Awa, Awa'aua, Aweoweo, Kaku, Kawale'a, Moi, Mu, Nenue, Nohu, 'O'io, O'opu hue, Po'opa'a and Uouoa. And along the shore where the fresh water comes out in sandy places that's where the Kupe'e is. They only live there, they got to have the fresh water."

There is a huge hole in this DSEIS—where the fresh water meets the ocean.

Sincerely,

Gregory Westcott

DEPARTMENT OF WATER SUPPLY
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September 4, 2002

Mr. Gregory Westcott
Valley Farm
P. O. Box 485
Haiku, HI 96708

Dear Mr. Westcott:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments of August 5, 2002 regarding the subject project. Our response is as follows:

Conclusions in the DSEIS are based on critical examination of hydrological and engineering data available for the Haiku region.

The report titled "Assessment of Impacts to Water Quality and Marine Community Structure from the Proposed East Maui Development Plan, Phase I," prepared by Marine Research Consultants, 1998, gives data collected at the coast and arrives at conclusions based on scientific analyses of the data. The Study was based on the shoreline areas between Pauwela Point and Baldwin Park in Paia which spans the enter coastline along the project area. In addition, comparison was made with roughly similar conditions along the North Kohala coastline.

You indicate that you are having difficulty understanding the need for a 36 inch main. The flow of 10 mgd is an average, but in designing pipelines maximum daily flows, peak flows and fire flows must be considered. The maximum may reach 25 mgd or more.

Sincerely,

David R. Craddick
Director
M&Y/DRC
cc: Mink & Yuen, Inc.

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
WATER RESOURCES
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813
PHONE (808) 587-2400/FAX (808) 587-2401

August 6, 2002

Mr. David R. Craddick
Director
Department of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Maui, Hawaii 96793-6109

Dear Mr. Craddick:

Subject: Draft Supplemental Environmental Impact Statement (DSEIS) For The East Maui Water Development Plan

We are in the process of reviewing the subject DSEIS but will be unable to provide a response by your August 7, 2002, deadline. We apologize for the delay but the appropriate staff members that need to review this have been in a continuous travel status for the past few months.

We anticipate being able to provide a reply by August 23, 2002. If you have any questions or concerns, please feel free to contact me at 587-2405.

Sincerely,

Gordon Tribble
District Chief

Cc: Mr. George Yuen
Mink & Yuen, Inc.
1670 Kalakaua Avenue, Suite 605
Honolulu, Hawaii 96826

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
WATER RESOURCES
677 ALA MOANA BOULEVARD, SUITE 415
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August 12, 2002

Mr. David Craddick
Director
Department of Water Supply, Maui County
PO Box 1109
Wailuku, Maui 96793-6109

Dear Mr. Craddick

In response to your letter of June 24, 2002, we are providing a review of the *Draft Supplemental Environmental Impact Statement (DSEIS) for the East Maui Water Development Plan* prepared for the Maui County Department of Water Supply by Mink and Yuen, Inc, June 2002. Our review is for Chapters 6 through 10 and 16 of the report, pertaining to the hydrogeology of the study area.

From a hydrologic perspective, the main conclusion of the report is that the proposed East Maui Water Development Plan will not affect stream flow in the area because there is an unsaturated zone below the water table in the Kula Volcanics that extends nearly to sea level. Consequently, the report concludes that pumping from the water body in the Honomanu Basalt near sea level will not affect ground water in the upper (Kula Volcanics) water body. Although this conclusion may be correct, the data presented do not clearly establish that the aquifer is not continuously saturated from the Kula Volcanics to sea level. Unfortunately, it appears that data needed to resolve the degree of saturation were either not collected or omitted from the DSEIS. Our specific comments are as follows:

<u>Section 6.1.4:</u>

1. It would be helpful to provide the water levels used in constructing the ground-water potential map on the map. The water level (12.0 ft; 9/97) from well 5318-01 is not included for the construction of the figure.

<u>Section 6.2:</u>

1. The referenced hydraulic conductivity calculation from Hunt (1996) is not a USGS approved or released aquifer test value and should not be cited as such.

Section 6.3:

1. The recharge estimates attributed to Gingerich and Shade are actually from the same source as noted on pg. 11 of Gingerich (1999). The values used in Gingerich (1999) are those calculated by Shade (1999) including the contribution of fog drip and are based on the same GIS-based water budget. They are not independent estimates, as implied in the DSEIS.
2. The use of the sustainable-yield equation may not be adequate for estimating the sustainable yield of the aquifer in the Haiku area. This method has been shown to underestimate the decline of water levels during ground-water development in instances where the assumptions of the model are violated (such as documented by Oki and Meyer [2001] for the Iao aquifer). In addition, it does not take into account the spacing of wells. Further, because the model used is one-dimensional, it cannot account for the effect of flow boundaries such as the low-permeability dikes that may be impeding the east-west flow of ground water near Maliko Gulch.

Section 7.5:

1. As noted in this section, no testing has been done to determine the effects of cesspool effluent on the aquifer. In addition to the possible cesspool-derived contaminants that were mentioned, some newly emerging contaminants such as pharmaceuticals should also be considered as potential threats.

Section 8.1:

1. The map showing the location of the newly drilled test hole is hard to read. A more legible version would be helpful.
2. It appears, from the text, that the installation of the monitor well was simply designed to prove that highest water body encountered was perched, rather than being used to impartially investigate if the aquifer is saturated or unsaturated between the highest water table in the Kula Volcanics and near sea level. Appendix 16.3 contains a narrative for well testing (Exhibit "3") and a well design that would have provided fairly solid evidence for an unsaturated zone beneath the Kula Volcanics. Further, discussions and correspondence between the USGS and both Maui DWS and Mink and Yuen, Inc. have stated the need for reliable water-level determinations, made each morning prior to the onset of drilling. It is regrettable, given the opportunity to settle the issue using the best investigative methods possible, that a fairly minimal effort was apparently made to determine water levels during drilling.

Section 8.2:

1. The drilling protocol calls for water levels to be made during various stages of drilling. These measurement records should be available for inspection.

2. How much time passed after drilling ceased before measurements were made in the hole? The effect of foam and water injected during drilling on water-level measurements should be addressed, especially if only 1 hour elapsed between the end of drilling and the water-level measurement.

Section 8.3:

1. While it is true that a video log may demonstrate the level of water in a well, it does not necessarily prove that the water level represents the water table in an aquifer, especially where there is vertical ground-water flow. In some cases where a well penetrates a water table, the well contains water at all depths it reaches but the water level in the well drops below the original water table. Meinzer (1923) termed this occurrence semi-perched but it essentially describes a fully saturated system with a downward flow gradient. The video log mentions moist or dripping areas above sea level that may be an indication of saturation.

Section 8.5:

1. The data for both the step-drawdown and long-term aquifer tests should be provided. Additional aquifer information could be determined from analyses of the long-term data. In general, a long-term test will provide better data for determining aquifer hydraulic conductivity as well as show the possible effect of hydrologic boundaries such as volcanic dikes on the water-level response of the aquifer to pumping.
2. Although the proposed pumping wells will be placed at least 3 miles inland, ground-water pumpage from these wells will reduce the amount of discharge to streams, springs, or the ocean by an equivalent amount. Streams or springs that are supplied from the lower water table near the coast could have flow reductions regardless of the distance of the wells from the coast.

Section 9.1:

1. Gingerich's report (1999) suggests through a compilation of evidence that there is an unsaturated zone beneath the Kula Volcanics but also suggests some important data needs that should be addressed to provide evidence that is more conclusive. The report is not a final "verification" of this type of ground-water occurrence. Some suggestions included piezometers completed only in the expected unsaturated rock and careful water-level measurements made each morning of drilling of new wells. It is misleading to cite Gingerich (1999) as a conclusive statement by the USGS that the aquifer below the Kula Volcanics is unsaturated. The one way to demonstrate if the aquifer is saturated or unsaturated is with a well that has water levels properly measured during drilling. Based on the information provided in Section 8, it is not apparent that this was done.

Section 9.3:

1. There is a reference to an uncompleted, unpublished, and unapproved USGS draft manuscript. We do not know how this report became available, but USGS publications should not be referenced unless they are officially approved to maintain the scientific and technical integrity of the organization.

2. Izuka and Gingerich (1998) for the Lihue Basin and Meyer (2000) for the Nahiku area of east Maui have described ground-water occurrences where a fully saturated water table is intersected by streams well above sea level. In these instances, ground water pumping from wells will decrease stream flow. These new interpretations of ground-water occurrence show that it is not appropriate to simply expect all high-level water to be perched. Environmental assessments of ground-water withdrawal should include the consideration of all scientific options.

Section 10.1:

1. What method is used to determine that the probable effects of pumping on coastal springs will be small? There is no indication of the current discharge of the coastal streams or what the impact will be after all pumping is underway. Assuming the Mink recharge value of 61 Mgal/d and the proposed additional pumping of 9.3 Mgal/d, discharge to the coast will be lowered by about 6.6 percent. For a simple comparison, a report on the impact of ground-water withdrawal on the coastal springs at Koloko-Honokohau National Historical Park on the island of Hawaii (Oki and others, 1999) demonstrated that flow through the park will be reduced by half when ground-water withdrawal throughout the Kona area is about 6.3 percent of the estimated recharge.

Section 10.3:

1. There are numerous small private wells in the Haiku area, some of which penetrate to near sea level. How will the quantity and salinity of water pumped by these wells be affected by the withdrawal of ground water upgradient, as proposed in the East Maui Water Development Plan?

Section 10.8

1. It is not accurate to state there are no perennial streams in the project area. There are several streams with perennial reaches. It is more accurate to state that under existing conditions, including the surface-water diversions in the area, there are no streams that are perennial along the entire length from their headwaters to the ocean.

Chapter 16:

1. The second and third equations are missing the term for head (*h*) and the fifth equation is missing the term for hydraulic conductivity (*k*) in the denominator.

2. It is unclear what the second paragraph of pg. 83 means.

Section 16.2:

1. What is the source of the value of 1,000 ft for r' in the transmissivity calculation? Is this value a standard commonly referenced in hydrological literature?

Section 16.6:

1. The long-term pumping test results are missing from the report.
2. Chain-of-custody form indicates that sample from well arrived at lab half opened and nearly empty. Although it is unclear if all or only some of the analyses were from this bottle, it appears that the sample integrity was compromised and the results are questionable. This is particularly true if analyses were made for volatile compounds. Conclusions about the suitability of the water for public supply may need to be based on a more reliable sample.

If you have any questions or need further clarification of any points discussed in this review, feel free to contact us to discuss these matters.

Sincerely,

Gordon Tribble
District Chief

Cc: Office of Environmental Quality Control
Department of Health
State of Hawaii
235 South Beretania Street, Room 702
Honolulu, Hawaii 96813

Mr. George Yuen
Mink & Yuen, Inc.
1670 Kalakaua Avenue, Suite 905
Honolulu, Hawaii 96826

References:

Gingerich, S.B., 1999, Ground water and surface water in the Haiku area, East Maui, Hawaii: U.S. Geological Survey Water-Resources Investigations Report 98-4142, 38 p.

Izuka, S.K., and Gingerich, S.B., 1998, Ground water in the southern Lihue basin, Kauai, Hawaii: U.S. Geological Survey Water-Resources Investigations Report 98-4031, 71 p.

Meinzer, O.E., 1923, Outline of ground-water hydrology: U.S. Geological Survey Water-Supply Paper 494, 71 p.
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September 4, 2002

Mr. Gordon Tribble, District Chief
U.S. Geological Survey
Water Resources Division
677 Ala Moana Boulevard, Suite 415
Honolulu, HI 96813

Dear Mr. Tribble:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments of August 12, 2002 regarding the subject project. Our response is as follows:

Introduction

The speculation that the Honomanu Basalt is saturated above the basal water table is false. The monitor well data, which was carefully collected and analyzed, disproves that speculation. U.S. Geological Survey (USGS) field observations as well as field observations by other hydrologists along with the exhaustive USGS stream measurements negate the speculation.

Section 6.1.4

1. The water levels used in the construction of the groundwater potential map are listed on pages 28 and 29. Not all of the water levels were given equal weight in the construction, as indicated in the column titled "Reliability." Experience has proven that not all water level measurements are equal in accuracy. The supposed water level of 12 ft. at the Kulamalu well (5318-01), for example, is somewhat higher than expectable in the basal lens. If that water level is true, a local condition may account for it.

2. Mr. Hunt's conductivity calculations are in the public domain.

Section 6.3

1. The Shade and Gingerich budgets are differentiated by inclusion or exclusion of fog drip. The distinction is discussed in the text. The budget values were taken from separate Gingerich and Shade reports.

2. It has not been acceptably demonstrated that the sustainable yield equation underestimates the decline in hydraulic head (as opposed to transient water levels) as proposed in the Oki and Meyer report. The sustainable yield equation is the steady state solution for RAM, the Robust Analytical Model. RAM is an exact analytical model in two geometric dimensions (x and z) and one flow dimension (x), in which the constants are h_0, the initial head in the unperturbed system at a defining location; V_0, the initial volume of water in storage; and I, the average of input into the system. I may also be manipulated to vary with time. The variables are h, the head (not necessarily the water level); D, the rate of extraction; and t, time. For an equivalent set of conditions RAM exactly replicates the SHARP numerical model. It is incorrect to say that RAM underestimates head loss. RAM is a straightforward, easily solvable mathematical model for both the transient and steady states. It is especially useful where the hydrological data base is too sparse to permit the rational use of a numerical model. This is the case in most aquifer systems in Hawaii, including the Haiku Aquifer System. When numerical models are employed to describe Ghyben-Herzberg lens behavior the product typically is for the steady state only, which may not come about for decades, during which time all conditions assumed in the model are presumed to hold fast, an unlikely expectation.

In comparing numerical models against exact analytical models the fundamental principle is that for a given set of conditions for which the analytical model can be solved, the numerical model solution must agree with the analytical solution for the numerical model to be considered a valid representation of the system. The inverse of this principle is mathematically inadmissible.

Section 7.5

1. No documentation exists stating that pharmaceuticals are a source of contamination in the Haiku Aquifer System.

Section 8.1

1. The monitor well location will be added to Figure 3, the map which gives the locations of the originally proposed wells and the re-located wells. Figure 4, the not-to-scale illustration of the hydrogeology at the monitor well site appears to be clearly legible.

2. The collection of data from the monitor well was performed to the best of ability allowed during drilling. It is an unfair accusation to speculate that pre-determined conclusions governed the collection and analysis of the data. The drilling protocol was followed, and water level measurements were attempted in the unsaturated Honomanu Basalt until the driller reported no standing water each morning.

Section 8.2

1. Water level measurements were attempted during drilling. As drilling proceeded, no water accumulated in the unsaturated Honomanu Basalt. Saturation at the basal water table was observed. The drilling results and other data are open for inspection.

2. Each morning the driller would test for standing water in the boring. After circulation was completely lost at depth 336 feet, even the foam-water mixture did not accumulate. The driller log notes that the initial water level was encountered at depth 662.33 feet from an elevation of 667 feet.

Section 8.3

1. The video log categorically marks the start of full saturation in the Honomanu Basalt at an elevation of 4.68 feet above sea level. No credible evidence supports the speculation that saturation occurs at higher levels throughout the Honomanu. The further speculation that vertical groundwater flow may account for the failure to recognize saturation is an unprovable assumption and not consistent with the data.

Section 8.5

1. The step-drawdown data is included in Appendix 16.2. The data for the long term test does not allow for calculating hydraulic conductivity because drawdown at the pump rate of 750 - 780 gpm reached 1.62 feet very quickly and held steady for the 92 hour period of the test. Also, recovery was virtually instantaneous. The data will be included in the amended SEIS.

2. Hypothetically, the basal water table where it is exposed near the coast will be affected by pumping, but the effect will be small and probably indeterminate. Complicating a prediction of how this short stretch of stream will be affected is tidal movement up the stream channel.

Section 9.1

1. The Gingerich quotation is from his USGS report (1999). All data derived from drilling and collected in the monitor well proves that the Honomanu Basalt is unsaturated above the basal water table. Water levels were properly measured during drilling.

Section 9.3

1. The reference alluded to is that for Paul Eyre, formerly of the USGS. Mr. Eyre is a hydrogeologist and engineer of outstanding credentials. His observations should not be censored; the data is in the public domain.

2. Interpretations in both the Izuka and Gingerich Lihue Basin study and the Meyer Nahiku study are in contention by practicing Hawaii hydrogeologists outside the USGS. The reports were not peer-reviewed by non-USGS experts and therefore the interpretations remain questionable. The studies are not directly relevant to hydrogeological conditions in the Haiku Aquifer System.

Section 10.1

1. The effect of the reduction of fresh water outflow at the coast is discussed in Section 10.9.

Section 10.3

1. The effect of pumping up-gradient on the small capacity wells nearer the coast is not determinable but is likely to be immeasurably small. Nevertheless, measurements are being recorded on a well in Maliko Gulch which is being operated by the Hokoana Trust.

Section 10.8

1. The statement "no perennial streams" will be changed to "no perennial streams throughout their channel lengths."

Section 16

1. The second and third equations will be corrected to include h, and in the fifth equation k will be added.

2. The paragraph is included to explain the limitations of drawing conclusions from either analytical or numerical models where the data base is so sparse as to render results unreliable.

Section 16.2

1. The commonly referenced value for r' in the hydrogeological literature is, r' = (1.6)(l), where l is the depth of the open or screened boring in the aquifer. In Hawaii this arbitrary value is too small for the high transmissivity of the basal aquifers. To illustrate this, consider the following:

$$r' = (1.5)(Tt/S)^{1/2}$$

in which r' is radius to zero drawdown, T is transmissivity, t is time, and S is effective porosity. For the monitor well penetrating just 70 feet in the basal aquifer the value for r' is 112 feet. This value represents a T value of just a few thousand sq. ft. at an S value of .05. The T at the monitor well, as is true in all basal aquifers in Hawaii, is two magnitudes higher. Assume for purposes of illustration that k = 1500 ft/day and S = .05 (common values for the Koolau Basalt in Oahu), then for the monitor well T = kl = (1500)(70) = 105,000 sq.ft./day. Thus, for the time of the step-drawdown test (4 hrs. = .17 days), r' = (1.5)(592) = 887 feet.

Although selecting a value for r' as 1000 feet is arbitrary, it is more reasonable for Hawaii basal aquifers than r' = (1.6)(l). Because r' occurs as a log term in the calculation of T by the step-drawdown formula, note that ln(112) = 4.7, and ln(1000) = 6.9. As noted in the discussion in Section 16.2, the calculated T and k values by either r' = (1.6)(l) or r' = 1000 are very high.

Section 16.6

1. The long term pumping test results will be added to the SEIS.

2. The chain of custody notes that sample was frozen when received by MWH labs. MWH certified that the test results meet all NELAC requirements unless noted in the comments section of the case narrative. There are no comments referring to the analyses for EDB, DBCP and TCP.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

07??? 05

William Meyer
6750 Hawaii Kai Dr. #501
Honolulu, Hawaii 96825

July 30, 2002

County of Maui
Department of Water Supply
P.O. Box 1109
Wailuku, Maui, Hawaii 96793

Re: Comments on the "Draft Supplemental Environmental Impact Statement For the East Maui Development Plan"

Attn: David Craddick, Director

As you are aware, the purpose of drilling the monitor well discussed in the Draft Supplemental Environmental Impact Statement (DSEIS) was to resolve the issue of whether pumpage from the proposed East Maui Water Development Plan (EMPLAN) wells would affect the flow in nearby streams. The DSEIS concludes that based on the drilling results of the monitor well and based on "other research data," pumping from the EMPLAN wells will not affect stream flow. It is my opinion, however, that information presented on the results of the drilling of the monitor well and the "other research data" in the DSEIS does not allow one to come to this conclusion.

Two different concepts of ground water occurrence in the Haiku area are possible given data existing prior to the drilling of the monitor well, and whether pumpage from the proposed EMPLAN wells will affect stream flow depends on which concept is the correct one. One concept of ground water occurrence was that the Haiku area is underlain by a perched aquifer in the Kula Volcanics and by a basal aquifer with water levels near sea level in the Honomanu Basalts, which underlie the Kula rocks. That part of the Honomanu Basalts above the presumed basal water table and below the Kula Volcanics is considered to be unsaturated in this concept. The other concept was that the rocks are saturated below the water table in the Kula Volcanics. This would mean that only a single, vertically extensive ground water body, such as now known to exist in the Nahiku area, underlies the Haiku area. It would also mean that the permeability of the Honomanu Basalts is generally low for several hundreds of feet below the Kula Volcanics, as is the case in the Nahiku area also. High permeability would be encountered some distance below sea level.

If the first concept proved correct, then pumpage from wells completed in the basal aquifer would only affect stream flow near the coastline at locations seaward of the point where the basal water table intersects the streambed. If the second concept proved correct, then wells completed at any altitude in the vertically extensive ground water body, even if this was below sea level, would affect stream flow throughout most of the Haiku area, or at least in the area where streams actually gained flow from the discharge of ground water into them. .

In order to resolve these conflicting viewpoints, I recommended to Judge Mossman of the Circuit Court that a monitor well be constructed and that a daily record of water levels (or depth to water in the well) be recorded as the well was drilled. Water levels were to be measured each morning before drilling commenced. Morning water levels obtained during drilling in the Nahiku area have been used by the USGS (USGS Professional Paper 1618) as a means of addressing the same conceptual question about ground water occurrence in the Nahiku area that existed for the Haiku area. I also recommended that the results of the East Maui surface water-ground water study conducted by the USGS be used to identify the location of the monitor well. If water persisted in the well as it was drilled to sea level, this would be evidence that the rocks in the Haiku area are saturated below the first water table encountered. A falling water level in the well as it was drilled, would still support the concept that the rocks in the Haiku area are saturated from the Kula Volcanics on down. If the hole encountered water in the Kula, but remained dry below the Kula until the basal aquifer near sea level was encountered, this would be evidence that the first concept is correct. Obviously, since the purpose of drilling the well was to record water levels, it was important that the well be drilled in such a fashion that water was free to enter the hole as it was drilled. It's my understanding that my recommendation was accepted by Judge Mossman as the means to resolve the conflict.

