CADES SCHUTTE LLP

DAVID SCHULMEISTER 2781-0
ELIJAH YIP 7325-0
1000 Bishop Street, Suite 1200
Honolulu, HI 96813-4212
Telephone: (808) 521-9200

Attorneys for
HAWAIIAN COMMERCIAL AND SUGAR
COMPANY

COMMISSION ON WATER RESOURCE MANAGEMENT

OF THE STATE OF HAWAII

In the Matter of: IAO GROUND WATER MANAGEMENT AREA HIGH-LEVEL SOURCE WATER USE WUPAS AND PETITION TO AMEND INTERIM INSTREAM FLOW STANDARDS OF WAIHEE, WAIEHU, IAO, & WAIKAPU STREAMS CONTESTED CASE HEARING	Case No. CCH-MA-06-01 HAWAIIAN COMMERCIAL AND SUGAR COMPANY'S OPENING BRIEF; DECLARATION OF GARRET HEW; DECLARATION OF MAE NAKAHATA; DECLARATION OF RICK W. VOLNER, JR.; CERTIFICATE OF SERVICE Hearing: Date: March 10-28, 2014 Hearing Officer: Dr. Lawrence Miike

HAWAIIAN COMMERCIAL AND SUGAR COMPANY'S OPENING BRIEF

I. INTRODUCTION

Hawaiian Commercial and Sugar Company ("***HC&S***") submits this Opening Brief along with the written testimony of its witnesses and its exhibits in accordance with Minute Order No. 27 herein to provide an overview of HC&S' initial position and evidence on the issues that the Hawai'i Supreme Court ordered the Commission on Water Resources Management ("***CWRM***") to consider on remand in this proceeding. Below, HC&S addresses the remand issues specific to its operations: (i) the continued cultivation of HC&S Fields 921 and 922; (ii) the viability of pumped groundwater from Well No. 7 and recycled wastewater from the Kahului sewage

treatment plant as reasonable alternatives to Nā Wai 'Ehā stream water for HC&S; (iii) the estimate of HC&S's system losses; and (iv) the incremental economic impact upon HC&S of further modifications to the Interim Instream Flow Standards of the Nā Wai 'Ehā streams. HC&S reserves the right to comment and submit evidence regarding other remand issues in its responsive and rebuttal submissions.

II. BACKGROUND

A. Procedural History

1. Petition to amend the IIFS

On June 25, 2004, Petitioners Hui O Nā Wai 'Ehā and Maui Tomorrow Foundation, Inc. ("***Hui/MT***") filed with CWRM a "Petition to Amend the Interim Instream Flow Standards for Waihe'e, North & South Waiehu, 'Īao, and Waikapū Streams and Their Tributaries" (the "***IIFS Petition***"). The IIFS Petition requested amendment of the IIFS for the Nā Wai 'Ehā Streams. Hui/MT followed with a Waste Complaint and a Petition for Declaratory Order ("***Waste Complaint***") against Intervenor Wailuku Water Company ("***WWC***"; formerly known as Wailuku Agribusiness Co, Inc.) and HC&S, filed with CWRM on October 19, 2004.

On February 15, 2006, CWRM *sua sponte* ordered that a contested case hearing be held for certain water use permit applications ("***WUPA***") from diked, high-level well and tunnel sources in the 'Īao Aquifer System Ground Water Management Area. CWRM specified that the IIFS Petition would be included in the contested case hearing. CWRM further directed that mediation for the Waste Complaint be initiated before the hearing. On March 17, 2006, CWRM clarified that two contested case hearings would be held, one for the IIFS petition and the 'Īao high-level WUPAs (CCH-MA06-01; hereinafter, the "***Hearing***"), and a separate hearing for the Waste Complaint (CCH-MA06-02). On June 19, 2006, CWRM granted standing in these two hearings to five parties: (1) the County of Maui Department of Water Supply ("***MDWS***"); (2)

WWC; (3) HC&S; (4) the Office of Hawaiian Affairs ("***OHA***"); and (5) Hui/MT. Dr. Lawrence Miike was appointed the hearings officer (the "***Hearings Officer***") for both hearings. On May 14, 2007, Hui/MT withdrew its waste complaint.

2. The 2007 Hearing

The evidentiary phase of the Hearing commenced on December 3, 2007 and ended on March 4, 2008, spanning 23 hearing days. The Hearings Officer heard the testimony of 77 witnesses and received over 600 exhibits into evidence. On July 18, 2008, HC&S filed a motion to reopen evidence and an offer of proof of a study of stream biota in the Nā Wai 'Ehā Streams that HC&S had commissioned but that had not been completed at the time the evidentiary record had been closed. The motion was granted on August 21, 2008 and, on August 25, 2008, OHA filed a motion to supplement the record with a portion of the Environmental Impact Statement Preparation Notice for the proposed Waiale Water Treatment Facility. On October 14, 2008, a further hearing was held for the receipt of HC&S stream study and the receipt of the additional exhibits offered by OHA.

3. The Hearings Officer's proposed Decision and Order

On April 9, 2009, the Hearings Officer submitted his Proposed Findings of Fact, Conclusions of Law, and Decision and Order dated April 9, 2009 ("***Proposed D&O***"). The Proposed D&O recommended upward amendment of the IIFS for Waihe'e, North Waiehu, South Waiehu, and 'Īao Streams. The Proposed D&O recommended amending the IIFS to return an aggregate of 34.5 mgd to the Nā Wai 'Ehā streams. The amended IIFS that the Proposed D&O recommended for each for stream was as follows:

- Waihe'e Stream: 14 mgd below the Spreckels Ditch diversion
- North Waiehu Stream: 2.2 mgd immediately below the North Waiehu Ditch diversion
- South Waiehu Stream: 1.3 mgd immediately below the Spreckels Ditch diversion

- ʻĪao Stream: 13 mgd below the ʻĪao-Waikapū and ʻĪao-Maniania Ditches

For Waikapū Stream, the Proposed D&O recommended release of 4 mgd below the Reservoir 6 Ditch for 120 days to determine if flows reach Kealia Pond. RA 188:199. The Proposed D&O recommended that the amended IIFS be set at 4 mgd unless the flows do not reach Kealia Pond, or the flows do reach Kealia Pond but surveys find no recruitment of amphidromous species.

4. The parties' exceptions to the Proposed D&O

The parties to the Hearing filed their respective written exceptions to the Proposed D&O on May 11, 2009. HC&S pointed out in its written exceptions that the return of 34.5 mgd to Nā Wai ʻEhā streams as provided for in the Proposed D&O would have a devastating effect on HC&S and other offstream users. *See* HC&S's Exceptions. HC&S also took issue with the D&O's stated rationale, which assumed that by setting the IIFS at Q90 instead of Q100, that no water would be available for diversion only one day out of ten under the proposed amended IIFS. *See id.* at 17. Based on actual 2008 data, the proposed amended IIFS of 13 mgd for ʻĪao Stream, would have resulted in there being no water available at all for the existing MDWS ʻĪao Water Treatment Facility (or for any other user of ʻĪao Stream) one out of every three days that year. *See id.* at 18. MDWS similarly filed exceptions emphasizing the importance of preserving the domestic water supply sourced from ʻĪao Stream. Recognizing that the drought conditions of 2008 might have skewed the impact analysis of the proposed amended IIFS, HC&S used the USGS's daily mean discharge data for Waiheʻe and ʻĪao Streams for calendar years 2005 through 2008 to model the flows that would be available to HC&S each day after subtracting system losses, diversions to kuleana users, and water used by the MDWS water treatment plant. This analysis revealed that the proposed amended IIFS would result in there be no water delivered to Waiale Reservoir for 159 days in the year, or 44% of the year. *See id.* at 19-20.