A basic problem I find with the DSEIS, is that before the report even discusses the results obtained from the drilling of the monitor well, it reaches the conclusion that the Haiku area is underlain by a perched ground water body in the Kula Volcanics which, in turn, is underlain by a basal aquifer in the Honomanu Basalts. Given this conclusion the DSEIS also concludes that pumpage from the proposed East Maui wells will not affect stream flow except near the coast at locations oceanward of the point where the basal ground water table intersects stream valleys. These conclusions, however, are not supported by any presentation in the DSEIS of the water level data that was supposed to be collected from the monitor well in order to answer the question in the first place. Based on the information presented in the DSEIS, the conclusion about ground water occurrence could have been written before the monitor well was drilled.

It would appear from the information presented on page 42 of the DSEIS, that the protocol followed while drilling the monitor well was not that which was recommended. In fact the protocol assumed that the water body in the Kula Volcanics was perched and that a basal water body existed. The stated protocol was to drill until the "perched water" in the Kula Volcanics was encountered, cement this area off, and continue drilling into the Honomanu Basalt. The drilling protocol in the Honomanu Basalt apparently called for cessation of drilling at 100 ft intervals for about one hour to allow water to accumulate, if it existed, before drilling was once again initiated. The protocol also called for establishing the height of the water table in the basal water body. The recommended protocol or procedure for obtaining water levels, however, was to measure the depth of water in the hole every morning prior to the initiation of drilling. The process of drilling generally removes water from an aquifer and time is required for the water level to recover. The lower the permeability of the host rock, the longer the time required for this recovery and for water to enter a large drill hole such as that of the monitor well. One hour is not sufficient time for this process to occur. The recommendation to allow water to accumulate overnight was made to allow for this time.

It is obvious from the video log presented on page 43 of the DSEIS that moisture was encountered in the Honomanu Basalt and that these rocks are not completely unsaturated as stated in the DSEIS. Water in the unsaturated zone will not enter an open drill hole owing to the fact that the water is under less than atmospheric pressure. If the Honomanu Basalts are truly unsaturated below the Kula Volcanics and above the presumed basal water body, there should be no evidence of visible moisture or water in the Honomanu Basalts in the video, but this is not the case. The Video records that the borehole is moist between the depths of 105-135 ft in the Kula Volcanics and for the depths 156-200, 207-210, 343-387 (water actually is dripping), and 520 ft in the Honomanu Basalts. The moist zone in the Kula Volcanics between 122-135 ft well depth is stated to be the source of the "perched" water body in the Kula Volcanics, but this same type of information concerning moist walls in the Honomanu Basalts is ignored as an indication of saturated rock.

The DSEIS states, on page 44, that the video log shows the presence of cavities and clinker in the Honomanu Basalt, which according to the DSEIS implies a high degree of permeability for the Honomanu Basalts, but, in fact, the log seems to show the opposite. The presumably high permeability zones such as clinker and voids are infrequent and account for only about 12 per cent or so of the Honomanu Basalt above sea level. This strongly suggests that the overall permeability of the Honomanu Basalt above sea level is low, and not high as stated in the DSEIS, a fact that would support the existence of a vertically extensive ground water body in the Honomanu Basalt.

The video log is the only data actually presented concerning the hydrologic setting of the monitor well, and as discussed immediately above, results from it do not actually support the conclusion that the Honomanu Basalts are unsaturated below the Kula Volcanics and above the presumed basal water body. In fairness, the log doesn't completely support either of the two concepts concerning ground water occurrence that were to be addressed.

The video information is not remotely the same thing as a log of morning water level in the well as it was being drilled. Perhaps the latter information is available and has been used to assist in the conclusions of the DSEIS, but no information is presented in this regard. The existence of the water table at about 4.6 ft above sea level is not entirely conclusive either. This water level corresponds to the final well depth of 65 ft below sea level. The water level in Mokuhau wells 15 C, 15, D, and 15 E remained several hundred ft above sea level for borehole depths ranging from about 80 to 120 ft below sea level after which they fell abruptly to about 25 ft above sea level (USGS WRI Report 00-4223). In order for reviewers of the DSEIS to be able to reach their own conclusions about the nature of ground water occurrence in the Haiku area, it is necessary that the information on daily water levels recorded in the well prior to the initiation of drilling each day be made available to them. It is also necessary that the method of drilling be indicated so that it is clear that water was free to enter the borehole. Without this information, the central issue remains unresolved.

Another problem I find with the DSEIS is that it identifies a new "aquifer unit", which it refers to as the Kuiaha Unit, in which all of the wells of the EMPLAN will be located and concludes that 10 mgd is available from this unit. Aquifer units are not recognized by the Commission on Water Resources Management (Commission) and given that production of ground water by the Maui County Department of Water Supply must conform to the administrative oversight of the Commission, creation and use of this "unit" in the DSEIS for the purposes of predicting ground water availability would not appear to be supportable. The DSEIS needs to discuss ground water availability within the existing aquifer framework of the Commission.

The DSEIS states that the "*volume of water in exploitable storage is a function of static head (elevation of the water table above sea level) and effective porosity*", but, in fact the amount of ground water that can be developed is constrained by the necessity to limit drawdown in a well to a value that precludes salt water intrusion into the well. Although the initial head is important in this regard, the effective porosity has no importance whatsoever. The DSEIS utilizes John Mink's Robust Analytical Model (RAM) to determine that 10 mgd is available. The RAM, however, has been shown by the USGS to over predict the availability of ground water, while at the same time leaving sites of ground water withdrawal subject to saltwater intrusion because it under predicts the drawdown at withdrawal sites (USGS WRI Report 00-4244). This is the current problem in the Iao aquifer.

Assuming that the water level in the EMPLAN wells is on the order of 7 ft, depth to the theoretical interface between fresh water and seawater is about 280 ft. There is no available information concerning the thickness of the upper transition zone in the EMPLAN area, but assuming that it's on the order of 150 ft, the thickness of the freshwater lens is about 130 ft. If the EMPLAN wells were to penetrate 100 ft below sea level, the available drawdown in the wells is less than 1 ft if saltwater intrusion is to be precluded. The use of the RAM in the DSEIS indicates drawdown in the proposed wells will be on the order of 1.2 to 1.8 ft. This amount of drawdown would not be acceptable unless the upper thickness of the transition zone is significantly less than 150 ft, and this is not too likely. Remembering that the RAM under predicts the drawdown at pumping locations, the actual drawdown at the proposed wells would be expected to be greater than that projected by the DSEIS. In order to more appropriately address ground water availability from the proposed wells, the DSEIS needs to discuss well yields in terms of well depth, estimated drawdown based on well hydraulics, and depth to the top of the transition zone, not on the basis of a prediction made from the RAM.

The DSEIS concludes that there is no connection between the Honomanu Basalts and streams in the EMPLAN area and the withdrawal of ground water from the proposed wells will not affect streamflow. Having made this conclusion, however, the DSEIS contradicts itself with the statement that "*streams are not sustained by discharge into the* *stream channels from the Honomanu aquifer except very near the coast below an elevation of about 3 ft where the Honomanu water table is exposed. The reach of this occurrence is less than a few hundred feet upstream from the coast*". Seemly, the DSEIS would need to address the effect of pumping on this even this reach of stream, assuming that its other conclusions are correct. The responsibility of protecting in-stream flow values does not end a few hundred feet from the ocean; rather it extends to the sea and beyond.

Finally, I find it somewhat strange that the DSEIS would quote a USGS draft report or that the authors of the DSEIS would even have a copy of it. The policy of the USGS is that draft reports are not available for public release and cannot be cited. I believe that this fact should be well known to at least one of the principles of the Company that produced the DSEIS. The USGS draft report by Mr. P. Eyre referenced in the DSEIS was not able to pass peer review and was never approved for release to the public as a result. Because the USGS will not stand behind this report, and because the authors of the DSEIS should never have received a copy of it in the first place, let alone referenced it, I believe that any reference to the Eyre draft report should be deleted from the DSEIS. The use of this report only weakens the DSEIS.

In conclusion, I believe that the information presented in the DSEIS falls considerably short of providing the information needed to resolve the issue with regard to ground water occurrence in the Haiku area. I appreciate the opportunity to have been able to comment on the subject report and I hope you find my comments useful.

Sincerely,

William Meyer

William Meyer

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September 4, 2002

Mr. William Meyer
6750 Hawaii Kai Drive #501
Honolulu, Hawaii 96825

Dear Mr. Meyer:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments of July 30, 2002 regarding the subject project. Our response is as follows:

The monitor well data and stream flow measurements made by the U.S. Geological Survey (USGS) and documented in the Draft Supplemental Environmental Impact Statement (DSEIS) prove beyond any doubt that the Honomanu Basalt is not saturated to the altitude of the stream channels except within a few hundred feet of the coast. If the Honomanu Basalt is not saturated above the basal water table level of five to ten feet above sea level, then it cannot act as a source of stream flow at altitudes greater than five to ten feet.

The other "research results" include observations in Maliko and other gulches where the Honomanu Basalt is exposed. These observations verify that the Honomanu Basalt is not saturated above the basal water table. Gingerich of the USGS (reference cited in the DSEIS) states that "the rocks at the contact between the Kula Volcanics and the underlying Honomanu Basalt above the fresh water table lens appear to be unsaturated ... ". See page 49, DSEIS.

The concept that the Honomanu Basalt is saturated above the basal lens water table is not supported by any credible evidence. The Nahiku hydrogeological environment, if indeed it exists as postulated in a USGS report that was not open to non-USGS peer review, does not exist in the Haiku region.

All credible evidence, which includes field observations, analysis of well data (including the monitor well) and stream flow measurements , support the first concept, that is, that a basal water table representing the surface of a Ghyben-Herzberg lens occurs in the Honomanu Basalt to an elevation above sea less of ten feet or less, and that the Honomanu Basalt between the basal water table and the Kula Volcanics is unsaturated.

The Court Order of September 6, 2000, authorized the construction of a single monitor well as recommended in a USGS letter to Tim Johns, then Deputy Director State Department of Land and Natural Resources (DLNR) for the State Commission on Water Resources Management (CWRM), dated September 9, 1998. A second well was authorized if data obtained from the first well was not adequate. The USGS letter is included as Appendix 16.3 of the DSEIS.

One of the statements in the letter is, "It is not necessary to monitor streamflow and potential pumpage to make this determination since results from such an effort can be extremely misleading". The `determination' refers to the effect of pumping on stream flow.

In addition, reference is made to the USGS East Maui Groundwater Study that was currently underway. The portion of the study by Gingerich (reference in the DSEIS) relating to the Haiku region does not support the existence of high level saturation of the Honomanu Basalt.

The monitor well was drilled on Hogback Road between Ohia and Pauwela Gulches at about Site 5 of the USGS recommended sites given in the Court Order. The well encountered water in the Kula Volcanics but was unsaturated below until the basal water table was encountered. Daily observations in addition to the video log proved that no water table in the Honomanu Basalt exists above the local water table at less than ten feet above sea level.

The zone of saturation commenced in the Honomanu Basalt at a depth 670 feet below the ground surface (elevation about 675 feet). Morning measurements on November 7 and 8, 2001 when the boring was 360 then 380 feet deep did not show any standing water. The driller commented that circulation was lost, which implies that drilling fluid passed into the unsaturated formation.

It is clearly evident from the monitor well data and data included in the USGS Haiku study and all other data collected during the DSEIS investigations that the Honomanu Basalt between the Kula Volcanics and the basal water table is not saturated and therefore does not constitute an aquifer. Unsaturated Honomanu Basalt cannot serve as a source of stream flow. The documentation of this conclusion is included and discussed in the DSEIS.

The decision to test for perched water in the Kula Volcanics was based on the model of groundwater occurrence supported by studies of and data collected in the Haiku region, including USGS investigations.

With reference to measuring water levels either at every 100 feet increment of drilling and/or every morning, once drilling proceeded below the Kula Volcanics, which was cemented to prevent downward leakage, there was no standing water to measure. When the lack of saturation was validated, drilling continued through the unsaturated zone into the basal lens. The video log, as explained in the DSEIS, conclusively demonstrates that saturation was not struck until the basal water table was reached. The moisture on the walls of the boring noted in the video log description is simply fugitive infiltration, not saturation. Moisture conditions in the unsaturated zone are noted in virtually all Hawaiian wells.

A single lithologic log is not representative of regional conditions. To conclude from the monitor well log that a vertically extensive groundwater body exists in the Honomanu Basalt is an unreasonable extrapolation.

Drilling was conducted with foam and water as the medium for lifting cuttings from the boring. Foam typically does not restrain water from entering the boring where the formation is saturated. Water did not accumulate in the boring as it penetrated through the Honomanu Basalt above the basal water table. The hydrogeological environment of the Mokuhau wells differs significantly from that at the monitor well, and the drilling protocol probably differed also. A direct comparison between Mokuhau and the monitor well is not tenable.

The Aquifer Unit named in the DSEIS is consistent with the terminology of aquifer identification endorsed by CWRM. The hierarchy, ranging from the largest to the smallest division, is: Aquifer Sector .. Aquifer System .. Aquifer Type .. Aquifer Unit. The hydrologic budget for the Kuiaha Aquifer Unit restricts the sustainable yield of the portion of the Haiku Aquifer System in which the wells are located.

The projected yield of 10 mgd is conservative, especially when compared with the potential yield that can be derived from the USGS study of the Haiku region. The statement about exploitable storage being a function of head and porosity implicitly includes the danger of salt water intrusion in deep wells and by excessive pumping. The USGS statement about the Iao aquifer is not final but a matter of contention. RAM (Robust Analytical Model) has been employed successfully to approximate sustainable yield in all the aquifers of Hawaii. The argument that it fails is not supported by experience with aquifer yields.

The effects of pumping from the Honomanu Basalt over the short distances of streams near the coast below a stream invert elevation of about 3 feet above sea level is likely to be indeterminate as well as negligible. Much of this stretch of the streams is affected by the tidal bore, leaving only a short distance in unaffected basal water.

Mr. Eyre is a hydrogeologist and engineer of impeccable credentials, and his work in the Haiku region of East Maui meets the highest standards. His observations about the lack of perennial flow in Maliko and other Haiku streams is validated in the main USGS report (Gingerich, ref, cited) and by USGS stream measurements. Results of the Eyre investigations are in the public domain and are not subject to censorship.

Sincerely,

David R. Craddick, Director
M&Y/DRC
copy: Mink & Yuen, Inc.

Tropical Orchid Farm, Inc.
Huelo, Maui

8-4-2002

David Craddick
Department of Water Supply
County of Maui
P.O. Box 1109
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Jeffrey Parker
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Haiku, HI
97608

Dear Mr. Craddick,
These are my comments on the EM Plan Draft SEIS. Thanks for including us in the "process".

Unfortunately, the new information in the SEIS draft does not allay my fears about the project. And my previous concerns in the SEISPN have not been adequately addressed, either in the Draft or in letters I received.

From the USGS report 'Ground Water In Hawaii' by Gingerich and Oki (1999): "In the Honolulu area of Oahu, some wells that originally produced fresh ground water were later abandoned because of increased salinity due to saltwater intrusion…Many wells in Hawaii that are pumped at high rates or drilled too deeply are affected by this process, resulting in increased sodium and chloride concentrations in pumped water. Ground water withdrawal ultimately reduces the amount of discharge to springs, streams, or the ocean by the amount that is withdrawn. Reduction of springflow and streamflow is a concern for several reasons, including loss of habitat for native aquatic species, reduced water supply for agricultural diversions, aesthetics, and recreational use. Reduced flow to the ocean may affect marine habitat and aquaculture practices in coastal fishponds. Groundwater withdrawal also lowers water levels around the pumped well. Nearby wetlands and ponds may shrink or dry up causing loss of habitat for aquatic species. Discharge from nearby flowing wells may decrease or stop if water levels are lowered sufficiently."

In contrast to the USGS warnings above, what we get with the new Draft SEIS is simply "No impacts". No impact to stream and spring flows, no impact to marine resources, no impacts to other wells, etc. The idea that this precious resource can be extracted without any impacts to anyone or anything is bizarre. Real life doesn't work that way – there are always tradeoffs.

For 9 years now we've been told that "the EM Plan cannot affect stream or spring flows" and the current document theoretically reaches the same conclusion. And then in Chapter 9, the document contradicts itself by saying that stream flows will indeed be diminished! "…streams are not sustained by discharge into the stream channels from the Honomanu aquifer <u>except</u> very near the coast below an elevation of about 3 ft. where the Honomanu water table is exposed. The reach of this occurrence is less than a few hundred feet upstream from the coast." The interface between the coast and the stream is known to be an important biological zone. The SEIS admits, "True perennial flows are restricted to a narrow zone near the coast where the basal water table in the Honomanu formation is exposed. In these estuaries, a few species of opae and oopu may be found."

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From Conservation of Hawaiian Freshwater Fishes (Devick, Fitzsimmos, Nishimoto, 1992): "With only five species comprising the native fish fauna, the loss of a single one would result in a dramatic reduction of diversity in Hawaiian fresh waters." "Such populations become narrowly adapted or specialized and eventually may lack the variability that permits adaptive response to above-normal changes in the environment." Under the heading "Conservation Efforts" this report states "Another point of agreement is that the greatest dangers to these animals [Hawaii's freshwater fish] are manmade." The section on Conservation Efforts ends with "..it is widely held that the "lesson of Oahu" need not and should not be repeated on other islands." Under the Conclusions section, the report states "The urgency for affecting a comprehensive program of conservation is underscored by the decline of suitable streams on Oahu and by the inevitable encroachment into aquatic habitats by agriculture and commercial development on all islands."

So, the SEIS appears to be saying that yes, a 200 ft. stretch of streams near the ocean may be dewatered or diminished by the project and that yes, there are important biological resources in those stretches. Also, it is important to note that these areas (i.e. the lower reaches of the streams near the ocean) are located in the Conservation District. This presents a major problem for DWS as they attempt to implement the EM Plan. Will the DLNR support dewatering or diminishing streams in the Conservation District, which contain important biological resources?

In regard to marine resources, I was interested in what the report by Marine Research Consultants actually says. A major problem with the SEIS is that it does not have important research attached to the actual Draft. The EIS rules require that copies of "important research" studies be attached to an EIS, so that any member of the public may easily review. (EIS RULES Section 11-200-19). We know that the issue of the possible affect of diverting flow away from ocean resources is an important one because Mink and Yuen refer to it on page 1 of the SEIS as one of 7 issues to be studied.

I went online using Google search engine to see if I could find the report and no, the report is not available anywhere online that I could find. This is somewhat curious because I did find several other studies authored by Steven Dollar, principal of Marine Research Consultants. It seems that all or most of Mr. Dollars work consists of assessments for developers. All of Mr. Dollars conclusions that I saw are the same, that there will be "no impact" caused by whatever project is being proposed. Some of Mr. Dollars clients have been very questionable characters, such as Charles Chidiac, the would-be developer of the now-defunct Hawaiian Riviera Resort in Kohala on the Big Island. In an editorial entitled "Make-Believe Financing for a Fantasy Resort" (Environment Hawaii, July 1991), the Editor refers to Steven Dollar of Marine Research Consultants as a member of "Chidiacs pep squad." The editorial begins with "From an environmental and cultural viewpoint, the Hawaiian Riviera Resort is a catastrophe waiting to happen."

In another high profile-case, the contested-case hearing for apportionment of Waiahole Ditch Water, Dollar sought to rebut witnesses testifying that increased flow of Waiahole Stream into Kaneohe Bay would increase productivity of the bay. In his prepared rebuttal, Dollar claimed that the increase in flow of Kaneohe Stream is insignificant in changing salinity – and thus estuarine – conditions of Kaneohe Bay. Dollar also emphasized that any increase in freshwater flow could actually HARM the corals in Kaneohe Bay. Water Commissioner Lawrence Miike, who served also as director of the State Department of Health, asked "Am I also to believe you're saying that Kaneohe Bay would be better off without any streams entering into it?" Dollar backed off the point, saying he meant only that he was speaking only to the "reef parts of the bay."

Based on Dollars work that I've been able to review, there are serious questions concerning his overall credibility.

I finally did get a copy of the 1998 Assessment of Impacts to Water Quality and Marine Community Structure from the Proposed East Maui Development by Marine Research Consultants

(Dollar). Mr. Dollar concludes that there appears to be no potential for negative impacts to marine ecosystems by the EMPLAN.

However, it is important to point out that **the study only looked at the effects of Phase 1 of the project**. The report relies heavily on the notion that the fast-mixing of freshwater with huge quantities of saltwater diminishes the importance of fresh groundwater on marine resources. What everyone seems to be missing is that 90% of the surface stream flow **has already been diverted** away from the project area. The fresh ground water seeping out all along the Northeast coast of Maui may very well be fulfilling a vital role in sustaining remaining biological communities, since streamflow is no longer able to reach the ocean and sustain those communities.

The Assessment also admits that the reduction in groundwater reaching the ocean (caused by the EMPLAN) could be as high as 23%. This reduction does not seem insignificant to me.

The Assessment further misses the point by studying only corals and macroalgae such as limu. What most people (at least most fishermen) are concerned with are fish. Haiku fishermen and divers I independently interviewed insist that certain types of fish congregate where fresh water is entering the ocean, and furthermore that these areas are where baby fish are being spawned. They say that one can actually see the freshwater coming into the saltwater. These fish were mentioned to me as congregating around the freshwater entry points:

Moi
Mullet
Wowo
Aholehole

There also is a rare shellfish, the Kupekala that lives around the freshwater entry points on the North Shore. The shells of the Kupekala are used to make special bracelets for hula ceremonies. They are quite hard to get and these bracelets sell for $100 or more.