Reducing offstream diversion of ʻĪao Stream by 13 mgd per the proposed amended IIFS would result in 73 days, or 20% of the year, in which there would be no flow available to supply the MDWS treatment plant. *See id.* at 21.

Accordingly, HC&S proposed alternative amended IIFS of 5 mgd below the diversions at the Waiheʻe and Spreckels Ditch intakes, and at 4 mgd below the WWC and HC&S diversions on ʻĪao Stream. *See id.* at 37. This alternative IIFS, HC&S submitted, would provide for mauka-to-makai flows but at least give HC&S a better chance—rather than no chance—at survival, because it would substantially reduce the number of days in which Waiale Reservoir and the ʻĪao-Waikapū fields would receive no water with less drastic impacts on HC&S and the public water supply. *See id.* at 39.

On October 15, 2009, CWRM heard oral arguments on the parties' written exceptions. HC&S, through its general manager at the time, Christopher Benjamin, advised CWRM that HC&S was poised to lose more than $25 million by year end due largely to the drought conditions of the preceding two years. *See* Tr. 10/15/09 at 16:10-17. HC&S's most recent profitable year had been 2006, and the profit margin for the agribusiness segment that year was a mere 2.6%.[1] *See id.* at 20:3-7.

Mr. Benjamin shared with CWRM that HC&S had made a commitment to the board of A&B and its shareholders to "make a decision and a determination on the future of HC&S by the end of this year." *Id.* at 21:16-18. While recognizing that "the commodity sugar business, even under the best of conditions, is a marginal one," HC&S remained optimistic about its prospects

[1] The agribusiness segment of A&B is comprised of HC&S, Kahului Trucking & Storage, Inc., Kauai Commercial Company, McBryde Resources, and Kauai Coffee Company until it was sold in 2011. In its public filings, A&B reports financial results of its agribusiness segment in the aggregate, and does not report financial data for HC&S separately. *See* Declaration of Rick W. Volner, Jr. dated January 7, 2014 ("***Volner Decl.***") ¶ 3.

for recovering from the drought, and was continuing to pursue its specialty sugar program and the development of an alternative energy crop that would require less water and produce more power. *Id.* at 21:13-16. HC&S would only be able to pursue such long-term prospects, however, by remaining viable in the near term under its current business model of growing sugar. *Id.* at 21:16-19. The IIFS recommended in the Proposed D&O would essentially impose a "perpetual, regulatory drought" that "would be more severe than the natural drought [HC&S] just experienced and would cause the shutdown of HC&S." *Id.* at 22:19-24. Mr. Benjamin closed by requesting CWRM to "give us a fighting chance to remain a part of this community by adopting our alternative IIFS." *Id.* at 25:9-11.

As noted in A&B's Form 10K for 2009, "A comprehensive review of the Company's sugar operations led to a decision to continue operations through 2010." *See* Exhibit E-R3. It was also noted that, "Favorable water rulings are critical to the long-term viability of the plantation." *Id.*

5. The 2010 D&O

After hearing the exceptions and arguments of the parties to the Hearing, CWRM issued its Findings of Fact, Conclusions of Law, and Decision & Order on June 10, 2010 (the "***2010 D&O***"). The 2010 D&O restored a total of 12.5 mgd to the Nā Wai 'Ehā Streams by amending upward the IIFS for three streams as follows: 10.0 mgd for Waihe'e River, 1.6 mgd for North Waiehu Stream, and 0.9 mgd for South Waiehu Stream. COL 261. CWRM did not amend the IIFS for Waikapū Stream because it found that the stream most likely did not have continuous flow to the ocean except under flood conditions in the pre-diversion period, and even if it did, Kealia Pond and the delta would further inhibit recruitment of amphidromous species. CWRM also did not amend the IIFS for 'Īao Stream because it found its reproductive and full restorative potential to be very limited or prohibited entirely due to the extensive concrete channelization of

the 2.5 miles of streambed above the mount and a 20-foot vertical drop in the channel.

HC&S would have preferred the alternative IIFS that it had proposed, which would have split 9 mgd between Waihe'e and 'Īao Streams with somewhat less of an incremental impact on HC&S's Waihee-Hopoi fields. HC&S nonetheless chose not to appeal the 2010 D&O which, in its view, gave HC&S the "fighting chance" that it had requested, and the board of A&B continued the operation of HC&S.

6. Implementation of the amended IIFS

Implementation of the amended IIFS stated in the 2010 D&O commenced on August 9 and 10, 2010. In accordance with the amended IIFS, WWC currently diverts Waihe'e River at a level that ensures at least 10 mgd remains in the stream below the Spreckels diversion. WWC no longer diverts North Waiehu Stream, leaving the entire flow to combine with South Waiehu Stream below HC&S's Spreckels Ditch diversion. *See* Declaration of Garret Hew dated January 7, 2014 ("***Hew Decl.***") ¶ 4.

With respect to South Waiehu Stream, shortly after the implementation of the amended IIFS, Hui/MT and OHA raised concerns that "full implementation of the amended IIFS for South Waiehu Stream has and/or will result in certain offstream users who use water from the ditch system on their kuleana lands to cultivate kalo or for other agricultural or domestic purposes . . . being harmed due to the loss of or a serious reduction in their current water supply," as stated in the fifth "Whereas" clause of the Fourth Stipulation and Order executed by the parties, approved by CWRM, and filed in this proceeding on January 4, 2012. *See* Exhibit E-415; Hew Decl. ¶ 5. These concerns arose because the IIFS for South Waiehu Stream, which was based on annualized daily averages, failed to adequately anticipate the impact the IIFS would have on the ability of kuleana users to receive water from the South Waiehu diversion ditch operated by HC&S during low flow conditions. To respond to all of these concerns, the parties entered into a

series of stipulations to ensure the continuous availability of diverted water to kuleanas – even if the amended IIFS of 0.9 mgd for South Waiehu Stream is thereby not achieved – and to provide for gaging to develop better data on actual stream flows at and below the diversion. *See* Hew Decl. ¶ 5.

Currently, and as a result of the collaborative efforts of the parties, the sluice gate at the South Waiehu Stream diversion remains partially open at a setting arrived at by trial and error that results in a sufficient amount of water being diverted into HC&S's diversion ditch to result in approximately 250,000 gallons a day being released through a grate in the bottom of the ditch located over the intake to the pipe that feeds the kuleana ditch in question. To minimize the diversion ditch flow needed to accomplish this, and with the consensus of all the parties and CWRM staff, HC&S installed a deflector in the bottom of the ditch to direct as much of the water in the ditch as possible over the grate. HC&S's understanding is that this has been acceptable to all parties concerned, including the users of the kuleana ditch. While this does result in some water flowing over and past the grate and into the Spreckels Ditch, most of the low flow remains in the stream. *See id.* ¶ 6.

7. **The Supreme Court decision**

Hui/MT filed an appeal of the 2010 D&O and MDWS filed a cross-appeal. The appeals were originally filed in the Intermediate Court of Appeals, but were later transferred to the Hawai'i Supreme Court by Hui/MT's motion.

The Hawai'i Supreme Court issued an opinion on August 15, 2012 vacating the 2010 D&O. *In re 'Īao Ground Water Management Area High-Level Source Water Use Permit Applications*, 128 Hawai'i 228, 287 P.3d 129 (2012) ("***Nā Wai 'Ehā***"). The Court, after holding that it had jurisdiction to entertain the appeal, held that CWRM erred by: making insufficient findings regarding how native Hawaiian traditional and customary ("***T&C***") practices are

affected by IIFS and the feasibility of lessening such impacts; inadequately justifying its decision to not restore some flow to ʻĪao and Waikapū Streams; finding that Fields 921 and 922 were suitable for cultivation in spite of conflicting evidence; finding that reclaimed wastewater was not a reasonably practicable alternative to Nā Wai ʻEhā stream water for HC&S; failing to adequately analyze evidence of the practicability of pumping more than 9.5 mgd from HC&S's Well No. 7; and inadequately analyzing what would be a reasonable estimate of HC&S's system losses. On the other hand, the Court affirmed the 2010 D&O with respect to: its use of the controlled release levels proposed by the U.S. Geological Survey ("***USGS***") at the Hearing as a starting point for setting the amended IIFS for Nā Wai ʻEhā streams; its decision to not place the burden of proof in the IIFS proceeding on a particular party; and its estimate of HC&S's irrigation requirements.

The Court remanded the matter to CWRM for further proceedings consistent with its opinion. Specifically, the Court instructed CWRM to consider the following matters on remand:

- The effect that IIFS will have on T&C practices, and the feasibility of protecting the practices. *Id.* at 249, 287 P.3d at 150.
- Instream uses other than support of amphidromous species. *Id.* at 251, 287 P.3d at 252.
- Whether HC&S' acreage for purposes of its irrigation requirements for fields irrigated with Nā Wai ʻEhā water should include Fields 921 and 922. *Id.* at 257, 287 P.3d at 157.
- Reasonable estimation of HC&S's system losses. *Id.* at 258, 287 P.3d at 159.
- Whether and to what extent Well No. 7 is a reasonable alternative water source for HC&S. *Id.* at 262, 287 P.3d at 163.
- Whether and to what extent recycled wastewater is a reasonable alternative water source for HC&S. *Id.* at 262, 287 P.3d at 163.

The Court did not mandate that CWRM arrive at a specific result in the remanded proceedings.

8. Remanded proceedings

CWRM appointed Dr. Miike to be the Hearings Officer for the remanded proceedings. At a prehearing conference held on September 24, 2013, the Hearings Officer established a briefing schedule for the remanded hearing and set the hearing dates for March 10-28, 2014. Minute Order 27.

B. Overview of HC&S Operations and Performance From 2006 to 2013

Given the tenuous long term viability of HC&S's in light of its continuing dependence upon the sale of commodity sugar and the precipitous financial position earnestly described by Mr. Benjamin to CWRM in late 2009, it is appropriate to examine how HC&S's operations and financial performance have fared from then until now. It is also important to recognize the factors affecting HC&S' performance that are within its control, such as agronomic practices, labor and cost management and strategic initiatives to enhance revenues, such as production of specialty sugars, and those that are beyond its control, such as 1) weather conditions, 2) global economic conditions affecting the price of sugar, and 3) the regulatory decisions of agencies such as the PUC (affecting the price HC&S receives for its power sales to MECO) and CWRM, whose IIFS determinations in East Maui and Nā Wai 'Ehā affect the availability of irrigation water needed to maintain high sugar yields.

Table 1 below assembles selected data regarding HC&S's operating results and financial position that are useful in identifying how HC&S has evolved its operations and how it has been affected by external factors from 2006 through 2012.

Table 1: HC&S Operations and Agribusiness Financial Performance 2006-2012[2]

	2006	2007	2008	2009	2010	2011	2012
Operating Profit for Agribusiness Segment (millions)	$6.9	$0.2	-$12.9	-$27.8	$6.1	$22.2	$20.8
Total Sugar Produced (tons)	173,600	164,500	145,200	126,800	171,800	182,800	178,300
Tons of Sugar Per Acre (tons)	10.2	9.7	8.6	8.4	11.1	12.1	11.3
Specialty Sugar Produced (tons)	15,500	12,200	27,500	34,300	16,300	18,700	15,600
Market Price of Raw Sugar (cents/lb)	22.14	20.99	21.30	24.93	35.97	38.12	28.90
Power Sales (MWH sold)	98,000	94,000	91,300	72,800	68,300	64,900	58,200
Revenue Per Ton of Sugar Produced	$350	$342	$355	$352	$575	$605	$619
Profit Margin	5.4%	0.2%	Neg. Margin	Neg. Margin	3.7%	14.1%	11.4

In 2006, the year before the evidentiary phase of the Hearing began, the agribusiness segment of A&B earned an operating profit of $6.9 million. *See* Volner Decl. ¶ 4. The next year, the segment's operating profit fell to $0.2 million. *See id.* ¶ 5. Drought conditions in 2007 extended into and became extremely severe in 2008, converging with the effects of the global fiscal meltdown. This was the year that HC&S experienced the lowest East Maui water deliveries on record since A&B first began recording deliveries in 1925, and 2007-2008 marked two consecutive years of the lowest rainfall recorded. *See id.* ¶ 11. This lack of water is reflected in HC&S's financial results in 2008 and 2009. In 2008, the agribusiness segment suffered a $12.9 million loss. Both production and yields tumbled by approximately 12% from the previous year. *See id.* ¶ 6.

Since HC&S grows sugar cane for two years before harvesting it, the effects of this drought were felt most significantly in 2009, which was a low point for HC&S in terms of yield, production and profitability. By October 15, 2009, HC&S's financial condition had become

[2] All data reported in Table 1 except for the price of raw sugar were published in A&B's Form 10-K filings for the years 2006-2012, portions of which are attached hereto as Exhibits E-R1 to E-R7. Raw sugar prices are reported in the chart of historical prices of U.S. raw sugar (Contract No. 14/16, duty fee paid New York) published by the Economic Research Service of the USDA, which is attached hereto as Exhibit [redacted].

dire. HC&S was struggling in an economic climate that forced the demise or exit of many substantial Hawai'i employers including Aloha Airlines, Molokai Ranch, ATA Charter service, and two Norwegian Cruise Line ships from the Hawai'i circuit, as well as massive layoffs at Maui Land & Pineapple. The two-year crop harvested in 2009 suffered from lack of water throughout its lifecycle, which significantly reduced cropped yields. As Mr. Benjamin had forecasted, the agribusiness segment lost $27.8 million in 2009. Production and yields slipped by another 12.8% and 2.3%, respectively, from the previous year. *See id.* ¶ 7

HC&S applied its best efforts to those matters over which it had control, such as improved agronomic practices. HC&S has implemented various measures to improve its agronomic practices in an effort to reverse the declining sugar yields experienced from 2006 through 2009 and to cope with the reduced water deliveries resulting from the amended IIFS determinations issued by CWRM in this proceeding and in the separate East Maui proceeding. The measures include a one-time harvesting delay in 2009 to increase the average crop age, increased deep tilling of fields before planting, improved fertilization and improved ripening practices. HC&S has also shifted some of its available power generation capacity from power sales to increased well pumping for irrigation. *See id.* ¶ 12.