The Marine Research Consultants assessment is clearly inadequate for an EIS because it studies only impacts from Phase 1 of the project, and the purpose of an EIS, as set forth in the EIS Rules, is to study a proposed project in its entirety.

Other issues:

__Cost of the project__

A tremendous deficiency of the Draft is that a person cannot ascertain the total cost of the project anywhere in the document. The old original costs in the first EIS are obsolete now and the total costs should be available to the public. On page 7 "The phased development of the project is expected to be completed in about 15 years. Total cost of the EMPLAN is estimated at $48.5 million for the year 2004". What does that mean? Because apparently the project will go on until approx. 2019. Table 1 on page 13 gives the total capital cost of phases 2-6 including GAC facilities as 35,705,000. Where is phase 1 shown? How can the total be derived? And who pays? It's obvious that it is the ratepayers who will pay. The SEIS should reveal that the project is to be paid for by ratepayers, and analyze the economic impacts of that.

__Operational Costs are too high__

In Table 2-A, the annual costs for 90% operational availability, including GAC and amortization are shown at $6,870,000. The amortization alone is a whopping $3,112,000! Who will pay? It is the ratepayers who will again carry this burden. The SEIS should make it perfectly clear to the public, that they the public, will pay for this project.

Wellhead Protection Area

In my comments for the SEISPN, I said that possible Wellhead Protection Areas might limit how a person with land anywhere within miles of a well field may use his or her land. I received no answers to this concern nor are there any in the Draft. Some of the Potentially Contaminating Activities (PCA) identified by the DOH are:

Boat repairing/refinishing
Furniture repairing and manufacturing
Home manufacturing
Photo processing
Research laboratories
Farm chemical/distribution and application
Farm machinery repair
Residential parcels larger than 1 acre

If these economic activities are later threatened because of Wellhead Protection Areas, it would be an extremely negative impact of the project, and therefore it is imperative that this possibility and its consequences must be analyzed in the EIS. The State of Massachusetts already severely limits development and septic systems in Wellhead Protection Areas. The citizens of Maui have a right to know that their land use options may be severely limited at some time in the future, should the EMPLAN be implemented.

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Pre-assessment Consultation with Maui Electric Company. Discussed the facilities that would be used to supply power to proposed pumping stations. The next sentence, "One of the principal concerns was aesthetics." is not very comforting given the recent move by Maui Electric to begin replacing all of their bigger poles with huge, gray, industrial-looking towers. How will the power be brought in? Underground? A complete EIS will show the total plan, including Maui Electric's portion.

10.10 Scenic and Aesthetic Values.

Not taken into consideration in the SEIS is the impact of noise, both during the construction phase and afterwards. The noise from pumping stations may be considerable. I would also point out that currently, our area has been severely impacted by the two bridge replacement projects that are underway in our area. You would have a hard time finding a resident who would say that the bridge replacements have not impacted their lives. The impacts from the bridge replacements include:

excessive noise
long waits at stops on Hana Highway
backed up traffic caused by the numerous slow-moving trucks and equipment

The bridge projects are in effect for a period of 2 years. I don't think many Haiku residents would willingly sign-on for another 15 years of heavy construction (of the pipeline) and well drilling. Well-drilling is an extremely noisy activity. It is ironic that Haiku residents are not only asked to give up our water resources in order to fuel inappropriate development in Wailea/Makena, we are also asked to endure years of inconvenience and noise.

10.5 Flora.

"In the gulches, flora consists mainly of eucalyptus, silk oak, guava, java plum, ohia and koa." Eucalyptus, silk oak, guava and java plum are no problem. However, remnant ohia and koa (the dominant species of the former forests of the Haiku area) are important cultural icons and must be protected from any damage or reduction caused by the construction phase of the EM Plan. For example, no herbicides may be used within 50 ft. of an Acacia koa. EIS must contain mitigation measures to protect any remnant ohia, koa, or other native species that may be encountered.

12.1.4

In section 12.1.4, Alternatives to the proposed action, possible sources of water are Waihee-Spreckles Ditch System and North Waihee Ditch. One constraint given is that Wailuku Agribusiness depends on this water for irrigation. This is old information and should be updated.. Wailuku Agribusiness is out of business now and all of its assets are for sale, including the water system. This could be a viable source for DWS.

Waiahole Legal Issues

Answers given in letters and the SEIS are insufficient. The opinion that "We [DWS] believe implementing the General Plan and the Community Plan is in furtherance of the self-sufficiency of the State" is just that – an opinion. Did DWS consult with any attorneys to come up with that opinion? Which attorneys? The SEIS should have a thorough legal analysis of the landmark Waiahole decision. And one thing remains clear, that the Supreme Court regards stream and underground water as the same water.

Streams

I wanted to add into the record, that no matter how much DWS and Mink and Yuen attempt to minimize the streams in the project area, there is running water between the EMI diversions. ("Gaining" stream sections)

Pauwela Gulch	Station	Kuiaha 14	.26 mgd
Pauwela Gulch		Kuiaha 15	.26 mgd
Ohia Gulch		Kuiaha 24	.1.34 mgd
Kapuaahoohui Gulch		Kuiaha 25	1.29 mgd

Project Induces Growth

The project is, of and by itself, growth-inducing. That is, growth will occur that otherwise would not occur if the project was not built. It is not sufficient to say that the DWS is just following the General Plan or the Community Plans. The project itself induces growth, for example the DWS will now have to go into the business of pushing water meter sales just to help pay for the EM project. Because the project itself induces growth, the impacts of the resulting growth must be studied in a valid EIS.

Pipeline Capacity:

I still believe that the failure of the SEIS to reveal the total carrying capacity of the 36" pipeline amounts to "segmenting" of the project. It's obvious that the pipeline can carry much more water than the 9.3 mgd average cited. My belief is that DWS will seek to develop more wells later or perhaps devise other ways to fill the pipeline to capacity. Nothing in the Draft SEIS changes my belief. Segmenting is a violation of EIS Rules.

11.2 Economy

"Implementation of the EMPLAN itself would have a positive impact on the local economy through its boost to the construction industry and state and county revenues." This is pure speculation, neither DWS nor Mink and Yuen are qualified to analyze effects of development. As I've mentioned, often the true costs of development are not factored-in to these rosy projections. HAR343-2 specifically requires that an EIS disclose "...the effects of a proposed action on the economic and social welfare of the community and State, **effects of the economic activities arising out of the proposed action,** measures proposed to minimize adverse effects..." What if fishermen see their livelihoods along the Haiku coast diminished, as a result of implementation of EMPLAN? What if farmers cannot protect their crops by spraying, because now they find themselves in a Wellhead Protection Area? And what if parcels larger than 1 acre are not allowed to be developed because they are now in a Wellhead Protection Area? And finally, what if tourism itself declines because tourists just can't handle the traffic jams in Kihei/Makena, or are unwilling to spend their vacations surrounded by raging backhoes, dump trucks and jackhammers?

Thanks and aloha,

Jeffrey Parker
President, T.O.F., Inc.

CC:
OEQC
MINK + YUEN

DEPARTMENT OF WATER SUPPLY
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WAILUKU, MAUI, HAWAII 96793-6109
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September 4, 2002

Mr. Jeffrey Parker
Tropical Orchid Farm, Inc.
P. O. Box 170
Haiku HI 96708

Dear Mr. Parker:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments of August 4, 2002 regarding the subject project. Our response is as follows:

The USGS admonition about the effects of pumping groundwater in the Honolulu area of Oahu neglects to mention that without groundwater development the community plans could not have been implemented.

The USGS warning has little relevance to the Haiku region because the hydrogeological environment in the Honolulu Aquifer Systems differs vastly from that of the Haiku Aquifer System.

The effect of pumping three miles inland on the short stretch of stream below an elevation of about three feet will be very small and not measurable. In this reach tidal transgression is a more important element than stream flow.

The DSEIS notes that the proposed re-located wells will conform to DOH regulations and decisions.

Stream flow gains are at elevations far above the Honomanu basal water table, the aquifer proposed for pumping. The springs which provide the flow originate from perched water, and this water will not be able to enter a well boring because the annulus will be sealed.

Marine Resources have been studied from Pauwela Point to Baldwin Park and indicates no potential for negative impacts to marine ecosystems.

Your apprehension regarding excessive noise from pumping stations is unfounded. Many deep well submersible pumps located in residential areas throughout the State do not give rise to noise problems.

It is true that the capacity of the proposed pipe line can handle more than the expected average daily flow, but factors such as maximum day, peak hour and fire flows must be incorporated in the design. The true maximum flow may reach as high as 25 mgd.

The estimated cost of the project in 1992 was $48.5 million projected to the year 2004. The estimate includes cost of inflation. Thus the estimate holds for the project if the contract is let by 2004. Table 1 and Table 1-A, on page 13, will be revised to include capital cost for Phase 1.

Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

ISAAC DAVIS HALL
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WAILUKU, MAUI, HAWAII 96793
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August 7, 2002

Via Hand Delivery

Mr. David Craddick, Director
Department of Water Supply and
the Board of Water Supply
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Re: Comments on the Draft Supplemental Environmental Impact Statement ("DSEIS") for the EM Plan

Dear David Craddick and the Board of Water Supply,

These comments are submitted on behalf of The Coalition to Protect East Maui Water and Hui Alanui o Makena, two of the Plaintiffs in The Coalition to Protect East Maui Water Resources et. al. v. The Board of Water Supply et. al. Civ. No. 93-0734(3) now pending in the Second Circuit Courts, as well as the Sierra Club, Maui Group, and Mark Sheehan, on the Draft Supplemental Environmental Impact Statement ("DSEIS") for the East Maui Water Development Plan ("EM Plan").

I. INTRODUCTION

The DSEIS prepared by Mink & Yuen falls well below the minimum procedural and substantive thresholds for an adequate document, on multiple grounds, as a matter of law and fact. The DSEIS should be withdrawn, prepared in accordance with the applicable laws, regulations and Court Orders, rewritten and resubmitted.

The EM Plan has not been treated with the seriousness which its size and scope dictate. The EM Plan is as large as the Central Maui Source Development Plan and Central Maui Transmission Project which led to the development of Maalaea, Kihei, Wailea and Makena, with a similarly sized 36 inch transmission line.

The EM Plan would also constitute the second de-watering of East Maui. The first de-watering occurred when A&B/EMI/HC&S constructed its ditch system and diverted the streams and surface water resources, transferring them to Central Maui. The second de-watering would occur through the pumping of the groundwater resources, indirectly affecting streams, and transferring these water resources again to Central Maui and beyond.

Plaintiffs' comments are addressed to the person and entity identified as the approving agency/accepting authority for the EM Plan in *The Environmental Notice* dated May 8, 2001, in accordance with Hawaii's "Environmental Impact Statement Rules," HAR §11-200-22(b). This submittal is without prejudice to our comment in §III.B. below that the approving agency/accepting authority has not been properly identified.

II. LEGAL REQUIREMENTS FOR THIS SEIS

A. This SEIS Must Be Prepared in Compliance With Court Orders

1. The FEIS is Inadequate/An SEIS is Required

The FEIS for the EM Plan was declared inadequate, *in toto*, through a Court Order entered in the Second Circuit Courts on August 23, 1994. This Order remands the case to the Board of Water Supply to prepare an SEIS for the EM Plan, in compliance with Chapter 343:

> ...to address the serious concerns raised by the Plaintiffs regarding water contamination, impact upon stream flow and other issues raised by Plaintiffs.

A true copy of this Order is attached hereto as Exhibit "1".

The Court later confirmed that the SEIS was required to address "all phases of the Plan as a whole." See Exhibit "2". The Plaintiffs have done nothing to delay the Board of Water Supply from preparing the SEIS between 1994 and the present, a period of eight years.

2. A Test Well is Ordered, With Protocol to be Followed

Further hearings were held in the above-captioned lawsuit with respect to the type and extent of testing which would be done within the SEIS to determine whether groundwater pumping would have an impact on stream flow. Eventually the Order was entered which is attached as Exhibit "3".

Through this "Order" a "monitoring well" is to be drilled as part of the SEIS which is **not** a production size well and which does **not** have production size pumps. The well drilling, conducted under the supervision of the USGS, is to determine whether or not the rock encountered during drilling is saturated. If the rock encountered is saturated, particularly in the Honomanu series, this is evidence that there will be an impact on stream flow through pumping of EM Plan wells. If the Board of Water Supply is not satisfied with the results of this testing it may drill a production size well and install production size pumps and conduct a different kind of test under different conditions.

On information and belief, the Board of Water Supply is already in violation of this Order because it has decided to install a production size well when the first well is not to be a production size well.

The Board of Water Supply and Plaintiffs also reached an agreement on the protocol which would be followed in drilling the well so that evidence could be developed to determine whether the geological formations were saturated with water or not at various levels as the well was drilled. The pertinent among these protocol are as follows:

a. **"Prior to start-up every morning, the driller will try to best determine if formation water has accumulated in the well. If so, measurements will be taken."**

b. The well driller will discern whether or not water has been encountered in the test hole **at the beginning of each day** and, if so, will record the amount of water which has been encountered, at the beginning of each day.

c. A video log of the completed pilot holes will be taken.

d. **Daily drilling logs** will be submitted by the contractor.

A true copy of the letter from the Board of Water Supply agreeing to these protocol is attached hereto as Exhibit "4". A true copy of a letter from Plaintiffs confirming that these protocol have been agreed to is attached hereto as Exhibit "5".

B. Subchapter 10 Of The EIS Rules

Subchapter 10 of the EIS Rules, HAR §§11-200-26 *et. seq.*, establishes the legal requirements for "Supplemental Statements", such as this one. The "content" and "procedures" requirements for an SEIS are the same as for an EIS. See HAR §§11-200-28 and 29. Unchanged material from the original EIS may be incorporated by reference; however all changes and additional information must be documented as required in HAR §11-200-16. See HAR §11-200-28.

C. The SEIS Must Satisfy The Legal Tests For Acceptance

An EIS is inadequate and cannot be accepted unless it satisfies the tests for "acceptability" set out in HAR §11-200-23. The EIS, in its completed form, must represent an informational instrument which fulfills the definition of an EIS and adequately discloses and describes all identifiable environmental impacts and satisfactorily responds to review comments. See HAR §11-200-23(a).

An EIS may only be accepted by the accepting authority or approving agency if all of the following criteria are satisfied, according to HAR §11-200-23:

(1) The procedures for assessment, consultation process, review, and the preparation and submission of the statement, have all been completed satisfactorily as specified in this chapter;

(2) The content requirements described in this chapter have been satisfied; and

(3) Comments submitted during the review process have received responses satisfactory to the accepting authority, or approving agency, and have been incorporated in the statement.

III. PROCEDURAL ERRORS

A. Preparer of the DSEIS is Biased in Favor of Exploitation of Water Resources Without Consideration of Trust Responsibilities

Plaintiffs, and others, objected to the hiring of Mink & Yuen to prepare the SEIS because they had well-established positions before they began their work and were incapable of preparing a non-biased SEIS. The SEISPN and DSEIS both bear this out.

B. The Approving Agency/Accepting Authority Has Been Misidentified

This is, at base, an "agency" action. See HRS §343-2. It is to be funded with both state and county funds. State lands and county lands will also be used. See HRS §343 -5(1). The "authority to accept a final statement' in agency actions "shall rest with" (1) "[t]he Governor, or the governor's authorized representative, whenever an action proposes the use of state lands or the use of state funds" or (2) "[t]he Mayor, or the mayor's authorized representative, whenever an action proposes the use of county lands or the use of county funds". See HRS §343-5(b). HAR §11-200-4, entitled "Identification of Accepting Authority," in subsection (a), repeats essentially the same requirements.

In this instance, the EISPN published in *The Environmental Notice* dated May 8, 2001 and the notice of the availability of the DSEIS published in *The Environmental Notice* dated June 23, 2002 both misidentify the accepting authorities.

These comments are submitted to the Governor and the Mayor because one or both of these two persons are the approving agencies/accepting authorities pursuant to Chapter 343 and the EIS Rules.

These two persons formally delegated responsibility to the Board of Water Supply to accept the Final EIS which was declared inadequate. No evidence has been presented that they have delegated any responsibility to accept this DSEIS to the Board of Water Supply. Acceptance, based upon this record, by the Board of Water Supply will be illegal, null and void.

C. The Required Consultation Never Took Place

The purpose of publishing an EIS Preparation Notice is to provide agencies, citizens groups and concerned individuals an opportunity to submit written comments regarding the environmental effects of the proposed action and to establish the scope of the SEIS. See HAR §11-200-15. It is the duty of the preparer to

> ... endeavor to develop a fully acceptable EIS prior to the time the EIS is filed with the office, through a full and complete consultation process, and shall not rely solely upon the review process to expose environmental concerns.

Plaintiffs, and others, submitted timely comments on the Preparation Notice. Through a letter dated June 7, 2001, which has been appended to the DSEIS. Plaintiffs, among other matters, requested that a "public scoping meeting" be scheduled on this SEIS. This would provide and assure an "early open forum for discussion of adverse effects and available alternatives, and that the decision-makers will be enlightened to any environmental consequences of the proposed action." See HAR §11-200-14.

Plaintiffs also requested to be consulted parties, pursuant to HAR §11-200-15. The preparer of the DSEIS never consulted with any of the Plaintiffs during the preparation of the DSEIS or at any time prior to its publication.

Mink & Yuen admit that they did not consult with any interested citizens' groups or concerned individuals in the preparation of the DSEIS in Chapter 13, pp. 72-73 of the DSEIS. Many of those who requested to be consulted parties (and were ignored) are listed in Chapter 14 on p. 75 of the DSEIS.

D. Scoping Comments Were Ignored

Plaintiffs, and others, submitted comments to establish the legitimate scope of the DSEIS. HAR §11-200-16 states, in pertinent part, as follows:

> In order that the public can be fully informed and that the agency can make a sound decision based upon the full range of responsible opinion on environmental effects, a statement shall include responsible opposing views, if any, on significant environmental issues raised by the proposal.

The preparers of the DSEIS have totally ignored "responsible opposing views." Environmental concerns have therefore not been "exposed" and evaluated as required in HAR §11-200-15.

E. Required Documents Have Not Been Appended to the DSEIS

An EIS is intended to be a disclosure document to aid members of the public and decision-makers. It must be "easily understood" and "self-contained." See HAR §11-200-19. This section states, in pertinent part, that:

> Care shall be taken to concentrate on important issues and to ensure that the statement remains an essentially self-contained document, capable of being understood by the reader without the need for undue cross-reference.

Data and studies prepared for the DSEIS must be appended to the DSEIS. This DSEIS is inadequate because studies relevant to important issues have only been referenced and have not been attached to the document. For example, a 1999 USGS study by S.B. Gingerich entitled "Groundwater and Surface Water in the Haiku Area, East Maui, Hawaii" is heavily relied upon for conclusions reached in the EIS on central issues; however, it is not attached as an appendix to the EIS and it is not even referred to in Chapter 15 entitled "References". Also, the study which allegedly proves that the reduction of groundwater discharged due to the pumping of EM Plan wells will have no impact on marine coastal waters, another important issue and reason for preparing the SEIS, is not appended to the DSEIS and is only referred to in Chapter 15 entitled "References". Interested members of the public and decision makers have absolutely no ability to review these Reports in the fashion intended by our EIS law.

IV. THE STYLE AND RIGOR REQUIREMENTS FOR AN EIS HAVE NOT BEEN MET

The parameters for an EIS are set out in the definition of an EIS in HRS §343-2 and in HAR §§11-200-14, entitled "General provisions," -16, entitled "Content requirements" and -19, entitled "Environmental impact statement style." These provisions are quoted elsewhere in this comment letter. Taken together, they require the hiring of consultants to conduct necessary studies of the feasible impacts resulting from a proposed action and a rigorous analysis of the significance of these impacts and alternatives that might avoid them. None of the foregoing have taken place in this DSEIS.

V. THE CONTENT REQUIREMENTS FOR A DSEIS HAVE NOT BEEN SATISFIED

A. The Requirement to Provide Information and Conduct Research

HEPA requires a rigorous study of impacts and evaluation of alternatives. HAR §§11-200-14 and 17(f). HAR §11-200-14 states, in pertinent part:

> The EIS process shall involve at a minimum: **identifying environmental concerns, obtaining relevant data, conducting necessary studies,** receiving public and agency input, evaluating alternatives, and proposing measures for avoiding, rectifying and reducing adverse impacts. **An EIS is meaningless without the conscientious application of the EIS process as a whole, and shall not be merely a self-serving recitation of benefits and a rationalization of the proposed action.** (Emphasis added.)

Mink & Yuen apparently did not retain any consultants to conduct any original studies for this DSEIS. They have simply relied upon studies previously prepared for other, mostly more limited, purposes, and assembled data from other sources used in earlier studies. With the exception of the test/monitoring well, required by court order, which was not conducted properly, as will be shown below, Mink & Yuen did not conduct necessary, new studies to address the issues the Court found had been dealt with inadequately in the previous FEIS.

B. *Information on the Environmental Setting Has Not Been Collected and Presented*

It is already admitted that the EM Plan may cause significant adverse impacts to the environment. That is why an EIS is being prepared in the first place. See HRS §343-5.

A DEIS **shall** include, according to HAR §11-200-17(g):

> **a description of** the environmental setting, including a description of **the environment in the vicinity of the action, as it exists before the action, from both a local and regional perspective.** (Emphasis added.)

Plaintiffs requested that this be done in their comments on the EISPN but these comments were ignored. Once Mink & Yuen summarily divined, without evidentiary support, that groundwater pumping would have no impact on stream flow, they simply refused to provide any meaningful information about the existing environmental setting, putting the viability of the SEIS of the Board of Water Supply at risk. See DSEIS, p. 2.

1. The Action is Never Properly Defined

There is no map which identifies the location of each of the EM Plan wells in the DSEIS. The document does not indicate where the wells would be originally located or where they would be relocated to avoid ground water contamination. No parcels are identified by Tax Map Key number for the wells. See §§ 3.1 and 4.2 on pp. 6 and 9-11 of DSEIS.

In result, the Board of Water Supply has not identified whether it will use properties for the wells which are government owned (federal, state or county) or whether it will use privately owned lands which may will need to be condemned. Without identifying particular parcels, it is impossible to disclose the actual costs of this project, particularly if private lands must be purchased for the wells. The cost to purchase these lands has not been disclosed.

More importantly, the correlative water rights of the county will derive from the ownership of the parcel of land upon which it drills the well. See In the Matter of the Water Use Permit Application, 94 Haw. 97, 1 P. 3d 409 (2000) and City Mill Co. v. Honolulu Sewer and Water Comm., 30 Haw. 912 (1929). The size of the parcel will influence the breadth of the county's correlative water rights. The location of the parcel will also determine the breadth of the county's correlative water rights because only after this location is disclosed will it be known who are surrounding landowners, whether these surrounding landowners have competing needs for correlative water rights and/or whether there already are existing wells on surrounding lands which could be affected by proposed county wells. This information has not been provided, and none of the potential adverse impacts have been addressed. These problems alone render the DSEIS inadequate.

Mink & Yuen acknowledge that no well can be drilled within 1,000 feet of an existing cesspool. Without knowing the precise location of the well sites, it is impossible to evaluate whether there are cesspools within 1,000 feet. Mink & Yuen have improperly swept this issue under the rug by declaring that no well will be drilled within 1,000 feet of an existing cesspool. See p. 39 of the DSEIS. Given the many cesspools in the Haiku area, this issue should have been addressed in detail.

Finally, the state and county lands to be used for this project have not been identified with particularity or by Tax Map Key number. The extensive use of state and county lands may determine whether it would be an abuse of discretion for the Governor or the Mayor to delegate away their responsibilities for accepting this SEIS. In addition, the use of state and county lands will require permits to be obtained. Necessary land use approvals have not been disclosed in this document as required. Likewise, the land use approvals necessary for the use of state and county lands have not been disclosed.

2. The Cost of the Action is Never Properly Disclosed

The cost of the action is never properly disclosed in the DSEIS and the sources of funding for the project are not detailed. See DSEIS, p. 4. On information and belief, state and county funds will be used for this project. These funding sources must be fully disclosed. On information and belief, federal funding has also been used for this project in the form of the USGS studies prepared specifically for this subject matter. This means that a joint federal/state SEIS should have been prepared in this case.

3. The Action Area is Never Defined Properly

The Action Area is never adequately described. To do so it would be necessary to determine the amount of water which the 36 inch transmission line has the capacity to carry. Once this number is calculated, it is then necessary to determine the number of wells that it would take to supply this capacity. It also would be necessary to locate the total number of wells in a horizontal line in an eastward direction, beginning at Maliko Gulch, with adequate distance between the wells so that over-pumping will not occur. The area encompassed by the location of these wells would constitute the Action Area for the EM Plan. This Action Area would be a great deal larger than the well field that has been discussed to date and would likely require environmental disclosures for an area which could extend as far as and perhaps beyond Kakipi Gulch and well into the Huelo region.

4. The Streams in the Action Area

There has been no adequate description of the streams in the Action Area. No map has been included showing these streams in the text of the DSEIS. There is a map attached as Appendix 16.4; however, it is small, difficult to read and inaccurate. Many of the streams and sections of streams, fed by springs, are gaining streams. These streams are not depicted on the map. Measurements have only been taken in "selected" streams in the Haiku area. Measurements have not been taken in all of the streams which could be affected by the EM Plan wells. See Appendix 16.4 of the DSEIS.

It is extremely unfortunate that Mink & Yuen have elected to conclude that there are no perennial streams in the Action Area. Residents of the Haiku area know full well that there are many perennial streams in the Haiku area. Anyone who has spent any amount of time in this area has seen streams that run for sufficiently long periods of time to meet the definition of a perennial stream.

5. Groundwater Resources in the Action Area

There has been no thoroughgoing assembly of information on the groundwater resources which exist in the Action Area. Mink & Yuen refer in the DSEIS to a purported aquifer unit, which they call the "Kuiaha" Aquifer. There is no such aquifer unit or segment and the use of this reference is extremely misleading.

Mink & Yuen have exaggerated the extent of the groundwater resources available in the "Kuiaha" Aquifer by using their RAM methodology which methodology led to many of the problems now being experienced in the Iao Aquifer.

6. A Catalogue of Riparian and Appurtenant Rights in the Action Area

There are numerous individuals in the Action Area who possess riparian water rights. There are also individuals within the Action Area who possess appurtenant water rights. Many of these possessors of riparian and appurtenant rights have registered with the Commission on Water Resources Management. These rights were completely ignored in the Draft and Final EIS for the EM Plan. They are ignored in the DSEIS as well. After declaring that groundwater pumping will have no impact on stream flow, Mink & Yuen state that any discussion of riparian and appurtenant rights and instream flow standards are "irrelevant" on p. 2 of the DSEIS. This erroneous determination is sufficient to render the DSEIS document inadequate.

For reasons which will be elucidated later in this document, it is not at all clear that groundwater pumping will not have an impact on stream flow or on those with riparian or appurtenant water rights. Since this project may have an adverse impact on those with riparian and appurtenant water rights within the Action Area, the rights of these persons/entities must be catalogued and they must be notified of this project and provided with an opportunity to object prior to its implementation.

7. Instream Values in the Action Area

For reasons to be discussed below, it has not been established that groundwater pumping will not impact stream flow. The groundwater pumping which is proposed to take place through this project may therefore de-water streams in the Action Area and further degrade instream values. Because the interim stream flow standards have been set at whatever flows now exist in these streams, **any** diminishment in the stream flows occasioned by the groundwater pumping through this project will be illegal.

As importantly, area residents have been promised by the Board of Water Supply a program of stream restoration rather than further stream degradation. The stream restoration program must be fully funded and implemented before the EM Plan becomes operational.

8. Existing Farm, Domestic and Other Uses in the Action Area

There has been no effort made to determine the extent to which stream flow is being used for farming, domestic and other uses in the Action Area. Again, it is by no means clear th/at groundwater pumping will not have an impact on stream flow and will not further impact the use of these streams for farming, domestic and other uses. It is therefore imperative that these other uses of streams be documented in the SEIS.

9. Existing Diversions in the Action Area

There must be a detailed description of the extent of the A&B/EMI/HC&S diversions of the streams in the Action Area. In other words, the SEIS must disclose on a stream by stream basis the amount of water that would flow in each stream without the diversions and the amount of water that is diverted in each stream at each diversion point. Streams in the Action Area are diverted between four and six locations. Mink & Yuen may have arrived at their conclusion that the streams are not perennial by only considering their conditions post-diversion.

The SEIS should disclose all of the end users of the diverted water and the amounts that each uses.

There is a section, §9.4 of the DSEIS, describing the ditch system, which is summary and vague at best and does not provide the information described above. Figures 9 and 10 are included in the EIS which purportedly describe the diversions on certain streams but these figures are almost impossible to interpret by the ordinary member of the public and decision-makers using this document.

10. Existing Groundwater Pumping in the Action Area

The SEIS must include a detailed disclosure of all of the groundwater pumping now taking place within the Action Area. The inventory of wells and the discussion about them on pp. 28-29 of the DSEIS is too general to be meaningful in an environmental disclosure document.

11. Amount of Groundwater to be Transferred Out of the Basin of Origin

The SEIS must include a detailed discussion of the amount of groundwater to be transferred out of the basin of origin or out of the aquifer of origin. This discussion should also include a disclosure of the amount of groundwater that will remain within the basin or aquifer of origin.

The DSEIS concludes that 10 mgd is available to be exploited in the "Kuiaha" Aquifer, that all of the EM Plan wells together will pump 10 mgd and that this amount of water will be transmitted to Central Maui. There is no discussion about the water needs of the Haiku region, past, present or future and reserving enough water for Haiku area residents.

C. Disclosure and Evaluation of the Significance of Impacts of the Action

The EIS Rules also require a rigorous study and disclosure of the impacts of the proposed action and an analysis of the significance of those impacts. HAR §11-200-17(i),(j),(k),(l) and (m).

1. Archaeological and Historical Impacts

The assessment of the impacts upon archeological and historic sites in §11.1 on p. 64 is inadequate. It relies upon a 1992 study by archaeological consultant Aki Sinoto. The area covered by the relocated well sites has not been studied and there is no basis for determining that there will not be any adverse impacts to archaeological, historical or cultural sites on these undisclosed properties.

2. Social and Economic Impacts

The assessment of the socio-economic impacts of this project are so vague as to be meaningless. See the one paragraph assessment or analysis in §11.2 on p. 64 of the DSEIS. This violates HAR §11-200-17(i) which directs that the construction of public facilities such as "water resource projects" may well stimulate or induce secondary effects and these secondary effects must be addressed.

VI. THE STUDY OF THE IMPACT OF PUMPING EM PLAN WELLS ON STREAM FLOW WAS WHOLLY INADEQUATE

One of the central issues to be addressed in the SEIS is the effect of pumping groundwater on stream flow. Mink & Yuen concluded in their EIS Preparation Notice that groundwater pumping will not have an impact on stream flow on pp. 9, 11 and 17. This is extremely unfortunate because the USGS has **not** reached this conclusion and because the specific test which had been devised to determine whether or not groundwater pumping does have an effect on stream flow had not yet taken place. The SEISPN makes a matter of record the unscientific bias of Mink & Yuen which subverts the SEIS process.

A. The USGS Recommendations Were Ignored by Mink & Yuen

1. The Limits of the East Maui Study

The USGS has published a study entitled "Ground-Water Occurrence and Contribution to Stream Flow, Northeast Maui, Hawaii" (1999). An over-generalized conclusion has been circulated that groundwater pumping has an impact on stream flow east of the Ko'olau Gap but not west of the Ko'olau Gap. This is speculated but not stated definitively and is subject to numerous qualifications and suggested needs for further data collections and studies.

2. The Recommendations Contained Within the Haiku Study and Their Import

The USGS also published "Ground Water and Surface Water in the Haiku Area, East Maui, Hawaii" (1999) in cooperation with the County of

Maui Department of Water Supply and State of Hawaii Commission on Water Resource Management. This document deals with the Haiku area which is the subject of the EM Plan. Mink & Yuen inappropriately rely upon this document to conclude that there will not be any impact upon stream flow through the pumping of EM Plan wells. Instead, this study concludes that more data needs to be accumulated to determine whether or not there will be such an impact. Plaintiffs strongly suggested to Mink & Yuen that this data be collected in the process of preparing this DSEIS but Mink & Yuen ignored these comments.

The "**DATA NEEDS**" which were identified as being necessary in the 1999 Gingerich USGS Report on pp. 33-34 were as follows:

> **Additional data are needed** to improve and confirm the understanding of the ground-water flow system in the study area. A few specific data needs are briefly described below.
>
> 1. **Data from exploratory wells could confirm the existence of an unsaturated layer between the upper and lower water tables.** The wells would be open only to a small part of the aquifer (a few tens of feet) above the freshwater lens but still in the Honomanu Basalt. Unsaturated conditions would be confirmed if the well remains dry or negative pressures can be measured in the well.
>
> 2. **Continuous monitoring of selected springs and streamflow in the area is needed to measure baseline ground-water discharge before the start of proposed additional ground-water withdrawal.** Comparisons can then be made to determine if the additional withdrawal is affecting ground-water discharge at the high-level streams or springs.
>
> 3. **An aquifer test in the Honomanu Basalt with multiple observation wells arranged both parallel and perpendicular to the preferred volcanic-dike orientation is needed to determine if the dike complex does indeed have higher conductivity in the north-south direction compared to the east-west direction. In addition, an observation well open only to the upper water body could be used to monitor any hydrologic effects felt there.**
>
> 4. **Geologic logging of all additional wells drilled in the area could provide more information on the relation of the upper water body to the stratigraphy. Water levels in the wells need to be monitored daily during drilling to determine the vertical-flow gradient in the ground-water system.**

These types of data should have been collected during this SEIS process and the results reported in this DSEIS. They were not.

It is significant that in paragraph 1. of the USGS recommendations above it is reaffirmed that the point of the test well is to determine if the layers of rock, as the well is drilled to deeper levels, are saturated or not. If they are, there is likely to be an impact of pumping on stream flow. If they are not, there is not likely to be such an impact.

It is also significant that in paragraph 2. of the USGS recommendations above is an admission that there are springs and streams flowing in the Haiku area. The DSEIS deems these summarily "irrelevant".

B. <u>There Are Perennial, Gaining Streams in the Action Area</u>

The DSEIS information on perennial streams in the Action Area is false and misleading. At points there are claims that there are no perennial streams in the Action Area. On other occasions it is admitted that there are perennial streams for certain segments of these streams. At other places Mink & Yuen admit that the streams gain or are perennial in their lowest reaches, near the ocean.

If Mink & Yuen, or the USGS, for that matter, had bothered to do a rigorous study of all of the streams in the Action Area, they would have discovered that there are spring-fed and/or gaining, perennial streams located throughout the Action Area. There are perennial streams that are not shown on Appendix 16.4. There are spring-fed streams at the 750 foot elevation and higher. There are streams which, for significant segments, run all year round throughout the Haiku region. Mink & Yuen and the USGS have simply failed to collect data on these significant surface water resources.

C. <u>Streamflow Has Already Been Adversely Affected By Groundwater Pumping in the Area</u>

Empirical evidence already exists that streamflows have been adversely affected by groundwater pumping in the area. Mr. Mark Sheehan owns property on East Kuiaha Road within the sphere of influence of the Dowling/County of Maui well located in the Kaupakalua region. His property is located at approximately the 750 foot elevation. The East Kuiaha Stream crosses his property. It is spring-fed and flows perennially. Once the Dowling/County of Maui well began to be pumped, streamflow diminished in the stream running through his property. Empirical evidence also exists from other sources about the impact of the groundwater pumping of the Dowling/County of Maui well on surface water running across properties owned by other individuals in the same area. This empirical evidence was and is available for anyone who cared to collect it.

D. <u>The Test Protocol Were Not Followed Properly</u>

The test protocol agreed upon by Plaintiffs and the Board of Water Supply were not followed properly. These protocol are repeated again below:

a. **"Prior to start-up every morning, the driller will try to best determine if formation water has accumulated in the well. If so, measurements will be taken."**

b. The well driller will discern whether or not water has been encountered in the test hole **at the beginning of each day** and, if so, will record the amount of water which has been encountered, at the beginning of each day.

c. A video log of the completed pilot holes will be taken.

d. **Daily drilling logs** will be submitted by the contractor.

As has been pointed out by William Meyer, water or saturation was noticed in the well at the Honomanu layer; however, measurements apparently were not taken and samples of the saturated rock were not kept. A record of the amount of water encountered was intended to be kept.

E. <u>Mink & Yuen Have Misrepresented The Test Results</u>

Mink & Yuen suggest in numerous places in the DSEIS that the Honomanu basalt was unsaturated even though Table 4 on p. 43 B of the DSEIS indicates that water or saturation was encountered at this level.

F. <u>The Test Results Show That the Rock is Saturated and That There Will Be an Impact On Streamflow Through Groundwater Pumping</u>

As has been pointed out in the comment letter of William Meyer, Table 4 indicates that the Honomanu basalt was saturated and undermines one of the primary conclusions within the DSEIS that there will be no impact on streamflow through groundwater pumping. In fact, the opposite is indicated by this data. Groundwater pumping **will** have an impact on the streamflow.

G. <u>The 1999 Recommendations of the USGS Must Be Implemented</u>

The recommendations in the 1999 USGS study referenced in §VI.A.2. above must be implemented. These are restated in abbreviated form below.

1. Data from exploratory wells could confirm the existence of an unsaturated layer between the upper and lower water tables. Unsaturated conditions would be confirmed if the well remains dry or negative pressures can be measured in the well.

2. Continuous monitoring of selected springs and stream flow in the area is needed to measure baseline ground-water discharge before the start of proposed additional ground-water withdrawal.

3. An aquifer test in the Honomanu Basalt with multiple observation wells arranged both parallel and perpendicular to the preferred volcanic-dike orientation is needed to determine if the dike complex does indeed have higher conductivity in the north-south direction compared to the east-west direction. In addition, an observation well open only to the upper water body could be used to monitor any hydrologic effects felt there.

4. Geologic logging of all additional wells drilled in the area could provide more information on the relation of the upper water body to the stratigraphy. Water levels in the wells need to be monitored daily during drilling to determine the vertical-flow gradient in the ground-water system.

It is clear from the foregoing that much more comprehensive testing needs to be undertaken in order to be sure that stream flow will not be adversely affected by EM Plan groundwater pumping.

VII. EXTENT OF GROUNDWATER CONTAMINATION AND COST TO MITIGATE

The extent of groundwater contamination in the Action Area and the cost to mitigate is another central issue to be resolved in the SEIS. After denying that the groundwater was contaminated in the Draft EIS and the Final EIS, the Board of Water Supply turned around and subsequently filed its own lawsuit against the manufacturer of DBCP for causing the contamination of groundwater in Napili and East Maui.

A settlement was reached requiring monetary compensation and a possible relocation "mauka" of the proposed East Maui well field. If the EM Plan well field is relocated mauka, this will have an impact on the testing program agreed to between the Plaintiffs and the Board of Water Supply, because this may require the monitoring wells agreed to by the parties to be relocated mauka as well. The SEIS must include a full description and disclosure of the DBCP lawsuit, the extent of the contamination that was discovered during the course of the lawsuit, the mitigation measures that were agreed to, the cost of the mitigation measures, the possible relocation of the well field and all other matters pertinent to the EM Plan.

Chapter 7 of the DSEIS discusses "Aquifer Contamination" on pp. 30-39. There is no detailed discussion of the real threat of contamination. No computer modeling was done to determine the extent of contamination that may be encountered. While the settlement of the DBCP lawsuit is discussed, the terms under which the EM Plan wells must be relocated "mauka" are not disclosed. The DSEIS represents that the Settlement Agreement is attached as an Appendix, on p. 36 of the DSEIS; however, the Agreement is nowhere to be found in the Appendix.

VIII. EFFECT ON EXTENSIVE CESSPOOLS EXISTING IN THE ACTION AREA

The Groundwater Water Protection Program of the Department of Health, State of Hawaii, adopted the "Hawaii Wellhead Protection Program Plan" in May, 1995. This Plan includes certain policies with respect to siting new public water supply wells. They are to be sited away from sources of contaminated waters.

In addition, HAR §11-62-32 prohibits cesspools from being located within 1,000 feet of a public drinking water well. It is common knowledge that there are numerous cesspools within 1,000 feet of the proposed location of the EM Plan wells.

The DSEIS simply states that the proposed wells will not be located within 1,000 feet of existing wells. See p. 39 of the DSEIS. The location of the wells, however, has never been disclosed with any specificity. The DSEIS should have investigated and disclosed the number of cesspools located within 1,000 feet of the public drinking water wells. The DSEIS should have investigated, as alternative, locations for the public drinking water wells that are not within 1,000 feet of any cesspools. The siting function of this SEIS has been subverted by the failure to locate these wells and determine whether or not proposed sites are consistent with the Groundwater Water Protection Program of the Department of Health.

IX. CUMULATIVE IMPACT ON OCEAN RESOURCES OF TRANSFER OF SURFACE AND GROUNDWATER OUT OF REGION

The surface water diversions already prevent a significant amount of fresh water from being discharged into the ocean. Groundwater pumping will now prevent an additional amount of fresh water from being discharged into the ocean. This fresh water has contributed to the near shore marine environment. The deprivation of this fresh water will cause adverse impacts to the marine environment.

This important issue was one of the reasons why an SEIS was required. Unfortunately, Mink & Yuen only devote less than three pages to addressing this issue in §10.9.2 of the DSEIS on pp. 61-63. Worse, they rely almost entirely on a study prepared by Marine Research Consultants which is not even attached to the DSEIS.

X. WATER POLICY, PLANS AND PLANNING

A. Relationship of Proposed Action to Land Use Plans, Policies and Controls

The EIS Rules, in HAR §11-200-17(h), require that an EIS include a statement of the relation of the proposed action to land use plans, policies and controls for the affected area. A discussion must be included about how the proposed action conforms or conflicts with plan objectives. Where a conflict or inconsistency exists, the statement must describe the extent to which the agency has reconciled its proposed action with any such conflicts. The EIS must also contain a list of necessary approvals for the project.

Mink & Yuen address land use plans, policies and controls in Chapter 5 of the DSEIS on pp. 17-19. The discussion is cursory and will not be useful to the decision-maker. It does not satisfy the purposes intended by the Rule cited above.

B. The Amount of Water Resources Available in Haiku Has Been Exaggerated

Mink & Yuen's RAM model exaggerates the amount of groundwater available to be pumped and transferred from the Haiku region. See comment letter of William Meyer.

C. No Water Development Plan

Maui County has not yet lawfully adopted its Water Development Plan. The enactment of this Plan is a necessary precondition to the implementation of the EM Plan. The General Plan and the Community Plan cannot dictate the manner in which water is to be supplied when the Legislature has provided that the Water Development Plans are to perform this role.

Without the Maui County Water Development Plan there is no basis for transporting the majority of the developed East Maui groundwater resources to Central Maui, Maalaea, Kihei, Wailea and Makena. What resources are being reserved for the Haiku region? What resources are being transmitted to the Central Maui Joint Venturers to compensate for deficits perceived to be owed to them? Why are there now to be connections to the 36 inch transmission line at Paia, Haleakala Highway and Puunene? All of these matters of water "policy" should be fully explored in the SEIS. In the end, however, these policy issues must be dictated by the enacted Maui County Water Development Plan, and not some "draft" of that plan.