With these improved agronomic practices and increased water availability as compared with the severe drought years of 2007 and 2008, HC&S was able to realize increases in total production of 35.4% in 2010 and an additional 6.4% in 2011, for a total two-year improvement of 44.2% from 2009 to 2011. *See id.* ¶ 13; Table 1. Compared to the four-year average of 152,525 tons of raw sugar produced between 2006 to 2009, the 171,800 tons produced in 2010 represented a 12.6% increase in production. *See* Table 1. Production of 182,100 tons in 2011 was a 19.8% increase over average production between 2006 and 2009. *See id.* ¶ 13. Yields also

improved in 2010 and 2011. As compared to the average of the four years preceding 2010, HC&S experienced 20.3% higher yields in 2010, *i.e.*, 11.1 tons of sugar per acre ("***TSA***"). Production continued to increase the next year (12.1 TSA) before returning to levels resembling 2010 (11.3 TSA) the next year. *See id.*; Volner Decl. ¶ 13.

Increased sugar production alone, however, is not the only explanation for the dramatic improvement in HC&S revenues experienced from 2010 through 2012. Fortunately, HC&S's increases in production occurred during a period of dramatically improved sugar prices. As a result, production improvements accounted for about half of the increase in revenues during this period, with high sugar prices accounting for the other half. HC&S benefited from a highly providential spike in raw sugar prices extending from the last quarter of 2009 through the first quarter of 2012. *See* Volner Decl. ¶ 15; Exhibit E-R7. In 2010, the annual average domestic price of sugar rose to 35.97 cents per pound, and in 2011, it further increased to 38.12 cents per pound. *See* Volner Decl. ¶ 16; Exhibit E-R7. These were the highest prices the sugar industry had seen in over 50 years. *See* Volner Decl. ¶ 16; Exhibit E-R7. The fortuitous rise in commodity sugar prices from late 2009 through early 2012 could not have come at a better time for HC&S. While HC&S' average realized sugar price in these years was below the referenced market peak levels due to the fact that each delivery is priced off a different contract month and not necessarily at these peak levels, HC&S nonetheless received significantly higher revenue in these years, and was able to respond by shifting some of its production away from specialty sugars to raw sugar. HC&S also increased deliveries of pumped well water to its fields at the expense of reductions in power sales. *See* Volner Decl. ¶ 17.

The result has been a short term return to profitability. Due primarily to the increase in sugar revenues from higher total production and unit pricing, coupled with the lowering of unit

costs attributable to higher production, profitability returned in 2010 and increased significantly in 2011 and 2012. *See* Volner Decl. ¶ 18; Table 1. The agribusiness segment earned an operating profit of $6.1 million (including $4.9 million in disaster relief funds) in 2010. *See* Volner Decl. ¶ 8; Table 1. In 2011, the segment earned an operating profit of $22.2 million. *See* Volner Decl. ¶ 9; Table 1. Among other things, this has enabled HC&S to invest in infrastructure upgrades, including a major improvement to Well No. 7, to enhance its ability to cope with reductions in Na Wai Eha surface water resulting from the amended IIFS. *See* Volner Decl. ¶ 18.

Just as quickly as the welcome relief of higher raw sugar prices came, however, prices have now trended back downward. The average annual price of sugar in 2012 was 28.90 cents per pound—a 24.2% reduction from 2011. *See* Volner Decl. ¶ 19; Exhibit E-R7. However, sustained high production enabled the operation to maintain its profitability, albeit at lower levels than 2011. The price of sugar continued to fall in 2013. The average price of sugar for the year as of the third quarter is 20.41 cents per pound—nearly 49.2% below 2011's peak and approximately four cents less than the average annual price in 2009, the year that sugar prices began to ascend to record highs. *See* Volner Decl. ¶ 190; Exhibit E-R7. Due to the steady decrease in raw sugar pricing in the last two years, profitability has declined significantly from 2012 to 2013. In a year in HC&S produces 170,000 tons of sugar, each one cent change in sugar price means a swing of $3.4 million in revenue for HC&S. Despite a forecast of production that would represent the highest levels achieved since 2005, HC&S is currently expecting to operate at significantly lower operating profit in 2013 than 2012, and the agribusiness segment of HC&S is expected to incur an operating loss in the fourth quarter of 2013. *See* Volner Decl. ¶ 20.

While overall economic conditions are not as severe today as they were in 2009, HC&S

still faces the considerable challenge of transitioning away from its heavy reliance upon the commodity sugar business in which HC&S remains subject to fluctuations in global sugar prices over which it has no control. As in the past, the inflated sugar prices have proven to be a spike and not a trend. Even at the current elevated production levels, current sugar prices are below the level necessary for HC&S to break even. *See id.* ¶ 21.

Further, the incremental benefits from improvements in agronomic practices have already been substantially realized. While HC&S clearly had room to make significant improvements in production in 2009, the majority of those improvements have since been made, resulting in a 40.6% increase in production from 2009 to 2012, and an expected additional 7.1% growth in 2013. In 2013, HC&S anticipates production of approximately 191,000 tons of raw sugar with an average TSA of 12.4, which is at the high end of what HC&S has been able to achieve in the past decade. In 2014, HC&S anticipates little upside in production improvements, which means that HC&S's profitability will remain especially sensitive to sugar prices and the availability of irrigation water. *See id.* ¶ 22.

HC&S also faces challenges on other fronts such as opposition to cane burning; increased environmental regulation; and the need to find alternatives for molasses carriage. Such issues drive up the costs and/or reduce the production of sugar. *See id.* ¶ 23.

In sum, HC&S again finds itself at a crossroads. As in 2009, HC&S cannot survive a "regulatory drought" imposed by CWRM. The supply of Nā Wai 'Ehā surface water for irrigation continues to be critical to HC&S's prospects of maintaining its business model and labor force while it explores longer-term alternatives to keep its 36,000 acres in agricultural cultivation. *See id.* ¶¶ 25, 26.

III. ANALYSIS OF REMAND ISSUES SPECIFIC TO HC&S

A. Continued Cultivation of HC&S Fields 921 and 922

The Supreme Court questioned the wisdom in CWRM's decision to allow HC&S to include Fields 921 and 922 in its acreage when calculating the volume of HC&S's reasonable off-stream use of Nā Wai 'Ehā stream water. The Court noted evidence that the soil types in Fields 921 and 922 were similar to the highly porous sand in Field 920, which CWRM explicitly excluded from HC&S's acreage and water duty calculations for that reason. Although HC&S's agronomist had testified that HC&S is able to achieve "good crop growth" on Fields 921 and 922 due to the loam layer beneath the sandy surface, the Commission did not refer to such testimony in the 2010 D&O. The Court thus concluded that "the record does not contain sufficient analysis showing that the Commission considered these fields with 'a level of openness, diligence, and foresight' required when authorizing the diversion of our public trust res." *Nā Wai 'Ehā*, 128 Hawai'i at 256, 287 P.3d at 157. The Court ordered CWRM on remand to reevaluate its determination that HC&S should be permitted to use Nā Wai 'Ehā water to irrigate Fields 921 and 922.

On remand, CWRM should make specific findings that Fields 921 and 922 are suitable for cultivation, and that use of surface water to irrigate those fields is reasonable. Fields 921 and 922 are former pasture lands that HC&S began cultivating in 1997 after having been approached by, and then entering into an agreement with, Maui Land and Pineapple ("***MLP***") to receive and dispose of wastewater from its cannery facility. *See* Volner, Tr. 1/29/08 at 161:23 to 162:16); Declaration of Mae Nakahata dated January 7, 2014 ("***Nakahata Decl.***") ¶ 3. The soil profiles of Fields 921 and 922 are similar to each other, and to other fields within HC&S's Waihe'e-Hopoi fields, but are significantly different from that of Field 920, which HC&S has ceased cultivating. *See* Nakahata Decl. ¶ 7. Exhibit E-R20 is a photograph of a pit in Field 920 showing that it is

predominantly sandy. Sand can be seen uniformly through the depths with small amounts of organic matter dispersed through the sand, resulting from roots of grasses and other plant material that grew on the land over time. *See* Nakahata Decl. ¶ 7.