XI. TRANSMISSION OF WATER RESOURCES FROM EAST MAUI TO CENTRAL MAUI

A. The Capacity of the Transmission Line Should Establish the Scope of this Project

Kihei, Wailea, Makena and Maalaea were developed with a 36 inch transmission line from Iao. Through the EM Plan, another 36 inch transmission line will drain water resources from East Maui to Central Maui and to Kihei and Wailea. The significance of this new 36 inch transmission line has been minimized.

The Board of Water Supply and Mink & Yuen must determine the full capacity of water that can be transmitted in this 36 inch transmission line and how many wells it can serve. It is highly probable that the capacity of this transmission line is more than 10 mgd and more than the number of wells currently planned for East Maui. This would mean that the EM Plan is, itself, only the first phase of a much larger project to construct many more wells extending much further into East Maui. The long term and cumulative impacts of this larger project must be analyzed now.

The use of the 36 inch transmission line makes it clear that the EM Plan is a commitment to a much larger project to develop ground water in the East Maui regions of Haiku, Huelo and eastward. When there is a "commitment to a larger action," such as this one, on a long term basis, that larger action must be fully addressed in the EIS. Molokai Homesteaders Coop. Ass'n v. Cobb, 63 Haw. 453, 629 P.2d 1134 (1981).

B. Transmission of Water from East Maui to Central Maui is Illegal

This issue is addressed in more detail in §XII.A. - D. below.

XII. OTHER LEGAL ISSUES

A. The Impact of the Waiahole Decision on this Project and Upon this SEIS

The Waiahole decision, In the Matter of the Water Use Permit Application, 94 Haw. 97, 1 P. 3d 409 (2000), establishes the constitutional and statutory obligations of those boards and commissions who manage water resources, including the Board of Water Supply. The Board has trust responsibilities in managing East Maui water. It has the obligation to protect instream values, riparian and appurtenant water rights.

The Board of Water Supply has no authority to authorize or implement an out of basin transfer of groundwater resources, such as is proposed here. The discussion of the Waiahole decision in the DSEIS in §9.6 on p. 53 is erroneous and should not be relied upon by the Board of Water Supply. In undesignated areas, the common law applies. Based upon the common law applicable in Hawaii, there is no right to transfer surface or groundwater outside or beyond the aquifer of origin.

B. The Discussion of County Correlative Water Rights is Incorrect

The DSEIS contains a one paragraph discussion of correlative water rights in §9.6, on p. 53. This section misstates the law. A correct statement of correlative water rights is found In the Matter of the Water Use Permit Application, 94 Haw. 97, 1 P. 3d 409 (2000) in §H.4.

The rule of correlative rights applies to all groundwaters in the state. The correlative rights rule grants to overlying landowners a right only to such water as necessary for reasonable use, also taking into consideration the reasonable needs of other landowners whose lands lie over the groundwater. The correlative rights law has been misstated by Mink & Yuen in the DSEIS.

Until and unless the Board of Water Supply identifies the lands upon which it intends to drill the wells, identifies the owners of the surrounding wells and engages in an analysis of potential competing uses for the groundwaters, it cannot be determined that the County of Maui has any correlative right to use these waters. Any claim of the Board of Water Supply that it has any correlative water rights is as "premature" as the claim of Bishop Estate which was rejected by the Hawaii Supreme Court on that basis in the Waiahole case. The Board of Water Supply possesses no existing correlative rights.

C. Lack of Legal Authority to Transport Groundwater Out of Haiku Region

The DSEIS deals only with the physical equipment effectuating the transmission of groundwater out of the Haiku region and fails to address the lack of legal authority to transport groundwater *within this* transmission system.

Mink & Yuen misstate the law, and mislead the public and the Board of Water Supply in suggesting that it would not be a direct violation of the law to transfer these groundwaters from East Maui to Central Maui. See §9.6, p. 53 of the DSEIS. The Waiahole decision in §H.4 makes it absolutely clear that in a non-designated area there is no right to transfer groundwaters outside the aquifer of origin or from one groundwater area to another.

Hawaii has a bifurcated system of water rights: one system applicable to designated water management areas and one system applicable to non-designated areas. Koolau Agricultural Co. v. CWRM, 83 Haw. 484, 927 P.2d 1367 (1996). This is not a designated area. According to the Waiahole decision, in a non-designated area such as this one, correlative rights extend only to uses on lands overlying the water source and well water may not be transported to distant lands. The Hawaii Supreme Court, in the Waiahole case, rejected the correlative water rights claim of Castle & Cooke, Inc., based upon the correlative rights rule, because Castle sought the right to use groundwater drawn from its windward lands on distant leeward lands. The Hawaii Supreme Court ruled that parties transporting waters to distant lands are deemed "mere appropriators" whose rights are subordinate to overlying landowners. The Supreme Court held that Castle could claim no "correlative rights" under these circumstances.

The "correlative rights rule" is a common law rule. The Hawaii Supreme Court went on to note that the State Water Code provides, with respect to areas which have been designated, in HRS §174C-49(c), that:

> The common law of the State to the contrary withstanding, the Commission shall allow the holder of a use permit to transport and use surface or groundwater beyond overlying land or outside the watershed from which it is taken if the Commission determines that such transport and use are consistent with the public interest and the general plans and land use policies of the State and counties.

To transfer Haiku groundwaters to Central Maui would require the designation of East Maui and an application for and receipt of a water use permit from the CWRM pursuant to Chapter 174C. Proceeding without these required approvals could subject any private parties involved to liability pursuant to HRS §607-25.

It is therefore clear, as a matter of law, that in a non-designated area, such as this one, the Board of Water Supply currently has no right to transfer these groundwaters beyond lands overlying the wells, outside the watersheds, to Central Maui, Kihei, Makena and Maalaea and other distant areas. The Hawaii Supreme Court rejected the similar claim of Castle & Cooke, which is a direct precedent for the claim being asserted through the EM Plan.

D. Violations of the Water Code

The Hawaii Water Code, HRS Chapter 174C, requires the protection of stream values, riparian and appurtenant water rights. In addition, the Water Code recognizes the common law prohibition against out-of-watershed transfers of groundwaters in non-designated areas. See HRS §174C-49(c).

XIII. THE STUDY OF ALTERNATIVES IS INADEQUATE

The study of alternatives in the SDEIS is inadequate. HAR §11-20-17(f) requires a description of all alternatives which could attain the objectives of the action, regardless of cost, in sufficient detail to explain why they were rejected. It further states:

> The section shall include a rigorous exploration and objective evaluation of the environmental impacts of all such alternative actions. Particular attention shall be given to alternatives that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs, and risks.

Examples of alternatives include (1) the no action alternative, (2) alternatives requiring actions of a different nature with similar benefits but different impacts, (3) alternatives related to different designs or details of the proposed action which would present different impacts, (4) the alternative of postponing action pending further study, and (5) alternative locations for the proposed project. This provision states:

In each case, the analysis shall be sufficiently detailed to allow the comparative evaluation of the environmental benefits, costs, and risks of the proposed action and each reasonable alternative.

The study of alternatives in the DEIS is less than seven pages long. None of the alternatives are studied in detail as required by the EIS Rules. Relocating wells away from cesspools and relocating the well field mauka away from contaminated water sources are both alternatives which should have been fully addressed. Locating wells away from streams whose flows could be affected is another alternative which should have been studied.

XIV. THE PASSAGE OF TIME

The passage of time between the Final EIS and the DSEIS requires that issues not addressed in the 1994 Court Order be addressed now.

XV. THE DSEIS IS AN ADVOCACY DOCUMENT

HAR §11-200-14 states, in pertinent part:

An EIS is meaningless without the conscientious application of the EIS process as a whole, and shall not be merely a self-serving recitation of benefits and a rationalization of the proposed action.

The DSEIS prepared by Mink & Yuen is a self-serving document, which primarily serves as a rationalization of the proposed project. Mink & Yuen has not prepared an adequate document and critical issues have been ignored.

XVI. THE NECESSITY FOR MONITORING WELLS INCORPORATED INTO THE PROJECT

Monitoring wells should be made components of the EM Plan as mitigation measures. There should be monitoring wells, at appropriate locations, performing the following three distinct functions: (a) to determine whether or not groundwater pumping has an impact on stream flow by testing the saturation of the rock as drilling takes place, (b) to monitor salinity levels within the aquifer as a whole on a long term basis and (c) to monitor the performance of the aquifer generally. The incorporation of these monitoring wells were recommended long ago by the Commission on Water Resources Management and are also recommended in the State Water Plan. They have also been incorporated into most other large well field projects. The USGS should supervise all of these monitoring wells (not Mink & Yuen or the Board or Department of Water Supply). The monitoring well proposed in §16.7 of the DSEIS should be required to perform the three functions addressed above.

XVII. THE ANALYSIS OF ENVIRONMENTAL EFFECTS WHICH CAN NOT BE AVOIDED IS INADEQUATE

HAR §11-200-17(j) requires that the DSEIS include a section analyzing the extent to which the proposed action involves trade-offs among short-term and long-term gains and losses, including the extent to which the proposed action forecloses future options, narrows the range of beneficial uses of the environment, or poses long-term risks to health or safety.

In a similar vein, the DSEIS must include a separate section describing all irreversible and irretrievable commitments of resources and unavoidable impacts resulting from any phase of the action. See HAR §§11-200-17(k) and (l). To the extent that there are adverse and unavoidable impacts, the DSEIS must include the rationale for proceeding with a proposed action, notwithstanding unavoidable effects. The DSEIS must indicate what other interests and considerations of governmental policies are thought to offset the adverse environmental effects of the proposed action. HAR §11-200-17(l) concludes:

> *The statement shall also indicate the extent to which these stated* countervailing benefits could be realized by following reasonable alternatives to the proposed actions that would avoid some or all of the adverse environmental effects.

The DSEIS is inadequate because it fails to include these required contents. See HAR §§11-200-17(j), (k) and (l).

XVIII. INCORPORATION BY REFERENCE OF OTHER COMMENTS

Plaintiffs hereby incorporate by reference all other comments submitted by all others who commented on this DSEIS, in particular the comments of the William Meyer, an unsigned copy of which is attached hereto as Exhibit "6".

XIX. THE DEIS DOES NOT MEET THE TESTS FOR ACCEPTANCE OR ADEQUACY

An EIS is inadequate and cannot be accepted unless it satisfies the tests for "acceptability" set out in HAR §11-200-23. The EIS, in its completed form, must represent an informational instrument which fulfills the definition of an EIS and adequately discloses and describes all identifiable environmental impacts and satisfactorily responds to review comments. See HAR §11-200-23(a).

An EIS may only be accepted by the accepting authority or approving agency if all of the following criteria are satisfied, according to HAR §11-200-23:

(1) The procedures for assessment, consultation process, review, and the preparation and submission of the statement, have all been completed satisfactorily as specified in this chapter;

(2) The content requirements described in this chapter have been satisfied; and

(3) Comments submitted during the review process have received responses satisfactory to the accepting authority, or approving agency, and have been incorporated in the statement.

It would be premature to assess whether the third test has been satisfied; however, it is already apparent that the first two tests have not been satisfied, based upon the foregoing.

XX. CONCLUSION/DSEIS SHOULD BE WITHDRAWN

It will be insufficient to simply respond to the comments received on the DSEIS. The inadequacies of the DSEIS are so severe that the document must be withdrawn, rewritten, republished as a DSEIS, and public review recommenced.

The BWS and Mink & Yuen are again forcefully reminded of their binding trust obligations to analyze and address in the SEIS "the full range of responsible opinion" and "responsible opposing views on significant environmental issues" raised by the EM Plan. See HAR §11-200-16. These views and issues cannot be "swept under the rug," especially in an SEIS paid for with a substantial amount of taxpayers' funds.

Thank you for the opportunity to comment on this DSEIS.

Very truly yours,

Isaac Hall
Attorney for Plaintiffs

IH/jp
Enclosures
cc: Plaintiffs
Mr. George Yuen, Mink & Yuen, Inc.,
1670 Kalakaua Ave., Suite 605, Honolulu, HI 96826
Office of Environmental Quality Control
235 S. Beretania St., Honolulu, HI 96813
Governor Benjamin Cayetano
Mayor James "Kimo" Apana

emc/letcrad13

ISAAC HALL #2238
2087 Wells Street
Wailuku, HI 96793
244-9017

Attorney for Plaintiffs

2ND CIRCUIT COURT
STATE OF HAWAII
FILED

1994 AUG 23 PM 3:30

CLERK

IN THE CIRCUIT COURT OF THE SECOND CIRCUIT

STATE OF HAWAII

THE COALITION TO PROTECT EAST MAUI WATER RESOURCES, an unincorporated association; HUI ALANUI O MAKENA, a Hawaii non-profit corporation; MARY EVANSON AND MARC HODGES, Plaintiffs, v. THE BOARD OF WATER SUPPLY, COUNTY OF MAUI and DAVID CRADDICK, in his capacity as Director of the Department of Water Supply, County of Maui, Defendants.	CIVIL NO. 93-0734(3) (Declaratory Relief) ORDER ON PLAINTIFFS' MOTION FOR PARTIAL SUMMARY JUDGMENT AND/OR FOR A PRELIMINARY INJUNCTION ON COUNT I Hearing date: 6/29/94 Time: 8:30 a.m. Judge: Boyd P. Mossman

ORDER ON PLAINTIFFS' MOTION FOR PARTIAL SUMMARY JUDGMENT AND/OR FOR A PRELIMINARY INJUNCTION ON COUNT I

Plaintiffs' Motion for Partial Summary Judgment and/or for a Preliminary Injunction on Count I came on for a hearing on Wednesday, June 29, 1994 at 8:30 a.m. in the Second Circuit Courts before the Honorable Boyd P. Mossman. Plaintiffs were represented by Isaac Hall, Esq. Defendants were represented by Deputy Corporation Counsel Guy P. D. Archer, Esq. Based upon the record and file to date, the argument of counsel and, good cause appearing,

IT IS HEREBY ORDERED, ADJUDGED AND DECREED as follows:

I hereby certify that this is a full, true and correct copy of the Original

Clerk, Circuit Court, Second Circuit

EXHIBIT 1

A. Order on Motion for Partial Summary Judgment

Because, from the record, there is no genuine issue as to any fact which is material to Plaintiffs' Count I claims and the movants have clearly demonstrated they would prevail as a matter of law, partial summary judgment is appropriate in this case and, therefore, adopting the reasoning in Blue Ocean Preservation Society v. Watkins, 767 F. Supp. 1518 (D. Haw. 1991),

1. Plaintiffs' Motion for Partial Summary Judgment is hereby granted because the Court determines that the Final Environmental Impact Statement prepared by or through the Defendants for the East Maui Water Development Plan (the "project") is inadequate in that it does not fully address important environmental issues such as water contamination, impact upon stream flow and other issues raised by the Plaintiffs;

2. Count I of this case is hereby remanded to Defendant the Board of Water Supply and Defendant the Board of Water Supply is ordered to prepare a Supplemental Environmental Impact Statement for the East Maui Water Development Plan, in compliance with Chapter 343, to address the serious concerns raised by the Plaintiffs regarding water contamination, impact upon stream flow and other issues raised by Plaintiffs; and

3. The Defendants, and all those acting through them, are prohibited from implementing the East Maui Water

Development Plan and Defendants, and all those acting through them, shall not (a) use any state or county funds for the project, except those necessary to prepare the Supplemental Environmental Impact Statement, (b) use any state or county lands for the project or (c) process permit applications or seek permits for the project, until and unless an adequate Supplemental Environmental Impact Statement is prepared and accepted in compliance with Chapter 343.

B. Order on Motion for Preliminary Injunction

The Court determines that while it may be unfortunate to Maui taxpayers that the funds allocated for this project cannot be spent now, it may also be that through the preparation of a Supplemental Environmental Impact Statement the public may be provided with safer sources of water; therefore, the balance of harm tips in favor of the Plaintiffs and the public interest is served through the entry of the prohibitory Order granted above in §A.3. of this Order. Because of the nature of the Order in §A.3. above, it is not necessary to grant Plaintiffs' Motion for Preliminary Injunction and this Motion is, for now, denied.

DATED: Wailuku, Maui, Hawaii AUG 2 5 1994

APPROVED AND SO ORDERED:

/s/ BOYD P. MOSSMAN

JUDGE OF THE ABOVE-ENTITLED COURT

APPROVED AS TO FORM:

Guy P.D. Archer, Esq.
Deputy Corporation Counsel
for Defendants the Board of
Water Supply and David
Craddick

The Coalition to Protect East Maui Water Resources, et al. v. The Board of Water Supply and David Craddick; Civ. No. 93-0734(3); Order on Plaintiffs' Motion for Partial Summary Judgment and/or for a Preliminary Injunction on Count I

DEPARTMENT OF CORPORATION COUNSEL
J. P. SCHMIDT 5263
Corporation Counsel
THOMAS PIERCE 6983
GARY W. ZAKIAN 5137
Deputies Corporation Counsel
County of Maui
200 South High Street
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Telephone (808) 243-7740

FILED
1998 DEC 16 PM 2:43
J. KAYA
CLERK

Attorneys for Defendants
THE BOARD OF WATER SUPPLY
OF THE COUNTY OF MAUI and
DAVID CRADDICK, Director
of Water Supply

IN THE CIRCUIT COURT OF THE SECOND CIRCUIT

STATE OF HAWAII

THE COALITION TO PROTECT EAST MAUI WATER RESOURCES, an unincorporated association, et al., Plaintiff, vs. THE BOARD OF WATER SUPPLY, et al., Defendants.	CIVIL NO. 93-0734(3) (Declaratory Relief) AMENDED ORDER ON DEFENDANT'S MOTION FOR CLARIFICATION OF THIS COURT'S AUGUST 23, 1994 ORDER ON PLAINTIFF'S MOTION FOR PARTIAL SUMMARY JUDGMENT AND/OR FOR A PRELIMINARY INJUNCTION ON COUNT ONE **HEARING**: Date : Nov. 10, 1997 Time : 8:30 a.m. Judge: Boyd P. Mossman

EXHIBIT 2

ORDER ON DEFENDANT'S MOTION FOR CLARIFICATION OF THIS COURT'S AUGUST 23, 1994 ORDER ON PLAINTIFF'S MOTION FOR PARTIAL SUMMARY JUDGMENT AND/OR FOR A PRELIMINARY INJUNCTION ON COUNT ONE

Defendant the Board of Water Supply, et al's MOTION FOR CLARIFICATION OF THIS COURT'S AUGUST 23, 1994 ORDER ON PLAINTIFF'S MOTION FOR PARTIAL SUMMARY JUDGMENT AND/OR FOR A PRELIMINARY INJUNCTION ON COUNT ONE came on for hearing before the Honorable Boyd P. Mossman on November 10, 1997 at 8:30 a. m. Defendants The Board of Water Supply of the County Of Maui and David Craddick, Director of Water Supply were represented by Joseph A. Wolsztyniak, Esq., Thomas Pierce, Esq., and Gary W. Zakian, Esq., Deputies Corporation Counsel. Plaintiffs Coalition to Protect East Maui Water Resources, et al., were represented by Isaac D. Hall, Esq.

During the course of oral argument the Court indicated there was no acceptable Environmental Impact Statement in place. During subsequent settlement discussions with the Court the Defendant's agreed that they would prepare a Supplemental Environmental Impact Statement for the East Maui Water Development Plan ("Plan") for the Plan as a whole and withdrew their first request for clarification.

The Court, having reviewed all memoranda, exhibits and affidavits submitted, and having heard the argument of counsel, and being ready to rule,

1. As to the Defendants first request for clarification, the Defendants have agreed, and THE COURT HEREBY SO ORDERS, that the Defendants shall prepare a Supplemental Environmental Impact

Statement which shall include all phases of the Plan as a whole; and

2. Defendants second request for clarification that "[t]his Court's injunction does not require the inclusion of the Haiku Well in the SEIS for Phase One; instead the Haiku Well may be addressed by separate environmental documentation" is hereby granted as THE COURT SPECIFICALLY FINDS AND SO ORDERS that the Haiku Well is not part of the East Maui Water Development Plan.

DATED: Wailuku, Maui, Hawaii, DEC 10 1998.

/s/ Boyd P. Mossman (Seal)

JUDGE OF THE ABOVE-ENTITLED COURT

APPROVED AS TO FORM:

ISAAC HALL
Attorney for Plaintiff
THE COALITION TO PROTECT EAST
MAUI WATER RESOURCES

FILED

2000 SEP -6 PM 3:03

J. KAYA, CLERK
SECOND CIRCUIT COURT
STATE OF HAWAII

DEPARTMENT OF THE CORPORATION COUNSEL 205

JAMES B. TAKAYESU 1483
Corporation Counsel
GARY W. ZAKIAN 5137
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County of Maui
200 South High Street
Wailuku, Maui, Hawaii 96793
Telephone No. 243-7740
S:\ALL\GWZ\EMDP\WELLSODR.3

Attorneys for Defendants
BOARD OF WATER SUPPLY, COUNTY
OF MAUI, and DAVID CRADDICK

IN THE CIRCUIT COURT OF THE SECOND CIRCUIT

STATE OF HAWAII

THE COALITION TO PROTECT EAST MAUI WATER RESOURCES, an unincorporated association, et al., Plaintiffs, vs. THE BOARD OF WATER SUPPLY, et al., Defendants.	CIVIL NO. 93-0734(3) (Declaratory Relief) ORDER ON (1) TEST WELLS FOR THE EAST MAUI DEVELOPMENT PLAN SEIS AND (2) THE WEST KUIAHA TANK PROJECT NOT BEING A COMPONENT OF THE EAST MAUI DEVELOPMENT PLAN; EXHIBITS "1" "2" AND "3"

ORDER ON (1) TEST WELLS FOR THE EAST MAUI DEVELOPMENT PLAN SEIS AND (2) THE WEST KUIAHA TANK PROJECT NOT BEING A COMPONENT OF THE EAST MAUI DEVELOPMENT PLAN

This matter was heard before the Honorable Judge Boyd P. Mossman on January 29, 1999, pursuant to agreement of the Parties and the Court on December 23, 1998. Gary W. Zakian, Esq., Deputy Corporation Counsel, appeared in behalf of Defendants David R. Craddick, Director, Department of Water Supply, and the Maui County

EXHIBIT 3

Board of Water Supply. Isaac D. Hall, Esq., appeared in behalf of Plaintiffs.