Fields 920, 921 and 922 were all classified by the Natural Resources Conservation Service of the U.S. Department of Agriculture ("***NRCS***") as composed of Puuone and Jaucas sand in its Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii issued in August 1972, (the "***1972 Soil Survey***"). *See* Exhibit E-R21; Nakahata Decl. ¶ 8. The 1972 Soil Survey is not determinative of actual field conditions, however. The 1972 Soil Survey was completed by the NRCS in cooperation with the University of Hawaii Agricultural Experiment Station and is used as a general guide to farmers and ranchers of soil characteristics on their lands. *See* Nakahata Decl. ¶ 8. As the 1972 Soil Survey expressly acknowledged on page 3 of its introduction:

> A map showing soil associations is useful to people who want a general idea of the soils on the Hawaiian Islands, who want to compare different parts of the islands, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. ***It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.***

Exhibit E-R21 (emphasis added). The appropriateness of this disclaimer is exemplified by the conditions actually encountered in Fields 920, 921 and 922 as compared with the general soil classifications in the NRCS maps. *See* Nakahata Decl. ¶ 9. While the maps indicate Puuone and Jaucas sand for all three, the actual field conditions are different, as recently reconfirmed by HC&S and verified in detail by the NCRS with specific reference to Field 921. *See id.*

When HC&S was first approached by Maui Land and Pineapple to make use of its

cannery water, HC&S investigated the possibility of adding Fields 921 and 922 to HC&S's seed cane farm. HC&S cleared and chipped the Kiawe trees on these fields and tilled them back into the soil to enhance its fertility and moisture retention. HC&S also dug test pits to determine soil conditions. The soil pits revealed that rich loam soil lay two feet underneath the sandy surface, which led HC&S to conclude that those fields could be viably cultivated, particularly for seed cane. In June 2007, when MLP shut down its cannery, HC&S lost access to the wastewater it previously used to irrigate these fields, but it continued to cultivate these fields as part of its seed farm. *See id.* ¶ 3.

"Seed cane" is sugar cane that is grown and cut into sections when harvested. The sections, which contain "eyes" from which new shoots develop, are then taken to other fields to be planted as "crop cane," which is grown and harvested for processing in the Puunene mill into sugar, molasses, and bagasse. Fields known to have significant amounts of sand are used as seed fields by HC&S. Seed cane operations result in the leafy biomass being left in the field after the cutting and removal of the stalks for planting material. The leafy biomass, called "trash," is left in the field to retain moisture as well as to add organic content to the sandy soil. Incorporation of the organic matter is important to improve soil structure and moisture retention. The ground is covered by the trash, thereby minimizing evaporative losses from bare ground. Unirrigated sugarcane areas around the world utilize this practice to conserve soil moisture. *See id.* ¶ 4. Exhibit E-R18 is a photograph of a seed cane field after harvesting, in which the trash can be seen covering the soil. *See* Nakahata Decl. ¶ 4.

Seed fields are "ratooned." Ratooning means the plants are cut, but the base of the plants, including the root systems, are left in place instead of being plowed and prepared for a new planting. This operation is possible due to the mechanized seed cutting process, which can

be used on the erect, 7-9 month old cane plant, that does not dislodge the cane plant so much of the underground root structure remains intact. This allows the rapid reestablishment of the cane plants and new growth within a week of cutting, prior to application of irrigation. Often, when reinjection of the irrigation tubing is delayed due to mechanical problems, the plants continue to grow, albeit, at a slower rate than if water is available. *See id.* ¶ 5. Exhibit E-R19 is a photograph in which seed cane can be seen regenerating without drip tubes having been installed. No irrigation had been applied to the field after cutting and before the photograph was taken. While cane growth occurs, it is at a significantly slower rate and eventually will stop as the crop water demand exceeds the moisture stored in the soil. *See* Nakahata Decl. ¶ 5.

In contrast, newly planted production fields must be irrigated frequently to keep the seed piece moist to allow it to germinate and grow. Fields are drip irrigated. Unlike flood or sprinkler irrigation which places the water on the plant, there is distance between the drip emitter and the seed piece. In ratooning, this additional water is not needed, thereby reducing the overall water requirement for the crop. *See id.* ¶ 6.

Recent test pits dug on Field 921 in October 2013 validated HC&S's earlier findings that loam lay underneath the sandy surface. The recently dug pits showed more loamy soil material and less sand material than initially mapped and identified in the 1972 Soil Survey. Based on these findings, HC&S requested NRCS to reclassify the soil types of Fields 921 and 922. *See id.* ¶ 10. In November 2013, Michael Kolman, a NRCS Soil Scientist, and Carl Hashimoto, a NRCS Soil Conservation Technician, conducted an onsite soil investigation of Field 921. They photographed, described, and classified the soil in seven pits dug by HC&S. They also augered three additional holes in which they made and recorded further observations. *See id.* ¶ 11. Exhibit E-R22 is a true and correct copy of Mr. Kolman's December 18, 2013 report. The report

clearly illustrates that the soil conditions in Field 921 are complex in nature with high variability. The majority of the area has loam and other soil characteristics providing it higher water holding capacity than if it were composed principally of sand. If this were not true, ratoons would not grow as seen in Exhibit E-R19, and nutrient deficiency symptoms, such as the yellow leaf characteristic of iron deficiency under high pH conditions, would be common. As set forth in his report, Mr. Kolman has concluded that the 1972 Soil Survey does not accurately describe the soil composition, landform, or soil type of Field 921 leading him to propose that NRCS reclassify the soil composition of Field 921. *See id.*

Mr. Kolman will also be conducting an on-site soil investigation of Field 922 this month in preparation for which HC&S recently dug pits at random locations on Field 922. *See id.* ¶ 12. Exhibits E-R23 to E-R26 are photographs of four pits in Field 922 showing significant levels of loam mixed with sand. The general fertility of Field 922 is illustrated by the contrasting appearance of a small area of the field that is transected by a sand river, as evidenced by the poorer cane growth shown in Exhibit E-R27. This represents 10% or less of Field 922. Even within this area, however there is a significant amount of loam within the soil profile, as shown in Exhibit E-R28, a photograph of a pit that was dug in this area. *See* Nakahata Decl. ¶ 12.

Not surprisingly, given the actual soils profile of Fields 921 and 922 and HC&S's cultivation practices with regard to the seed cane, HC&S's rates of water usage on Fields 921 and 922 compare favorably to that on other Waihe'e-Hopoi fields. *See id.* ¶ 13. Exhibit E-R29 is a table that HC&S has prepared based on its irrigation records comparing irrigation water applied to Fields 921 and 922 to the Hoopoi Seed Fields of which they are a part from 2009 through 2012. The table shows that Fields 921 and 922 have actually had somewhat less water applied to them per acre per day than the average for the balance of the seed farm. *See* Nakahata

Decl. ¶ 13.

Based on the foregoing, the Commission should find that cultivation of Fields 921 and 922 constitutes a reasonable beneficial use of Nā Wai 'Ehā water.