The Court having reviewed the files, the submittals of the Parties, and heard oral argument, and being prepared to rule,

HEREBY ORDERS, ADJUDGES AND DECREES AS FOLLOWS:

I. <u>TEST WELLS FOR THE EAST MAUI DEVELOPMENT PLAN SEIS</u>

A. Defendants are hereby authorized to construct the following wells for the purposes of gathering data and information for use in the Supplemental Environmental Impact Statement ("SEIS") to be prepared for the East Maui Development Plan ("EMDP"):

1. A single monitoring well as described in the USGS letter dated September 9, 1998, attached hereto as Exhibit "1" in one of the locations previously identified by the parties in cooperation with William Meyer, of the USGS, which locations are identified on the map attached hereto as Exhibit "2";

2. If, after the release and distribution to the parties of the test results form the drilling of the monitoring well, for any reason the Department of Water Supply determines the results are not adequate, the Department may drill one additional well, as specified in Section 3, immediately below, without coming back to court for approval;

3. The one additional well ("Well") the Department may drill is subject to the following conditions;

a. The Well may be configured to contain three to four nested piezometers, as shown on Exhibit "3", attached hereto;

b. The Well may be a production size well;

c. The Well may have production size pumps installed;

d. The Well may be used only for test purposes to obtain data or information necessary for the preparation of the SEIS; and

e. The well shall be located within one of the areas as indicated on Exhibit "2".

4. The monitoring well shall be used thereafter to monitor all wells drilled as part of the EMDP.

B. Defendants must seek further Court approval for the drilling of any wells other than the two wells permitted above in Section A.

II. <u>WEST KUIAHA TANK PROJECT</u>

Based on the representations of Defendant David R. Craddick, Director, Maui County Department of Water Supply, the Court specifically finds and hereby orders:

A. The West Kuiaha Tank Project is not a component of the East Maui Development Plan;

B. The West Kuiaha Tank Project will not be utilized as part of the East Maui Development Plan and shall not, directly or indirectly, be attached or connected to any component of the EMDP; and

C. The West Kuiaha Tank Project is not required to be discussed in the Supplemental Environmental Impact Statement for the East Maui Development Plan as part of the EMDP except as a related project.

DATED: Wailuku, Maui, Hawaii SEP 06 2000.

/s/ Joseph E. Cardoza (Seal)
Judge of the above-entitled Court

APPROVED AS TO FORM:

ISAAC D. HALL, ESQ.
Attorney for Plaintiffs

The Coalition to Protect East Maui Water Resources, an unincorporated association, et al. vs. The Board of Water Supply; Civil No. 93-0734(3); ORDER ON (1) TEST WELLS FOR THE EAST MAUI DEVELOPMENT PLAN SEIS AND (2) THE WEST KUIAHA TANK PROJECT NOT BEING A COMPONENT OF THE EAST MAUI DEVELOPMENT PLAN

XEROX COPY

FILE COPY

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

September 9, 1998

Mr. Timothy E. Johns
Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Johns:

The issues raised in your letter to me of August 31, 1998, and Mr. Isaac Hall's letter to you of July 31, 1998, are complex but I have tried to respond to them as completely as a letter and my memory will allow. I have always been strongly in favor of drilling a monitor well in the Haiku area of East Maui as a means, and as the only definitive means to resolve the issue of whether pumpage would affect streamflow in this area. For instance, part of the study plan for the East Maui surface-water/ ground-water investigation involved collecting data from the wells to be drilled in the area by the Maui County Department of Water Supply (MDWS). This part of the study did not materialize however, owing to the successful suit brought by the Coalition to Protect East Maui Water Resources (CPEMWR) against the MDWS. As a result we have completed the study without this information, although drilling a monitor well remains the only definitive way to establish the relationship between ground water and surface water in the Haiku area.

I presented this concept at a meeting that was held some months ago in the chambers of Judge Mossman, the Circuit Court Judge that has ruled in favor of the CPEMWR in their suit against the MDWS. This meeting was held in an attempt to resolve the CPEMWR suit against the MDWS and was attended by Mr. Isaac Hall, Mr. David Craddick, representatives of the Maui County Corp. Council, and myself; while Mr. Tom Nance, representing the MDWS, and a hydrologist for Mr. Isaac Hall, were included by telephone. At this meeting it was my suggestion to drill an exploratory or monitor well in the Haiku area at a location that the results of the East Maui surface-water/ground-water study could be used to identify, and to use the results obtained from water levels measured in the well as it was drilled as a means of resolving the legal issues existent between the CPEMWR and the MDWS. I also offered to locate the general area of the monitor well. It was my general understanding that Mr. Isaac Hall, the MDWS, and the Maui County Corp Council accepted both recommendations, which led to acceptance of the approach by Judge Mossman. Some days after this meeting I located a site for the two parties. It would appear

EXHIBIT "1"

from Mr. Hall's letter that the agreement arrived at in the Judge's chambers has now been rejected by the MDWS.

At this meeting I also indicated, and I thought generally accepted, that it would be possible to determine whether or not potential wells in the Haiku area would affect streamflow based only on observations made during drilling of the monitor well. It is not necessary to monitor streamflow and potential pumpage to make this determination since results from such an effort can be extremely misleading. This conclusion was also endorsed by the hydrologist representing Mr. Hall. Finally, as I remember, it was agreed that the monitor well could potentially be used as a pumping well, but the well would be the last well brought on line by the MDWS. The MDWS was adamant that it did not want to drill a well to be used simply as a monitor well. The concept that the Water Department could eventually use the monitor well as a production well was accepted by Mr. Hall and by Judge Mossman after the MDWS agreed that the monitor well would be the last well hooked into the supply system and that this would not occur for many years. This decision was reached after I indicated to the Judge, in response to a question from him, that the continual use of the monitor well was not necessary in order to resolve the main issue between the CPEMWR and the MDWS.

Despite the general agreement between the CPEMWR and the MDWS regarding the method to be used to resolve the question as to whether or not pumpage would affect streamflow in the Haiku area, Mr. Nance felt that more information was needed in order to resolve this issue. As I recall, Mr. Nance wanted to install piezometers at selected depths in the monitor well and drill monitor wells with piezometers at each proposed pumping location. As I also recall, Mr. Nance felt that it would only be possible to determine if pumpage was affecting streamflow by simultaneously monitoring actual pumpage, water levels in the piezometers, and streamflow. This approach was not considered technically defensible by myself and by the hydrologist representing Mr. Hall.

I have not been involved in the East Maui issue since selecting the site for the Monitor well several months ago and have no knowledge of the plans of the MDWS as described in Mr. Hall's letter to you of July 31, 1998. I still believe, however, that it is not necessary to construct more than one monitor well in the Haiku area to resolve the issue between the CPEMWR and the DWS.

In a general sense, although it is potentially possible to determine if pumpage affects streamflow by simultaneously monitoring pumpage and streamflow, this approach only works for field conditions that are rarely met. This approach can also lead to the conclusion that pumpage does not affect streamflow when, in fact, it does or will ultimately do so. This follows from several considerations among which are: 1) streamflow can only be measured within a certain level of accuracy (generally within 5 to 10 percent of the total flow). If the rate of pumpage is within this potential error band, the effect of the pumpage goes undetected, 2) assuming that pumpage will affect a stream, there will still be a time lag between the initiation of pumpage and the time at which the pumpage <u>begins</u> to affect streamflow. After this, the effect of pumpage on the stream increases with time until ultimately the rate of diversion from the stream (reduction in streamflow) equals the rate of pumpage. The time required for streamflow to be diverted as a result of pumpage can take minutes to years depending on the field situation, 3) assuming that pumpage affects streamflow, the length the stream over which flow is actually being reduced can be miles. Thus, measurements of streamflow over a relatively small distance of the stream following the initiation of pumpage can be very misleading from this fact alone and 4) streamflow naturally varies with time. Measurements of streamflow that are designed to determine if pumpage affects streamflow would have to take this fact into consideration. In areas where rainfall is frequent, this task can become exceedingly difficult to impossible.

The above conditions or some combination of these conditions are the "normal" circumstances in the field. As a result, statements such as "the effect of pumpage from a given well on streamflow will not be measurable" are often true, at least in the short term, and can be used to develop ground water at the expense of streamflow. Ultimately however, if pumpage continues to increase, it is possible to dry up a stream even though the effect of a single well could never be documented. The best way to know whether or not pumpage will affect streamflow is to establish whether or not there is a hydraulic connection between the stream and the ground-water system, and to determine how far the cone of depression must grow in order to divert an amount of water equal to the pumpage. If the stream is the nearest discharge boundary for the ground-water system, pumpage will affect streamflow.

The status of the East Maui Ground-Water Study is documented in the enclosed table. As shown in the enclosed table there are five reports associated with this study. Three of the reports are approved and are awaiting printing. The remaining two reports are written and going through final approval. Expected dates for approval are shown in the enclosed table. As stated above, the report covering the Haiku area was to be based in part on the results of the drilling program associated with the MDWS East Maui water plan. Because this drilling has yet to occur, the report lacks this information and, although it represents our best analysis of the available data and that collected during the study, there is still a need to drill a monitor well to confirm the conclusions of the report.

I hope the above information is useful and would be pleased to discuss the issues raised in your letter to me of August 31, 1998 further if desired.

Sincerely,

William Meyer

William Meyer
District Chief

Enclosure

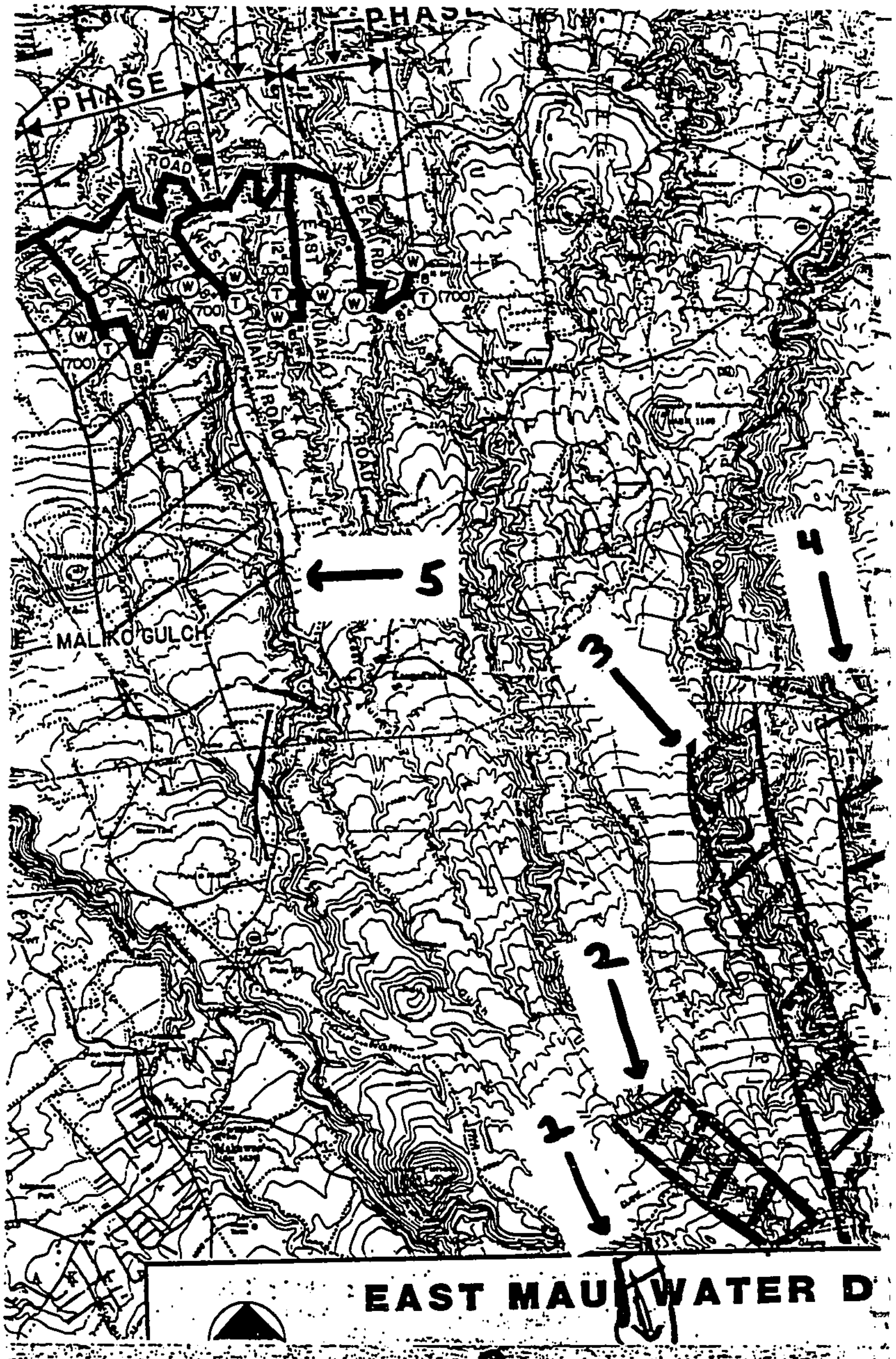
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EXHIBIT 2

Proposed Management Wells for the East Maui Water Development Plan

This brief narrative and its accompanying exhibits describe the objectives of the proposed management wells and details of their construction. At issue is whether the East Maui production wells, which will be designed to draw water from the deep basal lens, will have an impact on the flow of streams or springs. Based on information from the wells that have been developed to date, at least two groundwater aquifers are likely to be encountered in drilling the East Maui production wells: a shallow aquifer which is known to discharge into springs and streams; and the deep basal lens. In the wells that have been completed to date, the intervening strata between these two aquifers have been found to be unsaturated. This suggests that a well which is sealed off from the upper aquifer and is designed to only draw water from the deep basal aquifer will not impact stream or springflow.

However, it has been suggested that the aquifers are not hydrologically separate and, at least in some locations, the intervening strata between the upper to lower aquifers will be found to be fully saturated. If this is in fact the case, pumping from the basal aquifer would have the potential to draw water from the upper aquifer, thereby reducing stream or springflow. The proposed management wells, which will consist of nested piezometers in a 12-inch diameter borehole, will provide the data to demonstrate the validity of this contention.

Exhibit 1 illustrates the typical section for a management well which, for the purposes of this illustration, consists of three piezometers. In this example, it has been assumed that the upper aquifer is found between 100 and 150 feet below ground (the screened interval for Pipe No. 1 on Exhibit 1) and the nearby production well would draw water from the basal lens from 620 to 700 feet below ground (Pipe No. 3). The intervening strata would be monitored by a pipe open to the strata from 350 to 400 feet below ground (Pipe No. 2). Silica sand would be placed opposite the screened interval of each of these three pipes and the intervening annular space would be sealed with a bentonite-grout slurry. The sand and bentonite-grout slurry would both be carefully placed with a tremie pipe. Exhibit 2 illustrates the annular space available with three, 2-inch Schedule 80 PVC pipes as the piezometers. Exhibit 3 is a similar illustration with four-pipe piezometers. With four pipes, two different zones between the upper and lower aquifers could be monitored.

Each piezometer will allow water quality sampling and water level monitoring from the strata opposite its particular screened interval. If the strata between the upper and lower aquifers is unsaturated, no water will be found in the piezometers with these screened intervals. If the column penetrated by the borehole is fully saturated, then all piezometers would contain water. When the pump test of the nearby production well is undertaken, pressure transducers would be installed in all of the nested piezometers. A response in the piezometer tapping the same interval in the basal lens as the production well would obviously be evident. If no responses during or following the pump test are recorded in the piezometers which tap shallower strata, particularly if there is no response in the piezometer which is open to the shallow aquifer which feeds streams and springs, the hydrologic separation of the deep basal aquifer will have been demonstrated.

In addition to this monitoring during the production well's initial pump testing, the management well would continue to be used after the production well is in continuous use. Water level recorders in the piezometers in the deep and shallow aquifers would continue to provide information to confirm the findings of the initial pump test on a long-term basis. Should a longer term response that was not evident in initial testing occur, the pumpage of the production well could be reduced or even terminated, depending on the extent of the impact.

EXHIBIT "3"

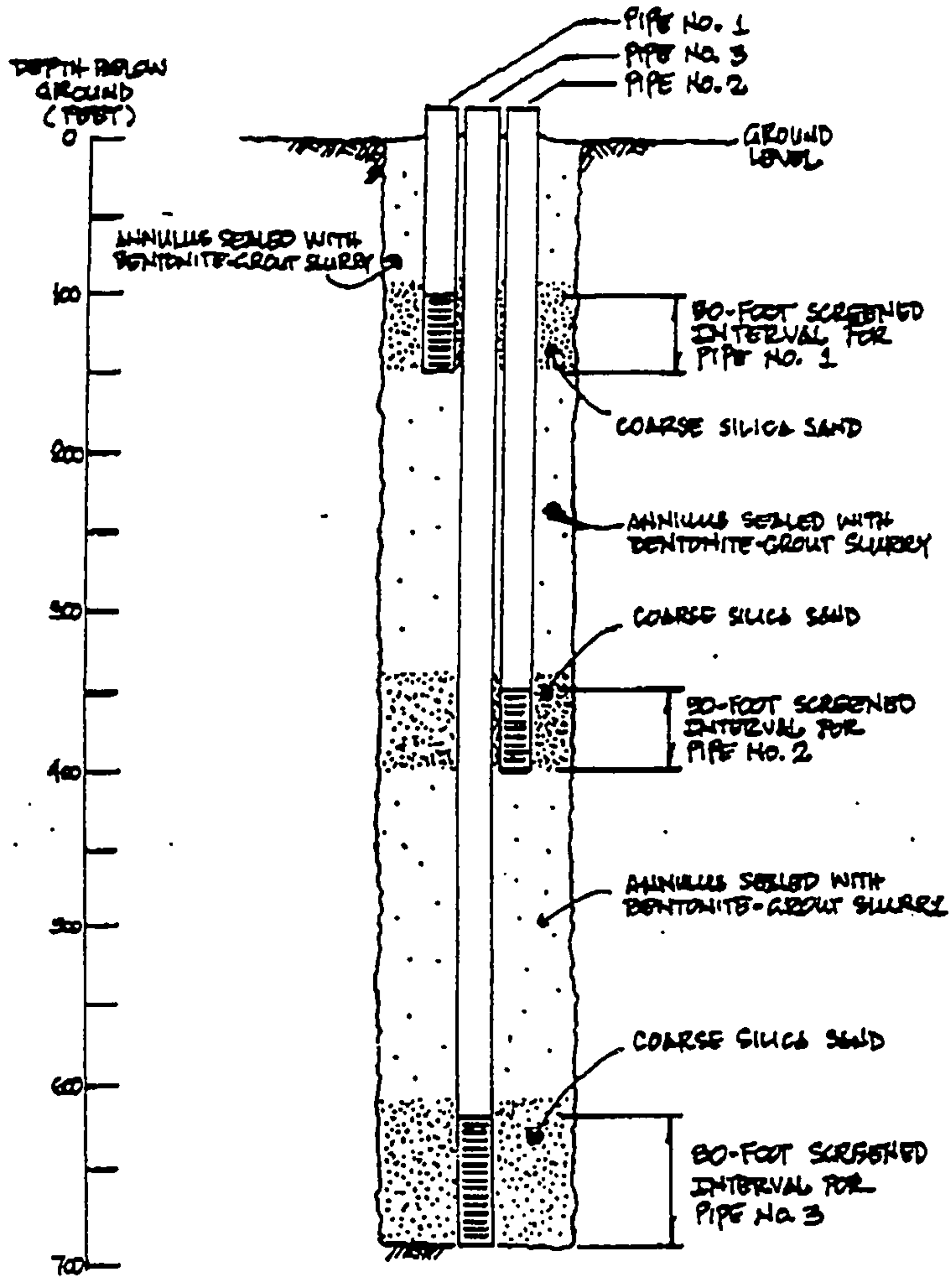

EXHIBIT 1

TYPICAL WELL SECTION

NOT TO SCALE

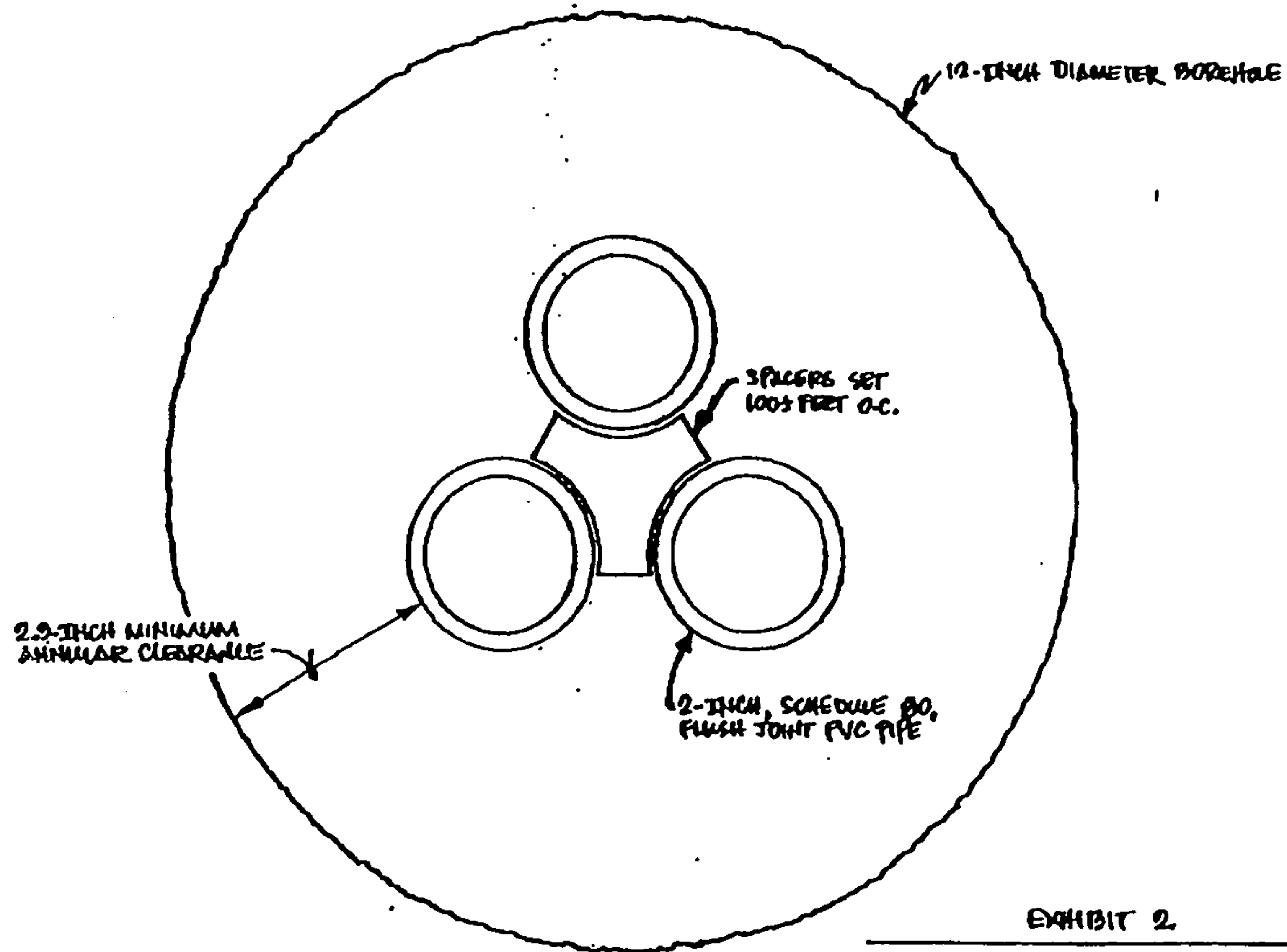

EXHIBIT 2

THREE PIEZOMETER CONFIGURATION

SCALE: 1/2:1

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

September 28, 2001

Mr. Isaac Hall, Attorney
The Coalition to Protect East Maui Water et. al.
c/o 2087 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Hall:

Subject: SEIS MONITOR WELL, HAIKU

This is in response to your letter of September 12, 2001 commenting on the drilling protocol for the subject project. We have considered your suggestion for daily sampling of water in the pilot hole and offer the following comments:

1. If water is encountered, then the amount of water will be measured before drilling begins each day and recorded.. When it is determined that the drilling has extended beyond the water bearing layer, the hole will be grouted to assure that the upper level water does not flow into the basal ground water table. Monitoring for water will continue as drilling continues.