B. Utilization of Well No. 7 as a Practicable Alternative to Nā Wai 'Ehā Stream Water

The Supreme Court teaches that "an alternative source is practicable if it is available and capable of being utilized after taking into consideration cost, existing technology, and logistics in light of the overall planning process." *In re Water Permit Applications*, 105 Hawai'i 1, 19, 93 P.3d 643, 661 (2004) ("***Waiāhole II***"). In *Waiāhole II*, the Court approved of CWRM considering evidence of the following factors in analyzing a groundwater alternative under the foregoing standard: (i) chloride levels; (ii) sustainable yield; (iii) pumping capacity; (iv) costs of desalination, construction, and operation; and (v) availability of leases and easements. *See id.* at 18, 93 P.3d at 660. In *Nā Wai 'Ehā*, the Court also restated the mandate of the Water Code that CWRM, in considering the practicability of an alternative source, should "weigh the importance of the present or potential uses of water for noninstream purposes, including the economic impact of restricting such uses[.]" *Nā Wai 'Ehā*, 128 Hawai'i at 259, 287 P.3d at 160 (quoting HRS § 174C-71(2)(D)).

HC&S Well No. 7, as explained in the earlier hearings in this matter, is capable of pumping groundwater from the Kahului aquifer to the HC&S Waihe'e Ditch that is internal to the plantation (not to be confused with the Waihee Ditch operated by WWC). *See* Hew Decl. ¶ 7. Before CWRM issued the 2010 D&O, Well No. 7 consisted of Pumps 7A, 7B, and 7C. *See id.* ¶ 8. Pumps 7A and 7B are the primary pumps, and they are located at the bottom of the well at water level. Pump 7C is a booster pump located on the surface that can pump water up to the Waihe'e Ditch. *See id.* ¶ 9.

Since the entry of the 2010 D&O, HC&S reinvested a portion of the timely proceeds of its improved financial performance on major improvements to Well No. 7 in order to enhance its ability to cope with reductions in Nā Wai 'Ehā surface water resulting from the amended IIFS. *See* Volner Decl. ¶ 18. HC&S spent $1,658,369 to upgrade Well No. 7 by installing a second booster pump (Pump 7D) and a 4,000 foot pipeline extending from the Well No. 7 wellhouse to the Waihe'e Ditch. The project was substantially completed to the point of being able to run the new pump on or about October 3, 2012, and was finally completed and financially closed in August 2013. *See* Hew Decl. ¶ 10.

Following the upgrade, the theoretical combined pumping capacity of the four pumps in Well No. 7 is approximately 32 mgd. Pumps 7A and 7C, running together, can pump approximately 13-14 mgd up to Waihe'e Ditch. Similarly, pumps 7B and 7D, running together, can pump approximately 18.5 mgd up to Waihe'e Ditch. *See id.* ¶ 11. However, on or about October 5, 2012, when HC&S first attempted to operate all four pumps simultaneously, after approximately a day and a half, the sump level in the well had lowered to the point of tripping the pumps' automatic sump shut off feature, which protects the equipment from damage due to the introduction of a mixture of air and water into the pumps. Operation of only one set of pumps (7A/7C or 7B/7D) has not triggered the pump shut off feature. HC&S is continuing to monitor sump levels in relation to tidal fluctuations and pumping rates in order to develop more data regarding how to best manage its pumpage. *See id.* ¶ 12.

HC&S's current working assumption, however, is that 18.5 mgd is the maximum amount that can be pumped from Well No. 7 on a sustained daily basis without excessive draw down of the sump level. This gives HC&S the following two options: 1) HC&S can either pump Well No. 7 at the rate of 14 mgd (Pumps A and C), or 2) HC&S can pump it at the rate of 18.5 mg

(Pumps B and D). These are the two alternative practices that HC&S has in fact been employing as needed to supplement ditch flows. *See id.* at ¶ 13.

The annual total of water pumped from Well No. 7 rose from 595.0 million gallons in 2007 to 3,890.1 million in 2012. *See* Exhibit E-R16. In 2007, HC&S pumped a total of 595.0 mg from Well No. 7; in 2008, a total of 59.2 mg; in 2009, a total of 690.1 mg; in 2010, a total of 2,211.6 mg; in 2011, a total of 4,327.2 mg; and in 2012, a total of 3,890.1 mg. From January to November 2013, HC&S has pumped a total of 3,542.6 mg from Well No. 7. *See id.*; Hew Decl. ¶ 14. Pumping has tended to be concentrated in the months of May through September when irrigation demands are higher and deliveries of surface water lower. Volner Decl. ¶ 47.

HC&S has been monitoring changes to the salinity of Well No. 7 associated with its increased usage. *See* Hew Decl. ¶ 13; Exhibit E-R17. The salinity data for Well No. 7 obtained since 2010 indicates that chlorides generally rise during periods of pumping and then recover, but with a gradual upward trend over time. The longer term effects on the water quality of the aquifer, and the resulting increase in the deposit of salts, particularly magnesium chloride, on the Waihee-Hopoi fields, need to be monitored closely as a long-term increase in deposits of magnesium in the soil causes a clumpiness of the soil that, unless remedied, will result in soil degradation and eventual yield decline. In addition to affecting soil structure, high levels of magnesium compete with nutrient absorption by the cane roots, resulting in artificial calcium and potassium deficiencies. Historical records document this problem as a regular occurrence in HC&S fields when pumping levels are high without significant leaching of salts from surface water. Many of the Hopoi fields are high in pH, so traditional amendments with calcareous sand will result in minor element imbalances. A soil amendment, such as the application of gypsum (calcium sulfate), is the only remediation alternative at this time. This material must be imported

with significant transportation costs. *See* Nakahata Decl. ¶ 14.

Well No. 7 may be a reasonable alternative to Na Wai Eha Stream water that can be relied upon by HC&S for up to 18.5 mgd during the summer months and other low flow periods, although this forces HC&S to incur the power cost associated with running Well No. 7. This is not tantamount to saying that it would be reasonable to expect HC&S to pump Well No. 7 at 18.5 mgd continuously for all 365 days of the year, i.e., even when stream flows are abundant. In addition to the cost to operate Well No. 7, there are some practical and physical constraints on the ability of HC&S to rely more heavily upon Well No. 7. *See* Volner Decl. ¶ 48. Total power generation available varies throughout the year due to fluctuations in the need for live steam fluctuates to support factory operations. In the summer months when irrigation demand is the highest, steam demand for the factory is also the highest, which puts a limit on electrical generation. Total maximum generation at HC&S is 36 MWH (30 from Puunene steam plant and 6 MWH from hydroelectric). Maximum availability varies seasonally with factory demand. Factory and power plant usage varies from 10 to 12 MWH leaving 13 to 20 MWH of available steam produced electricity for irrigation and/or MECO power sales. HC&S currently has 19.2 MW of available irrigation pumps and will have over 22 MW of pumps after completion of two additional irrigation infrastructure projects early next year. Na Wai Eha Surface Water and Well No. 7 are thus part of a larger system and cannot be viewed in isolation. On any given day, it may be more prudent to expend limited power generation on pumps other than those in Well No. 7. In addition, while factory demand for power diminishes with the cessation of harvesting in the Winter months, bagasse is also no longer being produced to fuel the power plant, which means that expensive fossil fuels must be burned to generate power. Under these circumstances, HC&S does not believe that it would be reasonable for HC&S to be expected to run Well No. 7 365

days of the year, i.e., even when stream flows are high. *Id.*

When balancing instream values against the benefits of off-stream uses, the balance should tip in favor of off-stream uses at flow levels where it is apparent that the needs of the streams are not being unduly compromised. For example, at flow rates where the minimum IIFS and average offstream diversion amounts is satisfied by a wide margin, as frequently happens during wet weather, on balance, it would not be reasonable to expect HC&S to incur power to run Well No. 7 during the off-season when fossil fuel, rather than bagasse, would need to be burned to generate power—especially considering the still unknown long-term effects that the increased usage of Well No. 7 will have on the salinity of the Kahului Aquifer and the chemical composition of the soil of the Waihe'e-Hopoi fields.

C. Utililization of R-2 Wastewater from the Kahului WWTP as a practicable alternative to Nā Wai 'Ehā Stream Water

HC&S has commissioned a study of the feasibility and cost of utilizing R-2 reclaimed wastewater from the Kahului wastewater treatment plant as an alternative to Nā Wai 'Ehā stream water. The study is anticipated to be complete on January 18, 2014. HC&S reserves the right to submit the study after its completion and to comment on the same.

D. Reasonableness of the 2 MGD Allowance in the 2010 D&O for HC&S System Losses

The 2010 D&O allowed for only 2 mgd of system losses for HC&S with respect to Na Wai Eha waters received by HC&S. This was arrived at by assuming that lining Waiale Reservoir would eliminate the 6-8 mgd of system losses HC&S estimated were lost from the Waiale Reservoir, and that HC&S could "halve" the 3-4 mgd it estimated for the balance of its irrigation system for its West Maui fields. 2010 D&O COL 229.

System losses are an inherent component of any water conveyance system. In closed systems that rely on piping, similar to municipal water systems, conveyance loss rates of 10% or

higher are not uncommon. This is supported by Exhibit E-R13, which is a printout of a page from the California Department of Water Resources website, which can be found at http://www.water.ca.gov/wateruseefficiency/leak, indicating that, among California's 47 municipal water systems, loss rates average 10% and range from 5% to 30%. *See* Volner Decl ¶ 50. For agricultural water systems that rely on open canals, ditches and reservoirs, loss rates are expected to be much higher. Exhibit E-R14 is a copy of a USGS report which estimated average conveyance losses in 1995 for irrigation systems across the United States at 19% [cite]. It would be reasonable to expect HC&S to have total system losses comparable to other open agricultural water conveyance systems of approximately 20%, or 4-5 mgd. *Id.*

E. Incremental Impact on HC&S of Modifications to the IIFS of the 2010 D&O

1. HC&S's model for analyzing incremental impacts

To assist CWRM in understanding the impacts on HC&S of the IIFS mandated by the 2010 D&O and any proposed modifications thereto, HC&S has developed a model to identify the general relationship between differing IIFS levels and the availability of irrigation water and resulting financial impacts to HC&S (the "***Model***"). *See* Volner Decl. ¶ 29. The initial impetus for the development of the Model was an internal effort to evaluate the potential impacts on HC&S expected to result from implementation of the IIFS as initially recommended by the Hearing Officer. This was explained in the exceptions and supporting declarations and exhibits filed by HC&S on May 11, 2009. *See* Volner Decl. ¶ 30.

Since then, HC&S has sought to update and refine the Model, utilizing the best information available to HC&S, in an effort to make it as useful as possible for the purpose of this remand proceeding. *See* Volner Decl. ¶ 31; Hew Decl. ¶ 16. It is important to understand that it would be impossible, even in the best of circumstances, such as where more and better data regarding actual stream flows and loss rates were available for specific stretches of stream

beds and ditches, to do anything more than estimate what the impacts will be. It is also impossible to accurately forecast what future rainfall patterns and daily stream flows will be. General relationships between daily stream flow rates and the availability of irrigation water to HC&S can, however, be illustrated and that is what the Model is designed to do. *See* Volner Decl. ¶ 31.

One of the main purposes of the Model is to account for the variability of daily stream flows in lieu of relying exclusively on annual average daily stream flows or annual average daily diversion amounts. Annual averages tend to obscure the daily impacts of changes to the IIFS by smoothing over or minimizing the effect of water shortages that occur during periods of low daily stream flows—creating a false impression that such shortfalls are remedied during periods of high daily stream flows. Crop growth that is lost during periods where daily irrigation requirements are not met cannot simply be recovered by applying more water later. This is one of the principal reasons why HC&S suffered so severely from several years of low sugar yields as the result of the drought conditions experienced in 2007 and 2008. *See id.* ¶ 32.

To estimate the number of days each year that specific IIFS levels will result in HC&S not being able to meet its irrigation requirements with stream water alone, HC&S imported into the Model daily stream flow measurements from the USGS stream gauges located above the diversions on Waihe'e Stream and 'Īao Stream for calendar years 2005 through September 2013. Utilizing these actual daily measurements from the two streams that supply the vast majority of all Nā Wai 'Ehā stream water used by HC&S during this period enables the Model to calculate the frequency that particular daily stream flows occur under a given IIFS scenario and to project the corresponding amounts that can be diverted. As explained further below, the Model then subtracts estimated seepage losses and deliveries to other users "upstream" of HC&S from the

amounts diverted to arrive at the amount of irrigation water available to HC&S. *See id.* ¶ 33.

South Waiehu Stream, from which some water is diverted into the Spreckels Ditch, is not gaged by the USGS and, since the implementation of the IIFS in 2010, has not been a significant contributor to deliveries received by HC&S, particularly during low flows, at which time, there has not been enough water in the stream to even satisfy the IIFS. Since the Model is most concerned with estimating impacts on HC&S during low flow periods, the Model assumes limited contributions from South Waiehu Stream, and only during high flow periods. *See id.* ¶ 34.

Waikapū Stream, from which water is diverted by WWC and, together with water diverted from ʻĪao Stream, is made available via the Waiheʻe Ditch to irrigate HC&S's ʻĪao-Waikapū fields, is also not gaged by the USGS. For purposes of the Model, HC&S has assumed that the average daily contribution of Waikapū Stream to the irrigation of the ʻĪao-Waikapū fields is 2 mgd. As with all assumptions upon which the Model is based, this assumption is subject to further review and modification to the extent more and better information becomes available. *See id.* ¶ 35.

Other key assumptions contained in the Model are as follows:

A. Regarding Waiheʻe Stream at the Waiheʻe Ditch intake, the Model assumes that the daily flow recorded at the USGS station is equal to the stream flow at the point of the intake, that the IIFS amount (currently 10 mgd) is left in the stream, that the balance, up to the current gate setting of 30 mgd, is taken into the Waiheʻe Ditch, and the remainder, if any, is left in the stream.

B. Regarding Waiheʻe Stream at the Spreckels Ditch intake, the Model assumes that the first 10 mgd is left in the stream and any remaining balance up to the current gate setting of

15 mgd is taken into the Spreckels Ditch. The Model further assumes that 6.84 mgd from the Spreckels Ditch, supplemented as needed by WWC from the Waihe'e Ditch, is delivered by WWC to Kuleana users and that the balance continues in the ditch and eventually reaches the Waiale reservoir.

C. Regarding 'Īao Stream at the 'Īao-Waikapū Ditch, the Model assumes that the daily flow recorded at the USGS station, up to the current gate setting of 18 mgd, is available for diversion

i. less any IIFS amount;

ii. less the amount delivered to the Maui County Department of Water Supply, currently estimated to be 1.5 mgd;

iii. less an estimated aggregate amount of 2.7 mgd to cover deliveries to other WWC customers, Kuleana users of 'Īao and Waikapū water, and WWC system losses;

iv. less the average daily requirement for the 'Īao-Waikapū fields remaining after first applying the assumed 2 mgd contribution from Waikapū Stream.

Any remaining 'Īao Stream water, is assumed to remain in the stream.