2. The specified protocol includes monitoring of any water accumulating in the pilot hole at 100 ft. intervals. Additionally, if water is encountered at other depths, drilling will stop and measurements taken. (Contract Specifications, Section 13, Part 3.03, 3.08)

3. Prior to start-up every morning, the driller will try to best determine if formation water has accumulated in the well. If so, measurements will be taken.

4. Sample cuttings of the drilled hole will be collected at 10 foot intervals and at every change in soil formation encountered. (Section 13, Part 3.07)

5. A video log of the completed pilot hole will be taken. This will provide a visual profiling of the well and allow visual detection of any other water infiltration not previously discovered.

6. Daily drilling logs (IADC-API Official Drilling Report Form) will be submitted by the Contractor.

EXHIBIT 4

OCT 0 2 2001

"By Water All Things Find Life"

We hope you find the above to be acceptable for your purposes. Should you have any further questions or comments, please do not hesitate to contact me.

Sincerely,

David R Craddick
Director

DRC/AM:sc

cc: Mink & Yuen
Peter Rice
Corp Counsel

ISAAC DAVIS HALL
ATTORNEY AT LAW
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January 30, 2002

Via Facsimile and U.S. Mail
270-7152

Richard K. Minatoya, Esq.
Deputy Corporation Counsel
County of Maui
200 South High Street
Wailuku, Maui, Hi 96793

Re: Protocol for Test Well for the EM Plan SEIS Ordered in The Coalition to Protect East Maui Water Resources, et. al. v. The Board of Water Supply, et. al.; Civil No. 93-0734(3)

Dear Richard Minatoya:

Thank you for sending to me some test results from the Haiku SEIS Test Monitor Well. They appeared to sample chloride, nitrate, DBCP and silica on September 10, 12 and/or 31, 2001 and, therefore, were not part of the protocol for testing potential impacts on stream flows. The protocol, quoted in my earlier letter included:

a. **"Prior to start-up every morning, the driller will try to best determine if formation water has accumulated in the well. If so, measurements will be taken."**

b. The well driller will discern whether or not water has been encountered in the test hole **at the beginning of each day** and, if so, will record the amount of water which has been encountered, at the beginning of each day.

c. A video log of the completed pilot holes will be taken.

d. **Daily drilling logs** will be submitted by the contractor.

These are the records and items I really want to review and copy. When we spoke by telephone, you indicated that you would communicate with Mr. Craddick and have him locate the documents and items mentioned above.

EXHIBIT 5

Would you kindly promptly assemble these documents and items for my review? I will choose those which I wish to have reproduced. I will then pay the reproduction costs. It is vitally important that I be able to review these documents and items as soon as possible.

Please contact me to discuss the foregoing at your earliest convenience. I look forward to hearing from you.

Very truly yours,

Isaac Hall
Attorney for Plaintiffs

IH/sn

cc: Plaintiffs
Bill Meyer

William Meyer
6750 Hawaii Kai Dr. #501
Honolulu, Hawaii 96825

July 30, 2002

County of Maui
Department of Water Supply
P.O. Box 1109
Wailuku, Maui, Hawaii 96793

Re: Comments on the "Draft Supplemental Environmental Impact Statement
For the East Maui Development Plan"

Attn: David Craddick, Director

As you are aware, the purpose of drilling the monitor well discussed in the Draft Supplemental Environmental Impact Statement (DSEIS) was to resolve the issue of whether pumpage from the proposed East Maui Water Development Plan (EMPLAN) wells would affect the flow in nearby streams. The DSEIS concludes that based on the drilling results of the monitor well and based on "other research data", pumping from the EMPLAN wells will not affect stream flow. It is my opinion, however, that information presented on the results of the drilling of the monitor well and the "other research data" in the DSEIS does not allow one to come to this conclusion.

Two different concepts of ground water occurrence in the Haiku area are possible given data existing prior to the drilling of the monitor well, and whether pumpage from the proposed EMPLAN wells will affect stream flow depends on which concept is the correct one. One concept of ground water occurrence was that the Haiku area is underlain by a perched aquifer in the Kula Volcanics and by a basal aquifer with water levels near sea level in the Honomanu Basalts, which underlie the Kula rocks. That part of the Honomanu Basalts above the presumed basal water table and below the Kula Volcanics is considered to be unsaturated in this concept. The other concept was that the rocks are saturated below the water table in the Kula Volcanics. This would mean that only a single, vertically extensive ground water body, such as now known to exist in the Nahiku area, underlies the Haiku area. It would also mean that the permeability of the Honomanu Basalts is generally low for several hundreds of feet below the Kula Volcanics, as is the case in the Nahiku area also. High permeability would be encountered some distance below sea level.

If the first concept proved correct, then pumpage from wells completed in the basal aquifer would only affect stream flow near the coastline at locations seaward of the point where the basal water table intersects the streambed. If the second concept proved correct, then wells completed at any altitude in the vertically extensive ground water

EXHIBIT 6

body, even if this was below sea level, would affect stream flow throughout most of the Haiku area, or at least in the area where streams actually gained flow from the discharge of ground water into them..

In order to resolve these conflicting viewpoints, I recommended to Judge Mossman of the Circuit Court that a monitor well be constructed and that a daily record of water levels (or depth to water in the well) be recorded as the well was drilled. Water levels were to be measured each morning before drilling commenced. Morning water levels obtained during drilling in the Nahiku area have been used by the USGS (USGS Professional Paper 1618) as a means of addressing the same conceptual question about ground water occurrence in the Nahiku area that existed for the Haiku area. I also recommended that the results of the East Maui surface water-ground water study conducted by the USGS be used to identify the location of the monitor well. If water persisted in the well as it was drilled to sea level, this would be evidence that the rocks in the Haiku area are saturated below the first water table encountered. A falling water level in the well as it was drilled, would still support the concept that the rocks in the Haiku area are saturated from the Kula Volcanics on down. If the hole encountered water in the Kula, but remained dry below the Kula until the basal aquifer near sea level was encountered, this would be evidence that the first concept is correct. Obviously, since the purpose of drilling the well was to record water levels, it was important that the well be drilled in such a fashion that water was free to enter the hole as it was drilled. It's my understanding that my recommendation was accepted by Judge Mossman as the means to resolve the conflict.

A basic problem I find with the DSEIS, is that before the report even discusses the results obtained from the drilling of the monitor well, it reaches the conclusion that the Haiku area is underlain by a perched ground water body in the Kula Volcanics which, in turn, is underlain by a basal aquifer in the Honomanu Basalts. Given this conclusion the DSEIS also concludes that pumpage from the proposed East Maui wells will not affect stream flow except near the coast at locations oceanward of the point where the basal ground water table intersects stream valleys. These conclusions, however, are not supported by any presentation in the DSEIS of the water level data that was supposed to be collected from the monitor well in order to answer the question in the first place. Based on the information presented in the DSEIS, the conclusion about ground water occurrence could have been written before the monitor well was drilled.

It would appear from the information presented on page 42 of the DSEIS, that the protocol followed while drilling the monitor well was not that which was recommended. In fact the protocol assumed that the water body in the Kula Volcanics was perched and that a basal water body existed. The stated protocol was to drill until the "perched water" in the Kula Volcanics was encountered, cement this area off, and continue drilling into the Honomanu Basalt. The drilling protocol in the Honomanu Basalt apparently called for cessation of drilling at 100 ft intervals for about one hour to allow water to accumulate, if it existed, before drilling was once again initiated. The protocol also called for establishing the height of the water table in the basal water body. The recommended protocol or procedure for obtaining water levels, however, was to measure the depth of water in the hole every morning prior to the initiation of drilling. The process of drilling generally removes water from an aquifer and time is required for the water level to recover. The lower the permeability of the host rock, the longer the time required for this recovery and for water to enter a large drill hole such as that of the monitor well. One hour is not sufficient time for this process to occur. The recommendation to allow water to accumulate overnight was made to allow for this time.

It is obvious from the video log presented on page 43 of the DSEIS that moisture was encountered in the Honomanu Basalt and that these rocks are not completely unsaturated as stated in the DSEIS. Water in the unsaturated zone will not enter an open drill hole owing to the fact that the water is under less than atmospheric pressure. If the Honomanu Basalts are truly unsaturated below the Kula Volcanics and above the presumed basal water body, there should be no evidence of visible moisture or water in the Honomanu Basalts in the video, but this is not the case. The Video records that the borehole is moist between the depths of 105-135 ft in the Kula Volcanics and for the depths 156-200, 207-210, 343-387 (water actually is dripping), and 520 ft in the Honomanu Basalts. The moist zone in the Kula Volcanics between 122-135 ft well depth is stated to be the source of the "perched" water body in the Kula Volcanics, but this same type of information concerning moist walls in the Honomanu Basalts is ignored as an indication of saturated rock.

The DSEIS states, on page 44, that the video log shows the presence of cavities and clinker in the Honomanu Basalt, which according to the DSEIS implies a high degree of permeability for the Honomanu Basalts, but, in fact, the log seems to show the opposite. The presumably high permeability zones such as clinker and voids are infrequent and account for only about 12 per cent or so of the Honomanu Basalt above sea level. This strongly suggests that the overall permeability of the Honomanu Basalt above sea level is low, and not high as stated in the DSEIS, a fact that would support the existence of a vertically extensive ground water body in the Honomanu Basalt.

The video log is the only data actually presented concerning the hydrologic setting of the monitor well, and as discussed immediately above, results from it do not actually support the conclusion that the Honomanu Basalts are unsaturated below the Kula Volcanics and above the presumed basal water body. In fairness, the log doesn't completely support either of the two concepts concerning ground water occurrence that were to be addressed.

The video information is not remotely the same thing as a log of morning water level in the well as it was being drilled. Perhaps the latter information is available and has been used to assist in the conclusions of the DSEIS, but no information is presented in this regard. The existence of the water table at about 4.6 ft above sea level is not entirely conclusive either. This water level corresponds to the final well depth of 65 ft below sea level. The water level in Mokuhau wells 15 C, 15, D, and 15 E remained several hundred ft above sea level for borehole depths ranging from about 80 to 120 ft below sea level after which they fell abruptly to about 25 ft above sea level (USGS WRI Report 00-4223). In order for reviewers of the DSEIS to be able to reach their own conclusions about the nature of ground water occurrence in the Haiku area, it is necessary that the information on daily water levels recorded in the well prior to the initiation of drilling each day be made available to them. It is also necessary that the method of drilling be indicated so that it is clear that water was free to enter the borehole. Without this information, the central issue remains unresolved.

Another problem I find with the DSEIS is that it identifies a new "aquifer unit", which it refers to as the Kuiaha Unit, in which all of the wells of the EMPLAN will be located and concludes that 10 mgd is available from this unit. Aquifer units are not recognized by the Commission on Water Resources Management (Commission) and given that production of ground water by the Maui County Department of Water Supply must conform to the administrative oversight of the Commission, creation and use of this "unit" in the DSEIS for the purposes of predicting ground water availability would not appear to be supportable. The DSEIS needs to discuss ground water availability within the existing aquifer framework of the Commission.

The DSEIS states that the "*volume of water in exploitable storage is a function of static head (elevation of the water table above sea level) and effective porosity*", but, in fact the amount of ground water that can be developed is constrained by the necessity to limit drawdown in a well to a value that precludes salt water intrusion into the well. Although the initial head is important in this regard, the effective porosity has no importance whatsoever. The DSEIS utilizes John Mink's Robust Analytical Model (RAM) to determine that 10 mgd is available. The RAM, however, has been shown by the USGS to over predict the availability of ground water, while at the same time leaving sites of ground water withdrawal subject to saltwater intrusion because it under predicts the drawdown at withdrawal sites (USGS WRI Report 00-4244). This is the current problem in the Iao aquifer.

Assuming that the water level in the EMPLAN wells is on the order of 7 ft, depth to the theoretical interface between fresh water and seawater is about 280 ft. There is no available information concerning the thickness of the upper transition zone in the EMPLAN area, but assuming that it's on the order of 150 ft, the thickness of the freshwater lens is about 130 ft. If the EMPLAN wells were to penetrate 100 ft below sea level, the available drawdown in the wells is less than 1 ft if saltwater intrusion is to be precluded. The use of the RAM in the DSEIS indicates drawdown in the proposed wells will be on the order of 1.2 to 1.8 ft. This amount of drawdown would not be acceptable unless the upper thickness of the transition zone is significantly less than 150 ft, and this is not too likely. Remembering that the RAM under predicts the drawdown at pumping locations, the actual drawdown at the proposed wells would be expected to be greater than that projected by the DSEIS. In order to more appropriately address ground water availability from the proposed wells, the DSEIS needs to discuss well yields in terms of well depth, estimated drawdown based on well hydraulics, and depth to the top of the transition zone, not on the basis of a prediction made from the RAM.

The DSEIS concludes that there is no connection between the Honomanu Basalts and streams in the EMPLAN area and the withdrawal of ground water from the proposed wells will not affect streamflow. Having made this conclusion, however, the DSEIS contradicts itself with the statement that "*streams are not sustained by discharge into the* *stream channels from the Honomanu aquifer except very near the coast below an elevation of about 3 ft where the Honomanu water table is exposed. The reach of this occurrence is less than a few hundred feet upstream from the coast*". Seemly, the DSEIS would need to address the effect of pumping on this even this reach of stream, assuming that its other conclusions are correct. The responsibility of protecting in-stream flow values does not end a few hundred feet from the ocean; rather it extends to the sea and beyond.

Finally, I find it somewhat strange that the DSEIS would quote a USGS draft report or that the authors of the DSEIS would even have a copy of it. The policy of the USGS is that draft reports are not available for public release and cannot be cited. I believe that this fact should be well known to at least one of the principles of the Company that produced the DSEIS. The USGS draft report by Mr. P. Eyre referenced in the DSEIS was not able to pass peer review and was never approved for release to the public as a result. Because the USGS will not stand behind this report, and because the authors of the DSEIS should never have received a copy of it in the first place, let alone referenced it, I believe that any reference to the Eyre draft report should be deleted from the DSEIS. The use of this report only weakens the DSEIS.

In conclusion, I believe that the information presented in the DSEIS falls considerably short of providing the information needed to resolve the issue with regard to ground water occurrence in the Haiku area. I appreciate the opportunity to have been able to comment on the subject report and I hope you find my comments useful.

Sincerely,

William Meyer

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833 • www.mauiwater.org

September 4, 2002

Mr. Isaac Hall, Esq.
The Coalition to Protect East Maui
Water Resources et. al.
2087 Wells Street
Wailuku HI 96793

Dear Mr. Hall:

Re: Draft Supplemental EIS for the East Maui Water Development Plan

Thank you for your comments of August 7, 2002 regarding the subject project. While we respect your right to make comments not related to the Draft Supplemental Environmental Impact Statement (SEIS), we will limit our response to environmental concerns raised through our consultation process which you have responded to on behalf of your clients.

I. The transmission pipeline size needed for the project is based on flow peaks from system demand and will not deliver as much water as the Central Maui Transmission Joint Venture line out of Iao because the East Maui line will be longer. Based on simple laws of physics the longer of two similarly sized pipelines with similar initial pressures will deliver less water due to increased friction losses over the longer length.

The comments on the ditch system and its effect on the environment are not a part of this SEIS.

II.A.1. The Draft SEIS was prepared in compliance with the Court Orders and addresses the concerns raised by the plaintiffs.

II.A.2. The Court Order, which authorized the construction of the SEIS monitor well, does not limit the diameter of the well. The Department chose to drill a production size well to remove any argument that the data collected to determine the effect on stream flow was not measurable because the well was pump tested below the capacity of well proposed in the East Maui Water Development Plan (EMPLAN) dated September 1992. By doing so, the data collected from the SEIS monitor well is of the greatest value in determining the effect on stream flow at production rates envisioned in the EMPLAN.

"By Water All Things Find Life"

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Mr. Isaac Hall
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The SEIS monitor well was drilled in accordance with the protocol agreed to by both parties. Measurements were attempted each morning during drilling in the Honomanu Basalt until no fluid accumulated in the bore hole. In the uppermost portion of the Honomanu Basalt, drilling fluid accumulated until circulation was lost, following which no standing water occurred until nearly at sea level. Drilling a well is not an operation in which every result is predictable. Once circulation was lost, at a depth of 336 feet, the boring was dry except for an occasional film of fugitive moisture. The Honomanu Basalt, based on observation during drilling proved to be unsaturated until the basal water table was encountered at 4.7 feet above sea level, about 670 feet below the ground surface. A video log of the open boring was taken and the driller also maintained a daily drilling log, both of which were submitted to the Department.

III.A. Mink and Yuen, Inc. prepared the Draft SEIS in a scientific manner, free of bias. Its conclusions were based on rigorous analyses of data collected from the SEIS monitor well and references to work of other investigators, including the U.S. Geological Survey (USGS).

III.B. Governor Cayetano and Mayor Apana have both delegated their authority for acceptance of the Final SEIS to the Maui Board of Water Supply.

III.C. The Department responded in writing to all comments received on the SEIS Preparation Notice. By law, the Department is not required to hold a public scoping meeting. See HAR §11-200-15.

III.D. Responsible opposing views (e.g., that the Honomanu Basalt is saturated to high elevations above sea level) were evaluated and determined not to be applicable to the hydrogeological environment of the Haiku Aquifer System.

III.E. The 1998 Marine Research Consultants report titled "Assessment of Impacts to Water Quality and Marine Community Structure from the Proposed East Maui Development Plan, Phase I" will be included in the Final SEIS. The USGS study entitled "Ground Water and Surface Water in the Haiku Area, East Maui, Hawaii" (1999) will not be included, but will be available at the Department for review or may be obtained directly from the USGS. Including a copy of every reference in appendix of the Final SEIS is unwarranted.

IV. The parameters for an EIS as defined in HRS §343-2, HAR §11-200-14, -16, & 19 have and will be addressed in the Final EIS.

V.A. Studies previously conducted to assess environmental impacts were thoroughly reviewed. A repeat of these studies would be redundant. Mink and Yuen, Inc. conducted its own field investigations to supplement previous studies.

V.B. The Final EIS will address HAR §11-200-17(g).

V.B.1. The location of the original wells may be found in original Final EIS ('93) and the EMPLAN. The Tax Map Key number of potential well locations may be found in Exhibit "B" of the original Final EIS ('93) in a report titled "Well Exploration and Development, East Maui Source Development" (11/91).

If the original well sites are to be relocated, they would be situated at an elevation of about 1,000 feet. The Department has taken no action to relocate the original well sites, other than discuss the possibility of relocation in the Draft SEIS for the subject project. Once a determination is made to relocate the well sites, studies will be conducted in compliance with HRS Chapter 343.

V.B.2. The construction cost to implement the project is discussed in the EMPLAN. The USGS has not performed any studies specifically for the SEIS that we know of.

V.B.3. The action area is outlined on the groundwater potential map, Figure 5 (pg. 23A) of the Draft SEIS. All of the wells as proposed in the EMPLAN will be located within this area. The wells will be sited and designed to prevent overpumping and interference between wells.

V.B.4. The stream flow diagrams in Figure 9 (pg. 48A) and Figure 10 (pg. 48B) depict the major streams and their tributaries in the Haiku region. The USGS measurements are included on the flow diagrams. No streams will be affected by the wells proposed for the EMPLAN.

There are no perennial streams throughout their channel lengths in the action area, according to USGS measurements. To be perennial a stream must flow all of the time.

V.B.5. A thorough study has been made of the water resources in the Haiku region by the USGS and subsequently by Mink and Yuen, Inc. The Kuiaha Aquifer Unit has been identified by Mink and Yuen, Inc. as lying in the region between the two traces of the north rift zone of Haleakala. The reasons for this assignment is given in the Draft SEIS. Terminology of aquifer subdivisions in the Aquifer Classification system employed by CWRM is as follows, from largest division to smallest: Aquifer Sector ... Aquifer System ... Aquifer Type ... Aquifer Unit.

The use of the Robust Analytical Model (RAM) is based on a conservative estimate of water balances. Groundwater flux assumed to pass through the Haiku region is a third less than that assumed in the USGS study.

V.B.6. Because stream flow will not be affected by pumping from the Honomanu basal aquifer, this SEIS does not have to address riparian and appurtenant rights. They will not be impacted by pumping.

V.B.7. It has been unequivocally established that pumping groundwater from the Honomanu basal aquifer will not affect stream flow and therefore will not degrade instream values. There will be no diminution in stream flow due to pumping.

V.B.8. To reiterate, pumping from the Honomanu basal aquifer will not affect stream flow and thus will not infringe on the current use of streams for farming, domestic and other uses.

V.B.9. Pumping from the Honomanu basal aquifer will not affect streamflow. Potential natural stream flow is impacted by collection and diversion ditches, but an analysis of the effects of these diversions is beyond the scope of this SEIS, which hydrogeologically focuses on the putative effects of groundwater pumpage on stream flow, coastal outflow and the potential for contamination.

V.B.10. The data about groundwater wells and draft given in the Draft SEIS were abstracted from records filed with the Commission on Water Resource Management (CWRM) and has been found to be correct.

V.B.11. The average anticipated groundwater draft will be 10 mgd from the Kuiaha Aquifer Unit. The sustainable yield is estimated at 16.7 mgd. A sufficient surplus exists beyond the 10 mgd scheduled for Central Maui to supply the Haiku region. The Haiku region is in Census Tract 302 which for the 2000 census counted 8,377 people. Tract 302 extends from Maliko to Huelo. Total demand would be less than 1 mgd.

V.C.1. Archaeological and historic impacts are covered in the original EIS. Once a determination is made to relocate the well sites, studies will be conducted in compliance with HRS Chapter 343.

V.C.2. Social and economic impacts are covered in the original EIS. However, since that time numerous community plans which will be served by the proposed action have been updated. The information from these updated community plans is included in the appendix of the Final SEIS. The EMPLAN meets the objectives and policies of all of the community plans. One of the objectives and policies of the Kihei-Makena Community Plan is to "support and expand the projected development of Central Maui and East Maui water systems in order to meet the needs of all Maui residents."

VI. All testing and analysis of available data by Mink and Yuen and others show that pumping from the Honomanu basal aquifer will not affect stream flow. Representation that there may be potential impacts is speculative and not based on concrete evidence or data. Stream flow measurements done by USGS also invalidate the notion that the streams are sustained by groundwater from the Honomanu basal aquifer.

VI.A.1. A clear and unarguable conclusion derived from the USGS study entitled "Ground-Water Occurrence and Contribution to Stream Flow, Northeast Maui, Hawaii" (1999) is that pumping from the Honomanu basal aquifer in the Haiku region does not and will not affect stream flow.

Data from the monitor well has indeed confirmed that the Honomanu Basalt is unsaturated above the basal water table, which stands less than about 10 feet above sea level.

VI.A.2. The monitoring of springs and stream flow to establish a baseline measurement of groundwater discharge would take many years to yield statistically reliable results. Springs and stream flow will not be impacted by pumpage from the Honomanu basal aquifer. The Department continues to work with the CWRM to study streams in the area. This action however is not a part of the EMPLAN.

VI.A.3. The USGS suggestion that aquifer tests using multiple observation wells to determine hydraulic conductivity related to the orientation of the rift zones would yield results not needed for this SEIS. Hydraulic conductivity vertically is already known to be such that the formations above the basal aquifer are not saturated in the area of the EMPLAN.

VI.A.4. The lithology of new wells can be logged during drilling and water levels measured. Vertical flow gradients are postulated but not explained. They cannot be measured directly, if in fact they are of consequence.

Implementation of the actions proposed above would entail large costs and a very long time, well beyond the scope of the Draft SEIS.

VI.B. The Draft SEIS will be amended to state that "there are no perennial streams throughout their channel lengths under current conditions." The USGS stream flow measurements clearly demonstrate this conclusion. Flow in the perennial reaches of the streams is derived from perched water in the Kula Volcanics, which overlie the Honomanu Basalt. The Honomanu basal aquifer, the source of the proposed pumpage, does not drain into streams except very near the coast below an elevation of about two feet above sea level.

VI.C. The Dowling well could not have impacted stream flow in the Sheehan property. The well draws water from the Honomanu basal aquifer where the water table is about ten feet above sea level. The well is sealed from inflow above this elevation.

VI.D. The monitor well protocol was followed to the best of opportunities allowed during drilling. Once the drilling started in the Honomanu Basalt at a depth of about 150 feet water level measurements were attempted each morning but measurable water had not accumulated except near the top of the formation where saprolite conditions occur and drilling fluids accumulated. Drilling circulation was lost at a depth of 336 feet, which indicates that the formation is highly permeable and unsaturated. The video log unequivocally establishes that saturation was not encountered until the basal water table was struck at 4.7 feet above sea level.

VI.E/F. The description of the video log in Table 4 clearly states that the Honomanu is unsaturated. A different interpretation is false. The Honomanu is not saturated above the basal water table, and consequently pumpage from it will not affect stream flow.

VI.G. Response is given above.

VII. An analysis of groundwater from the Kula Volcanics showed contamination with DBCP of 13 ppt, considerably less than the DOH MCL (allowable maximum concentration of 40 ppt). No volatile organics (including DBCP, EDB and TCP) were detected in the Honomanu basal groundwater. The data base for contaminants elsewhere in the Haiku region does not allow rational computer modeling.

VIII. The Draft SEIS states that the wells will be sited to meet DOH requirements.

IX. Studies conducted to determine the potential effect of the proposed project on water chemistry and marine community structure revealed that there appears to be no potential for negative impacts to marine ecosystems in the near shore region of East Maui. As

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stated previously a copy of the study prepared by Marine Research Consultants will be included in the appendix of the Final SEIS.

X. The estimate of the sustainable yield in the Kuiaha Aquifer Unit is deliberately conservative. Apportionment to the Unit of the USGS estimate of groundwater flux for the Haiku Aquifer System would result in a higher sustainable yield.

XI.A. A number of comments have been made that the 36 inch pipeline will have more capacity than is needed to transmit an average of 10 mgd to Central Maui. In designing pipelines, maximum day, peak hour and fire flows must be considered. When all are taken into account, flows as great as 25 mgd may be expected.

XII. Groundwater knows no boundaries. Most Aquifer Systems are hydraulically connected, although the continuity may be suppressed. An "aquifer of origin" has not been defined, nor is it definable. Transfer of groundwater from area to area in Hawaii is common. All of the water served in Central Maui is transferred from other areas.

The claim that the transfer of groundwater from an undesignated area is a violation of the Water Code is unfounded. The Water Code does not prohibit such transfers. The transfer of groundwater from an undesignated area from an undesignated area does not require a water use permit from the State Water Commission.

XV. The Draft SEIS was prepared without bias and the conclusions are based on rational analyses of data and observations.

XVI. In drilling the monitor well, attention was focused on determining whether the Honomanu Basalt is saturated above the basal water table. It was determined that it is not saturated above the basal water table. To propose otherwise is speculation that cannot be proved. Therefore, pumping from the basal aquifer will not impact stream flow.

Changes in salinity over time can best be determined by a monitor well drilled into the salt water below the basal lens.

The performance of the aquifer will be monitored at the recently drilled monitor well and other wells in the region.

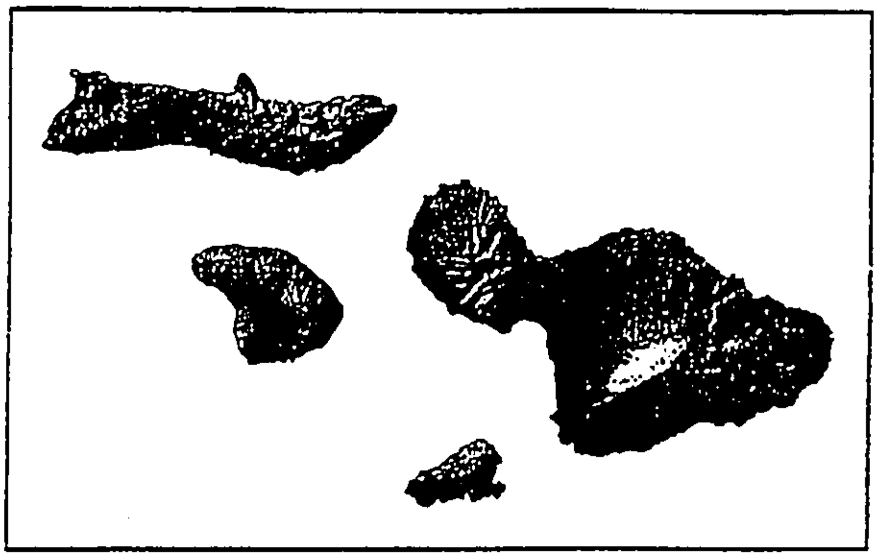
Sincerely,

David R. Craddick, Director
M&Y/DRC
cc: Mink & Yuen, Inc.

19.11

SECTIONS DEALING WITH WATER

COUNTY OF MAUI GENERAL PLAN (1990)



General Plan
1990

COUNTY OF MAUI

B. <u>WATER</u>

Objective

1. To provide an adequate supply of potable and irrigation water to meet the needs of Maui County's residents.

Policies

a. Support the improvement of water transmission systems to those areas which historically experience critical water supply problems provided the improvements are consistent with the water priorities and the County's Water Use Development Plan provisions for the applicable community plan area.

b. Meet or exceed Federal quality standards for the potable water supply.

c. Develop improved systems to provide better fire protection.

d. Monitor growth activities throughout Maui County in order that development of new water sources is concurrent with approval of new developments.

e. Support the Board of Water Supply in its determination of future water needs consistent with the General Plan, Community Plans and the growth management strategy.

f. Support expeditious action on legislation providing replacement of inadequate water transmission systems.

g. Seek new sources of water by exploration in conjunction with other government agencies.

h. Maintain the right to manage the County's water sources and transmission systems at the County level.

i. Develop sufficient water supply during drought seasons so as to keep agricultural activities viable.

j. Support the planning, preservation and development of water resources and systems which service Hawaiian Home Lands.

Objective

2. To make more efficient use of our ground, surface and recycled water sources.

Policies

a. Reclaim and encourage the productive use of wastewater discharges in areas where such use will not threaten the integrity of ground water resources.

b. Create means of supplying low cost water for agricultural purposes especially in areas where water systems can be diverted for agricultural needs while continuing to meet domestic needs.

c. Create water distribution practices during droughts favorable to farmers who use water efficiently during non-drought periods.

d. Improve catchment systems and transmission systems to reduce runoff.

e. Maximize use of existing water sources by expanding storage capabilities.

f. Discourage the use of standpipes for fire protection purposes.

g. Promote water conservation practices to make the most efficient use of existing water sources.

h. Support the establishment of potable groundwater use priorities which prohibit the use of potable water for the irrigation of golf courses, golf driving ranges, parks and landscaped open space.

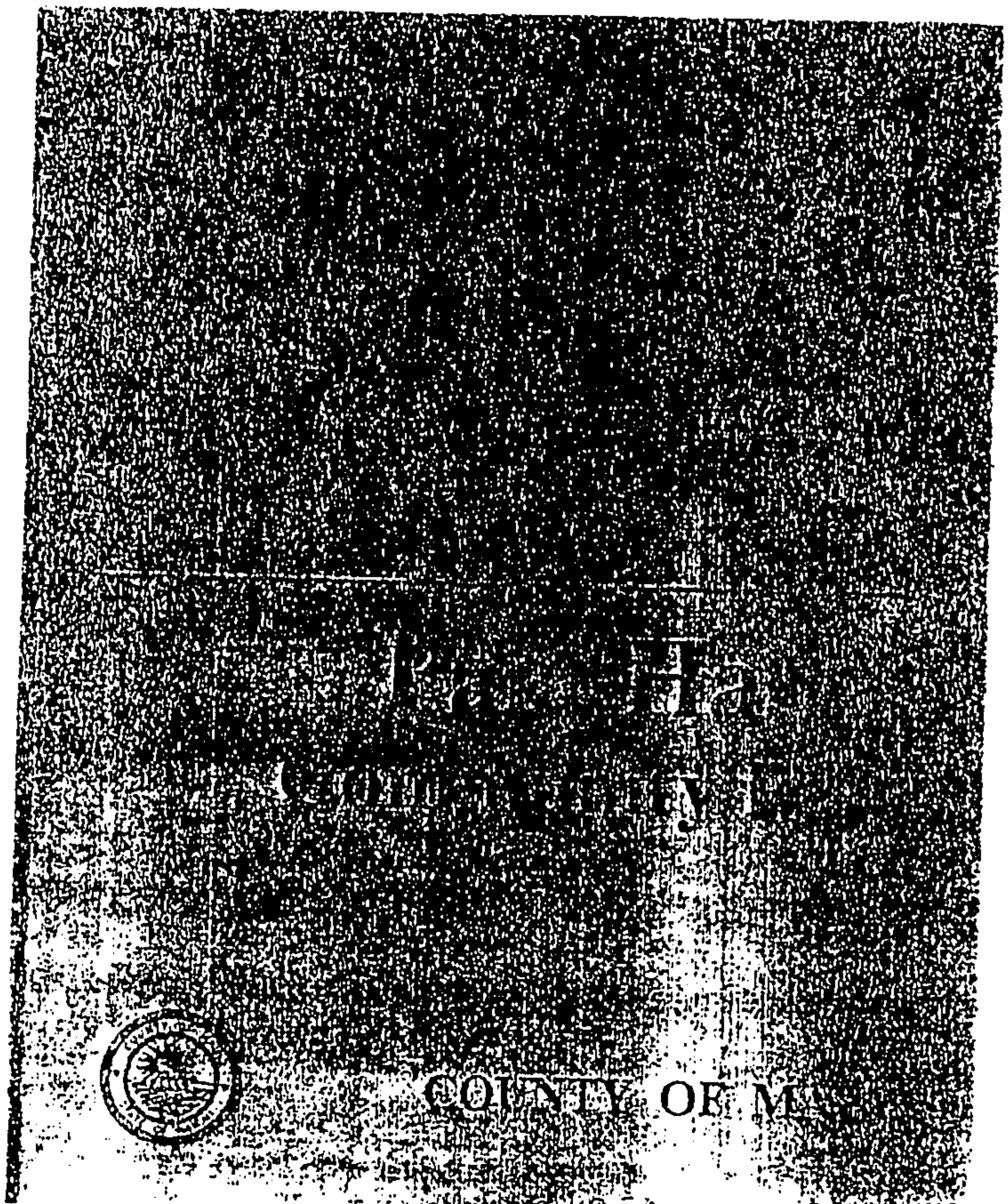
i. Develop a method of allocation of water based on community need.

19.12

SECTIONS DEALING WITH WATER

HAIKU-PAIA COMMUNITY PLAN

COUNTY OF MAUI


COUNTY OF

WATER USE ALLOCATION. The development of new ground water sources in Ha'iku to service the Central Maui area of Wailuku-Kahului and Kihei-Makena raises a concern over the allocation of water resources to these other regions if and when the present and future needs of the Pa'ia-Ha'iku area are not met.

C. **Interregional Issues**

During deliberations over possible amendments to the Pa'ia-Ha'iku Community Plan, several issues were considered which affect other regions. This section discusses these issues which need interregional, island-wide or County-wide comprehensive policy analyses and formulation.

1 Water use allocation. There is concern over the development of new ground water sources in Ha'iku and the allocation of this resource to service other regions of the island, namely Wailuku-Kahului and Kihei-Makena, and how this relates to the future needs of the Pa'ia-Ha'iku area.

Water

Goal

An adequate supply of potable and irrigation water to meet the needs of the region.

Objectives and Policies

1. Increase water storage capacity with a reserve for drought periods.
2. Ensure that adequate water capacity is available for domestic and agricultural needs of the region.
3. Ensure that the development of new water sources does not adversely affect in-stream flows.
4. Continue the conversion to drip irrigation in sugar cane fields, provided that the practice complies with soil conservation standards.
5. Improve the existing potable water distribution system and develop new potable water sources prior to further expansion of the State Urban District boundary or major subdivision of land in the State Agricultural or Rural Districts.
6. Ensure adequate supply of groundwater to residents of the region before water is transported to other regions of the island.

Implementing Actions

1. Prepare or update a water improvement master plan for the Pa'ia-Ha'iku region to be incorporated as a functional component of the Community Plan.
2. Update the County's Water Use and Development Plan and estimated water use for the Pa'ia-Ha'iku region based on the adopted Community Plan and include a reserve capacity for drought conditions.
3. Develop a comprehensive agricultural water system, including the use of recycled water and a dual water system for domestic and irrigation uses.
4. Provide incentives for water conservation practices.

19.13

SECTIONS DEALING WITH WATER

WAILUKU-KAHULUI COMMUNITY PLAN

COUNTY OF MAUI

WAILUKU-KAHULUI
COMMUNITY PLAN
(2002)

MAUI COUNTY COUNCIL

EXHIBIT "1"

[illegible]

WATER AND UTILITIES

Objectives and Policies

1. Coordinate water system improvement plans with growth areas to ensure adequate supply and a program to replace deteriorating portions of the distribution system. Future growth should be phased to be in concert with the service capacity of the water system.

2. Improve the quality of domestic water.

3. Promote water conservation and education programs.

4. Protect water resources in the region from contamination, including protecting ground water recharge areas, and wellhead protection areas within a 1.25-mile radius from the wells.

5. Coordinate the construction of all water and public roadway and utility improvements to minimize construction impacts and inconveniences to the public.

6. Coordinate expansion of and improvements to the water system to coincide with the development of residential expansion areas.

7. Promote conservation of potable water through the use of treated waste water effluent for irrigation.

8. Encourage reasonable rates for water and public utility services.

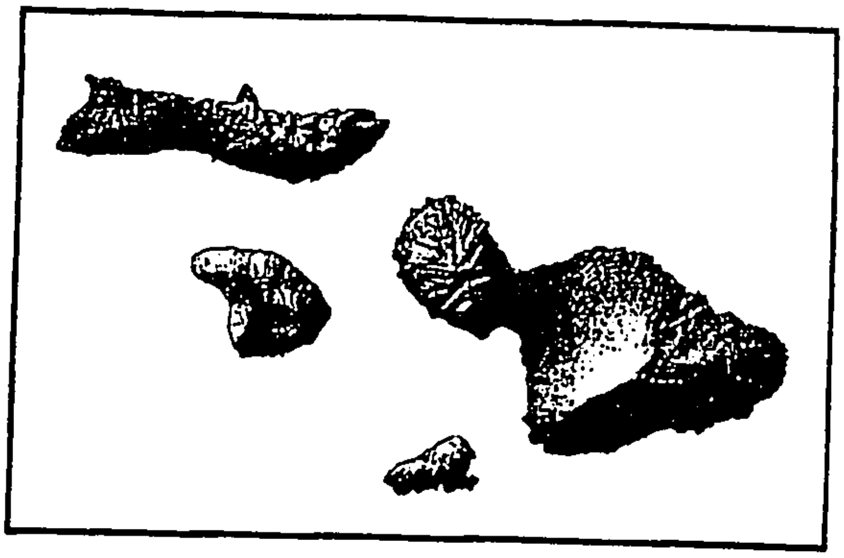
9. Ensure that proliferation of telecommunication towers does not negatively impact the natural beauty of Maui County and the comfort and health of its residents.

19.14

SECTIONS DEALING WITH WATER

KIHEI-MAKENA COMMUNITY PLAN

COUNTY OF MAUI



Kihei-Makena Community Plan

COUNTY OF MAUI

Water Distribution

Objectives and Policies

a. Provide for appropriate water source and transmission improvements concurrent with planned growth of the Kihei-Makena region.

b. Support and expand the projected development of the Central Maui and East Maui water systems in order to meet the needs of all Maui residents.

c. Develop water conservation, reuse and educational programs.

d. Encourage the use of non-potable water for irrigation purposes and water features. Prohibit the use of potable water in large water features or require substantial mitigation fees.

e. Encourage the use of plants which have a relatively low need for water.

END

CERTIFICATION

I HEREBY CERTIFY THAT THE MICROPHOTOGRAPH APPEARING IN THIS REEL OF FILM ARE TRUE COPIES OF THE ORIGINAL DOCUMENTS.

2006

DATE

J. Kaai

SIGNATURE OF OPERATOR

TOP

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PRECISION℠ RESOLUTION TARGETS

LEFT

RIGHT

150 MM

6″

PA-3 8½″x11″ PAPER PRINTED GENERAL TARGET

DENSITY TARGET

ADVANCED MICRO-IMAGE SYSTEMS HAWAII