D. The Model further assumes that Iao stream loses 5 mgd between the WWC diversion and the HC&S diversion at the Spreckels Ditch and that any remaining flow, less the IIFS for this point (currently 0 mgd) is taken into the Spreckels Ditch and delivered to the Waiale Reservoir. *See id.* ¶¶ 36(A)-(D)

For the Waihe'e-Hopoi fields, the Model calculates the number of days that the deliveries to HC&S's Waiale reservoir are expected to be less than the average annual daily requirement of those fields as determined in the 2010 D&O, including 2 mgd for systems losses. To cover the

shortfall between the average daily irrigation requirement and the delivery amounts for those days, the Model assumes that Well No. 7 will be operated up to its maximum sustainable capacity of 18.5 mgd. The Model further calculates 1) the expected number of days when the shortfall will be greater than what can be replaced with the 18.5 mgd available from Well No. 7 and 2) the aggregate annual volume of the expected shortfall. For days when the shortfall is made up with pumped water from Well No. 7, the financial impact to HC&S is calculated by adding the cost of the power needed to operate Well No. 7 to the amortized value of the infrastructure improvements made in 2012. For days when operating Well No. 7 at its maximum sustainable capacity of 18.5 mgd still leaves a shortfall, the financial impact is calculated by multiplying the amount of the shortfall by the estimated loss in net sugar revenues per million gallons of water unavailable to the crop. *See id.* ¶ 37.

The ʻĪao-Waikapu fields, the elevation of which physically precludes them from being served by water delivered to the Waiale Reservoir or pumped from Well No. 7, are currently irrigated principally with water diverted from ʻĪao Stream and, to a lesser extent, Waikapū Stream. The Model calculates 1) the number of days where the water available for the ʻĪao-Waikapū fields will be less than the irrigation requirement for these fields determined in the 2010 D&O, and 2) the aggregate annual volume of the expected shortfall. *See id.* ¶ 38.

2. Results of the Model for selected IIFS scenarios

HC&S has run the Model for five IIFS scenarios, numbered 1 through 5 in ascending order of the annual financial impact of each on HC&S. The parameters and results for each are contained in Exhibits E-R8 to E-412 attached hereto. As a check against reality, each exhibit compares the output of the Model under the given scenario to actual data for the average and median daily flow, under conditions preceding implementation of the amended IIFS (January 2005 to July 2010) as well as under conditions following implementation of the amended IIFS at

the following locations: (a) the Waihe'e Ditch at the Hopoi Chute; (b) Spreckels Ditch at Mill Street; and (c) total inflows to the Waiale Reservoir. *See id.* ¶ 39.

Under Scenario 1, the Waihe'e IIFS is 5 mgd at both the upper and lower diversions; the Īao IIFS is 4 mgd at both the upper and lower diversions; the IIFS for South Waiehu is the current status quo, i.e., the gate setting described in the written testimony of Mr. Hew which approaches but is less than the 0.9 IIFS of established in the 2010 D&O; and the IIFS for Waikapu is also current status quo, i.e., 0 below the lowest WWC diversion. *See id.* ¶ 40. Scenario 2 represents the current status quo; i.e., an IIFS for Waihe'e of 10 mgd with all other streams at the current status quo. *See id.* ¶ 41. Scenario 3 is the same as Scenario 2, but adds an IIFS of 4 mgd for Īao at both the upper and lower diversions. *See id.* ¶ 42. Scenario 4 is the same as Scenario 3 but adds an IIFS of 2 mgd for Waikapu below the last WWC diversion. *See id.* ¶ 43. Scenario 5 assumes an IIFS of 14 mgd for Waihe'e at the Spreckels Ditch diversions, 13 and 8 mgd for Īao at the upper and lower diversions, with Waikapu and S. Waiehu remaining at the current status quo. *See id.* ¶ 44. The results are summarized in Table 2 below.

Table 2: Impacts of Various IIFS Scenarios on Off-Stream Uses[3]

	Scenario 1 5-4/4-0	Scenario 2 10-0/0-0	Scenario 3 10-4/4-0	Scenario 4 10-4/4-2	Scenario 5 14-13/8-0
Well 7 Water Pumped to Meet Daily Requirement (mgd)	5.12	6.42	8.24	8.61	11.91
Annual Operating Cost to Run Well 7	$348,695	$437,155	$560,731	$585,937	$810,803
Total Annual Well 7 Cost (Operating + Amortized Cost)	$454,400	$542,860	$666,436	$691,642	$916,508
Total Revenue Shortfall Due to Less Than Daily Water Requirement					
ʻIao-Waikapū	$80,813	$2,229	$80,813	$227,113	$548,167
Waiheʻe-Hopoi	$1,105	$202,828	$282,540	$270,487	$232,579
Total Annual Financial Impact	**$536,318**	**$747,917**	**$1,029,790**	**$1,189,242**	**$1,697,254**
Zero Days					
Total Inflows to Waiale Reservoirs (%/yr)	1%	0%	1%	1%	28%
County Water Treatment Plant					
Zero Days	0%	0%	0%	0%	23%
Less than 1.5 mgd available	0%	0%	0%	0%	29%
ʻIao Waikapū Fields					
Zero Days (%/yr)	0%	0%	0%	0%	0%
Less than Daily Requirement Available (%/yr)	0%	0%	0%	1%	27%
Annual Water Shortfall (mg)	67	2	67	189	457
Waiheʻe-Hopoi Fields					
Less than Daily Requirement Available (%/yr)	63%	61%	69%	70%	78%
Less than Daily Requirement Available w/ Well 7 pumping (%/yr)	1%	13%	18%	20%	49%
Annual Water Shortfall (mg)	1	169	235	225	194

The estimated annual financial impact of each of these scenarios ranges from a low of $536,318 for Scenario 1, which approximates the HC&S proposal in its May 11, 2009 exceptions, to a high of $1,697,254, which approximates the IIFS levels proposed in the Recommended D&O (but assuming status quo for Waikapū Stream). Scenario 2 is intended to reflect the current status quo, and estimates an annual financial impact to HC&S of $747,917. *See* Volner Decl. ¶ 45.

[3] The numerical headings for each scenario represent Waihee IIFS – Iao IIFS at Upper/Lower Diversion – Waikapu IIFS. All scenarios assume an IIFS for South Waiehu of current status quo conditions, as described in the Declaration of Garret Hew at ¶ 6.

To be clear, the Model nor any other predictive tool can perfectly estimate what the actual impacts will be, and HC&S continues to review and refine the formulas and assumptions contained in the Model. A conservative feature of the Model, however, is its measurement of the expected annual water shortfalls to the crop against the annual average daily irrigation requirement per the 2010 D&O, rather than the actual daily requirement which. Since days with shortfalls tend to be concentrated in the summer months, when evapotranspiration is at its highest, a seasonal calculation would likely result in greater impacts. *See* Volner Decl. ¶ 46.

IV. THE CONTINUED VIABILITY OF HC&S REMAINS HIGHLY SENSITIVE TO ANY FURTHER IIFS INCREASES

When assessing the impacts on HC&S, and the community at large that benefits from its continued operations on Maui, it would be incorrect to assume that the profitability of 2010-2012 is a norm that can be expected to continue. Sugar prices are already declining to 2007 levels, where prices had hovered relatively consistently without any appreciable increases since the early 1980s. As of the third quarter of 2013, the price of sugar was 20.41 cents per pound—0.49 cents lower than the average annual price of 20.99 cents per pound in 2007. *See* Exhibit E-R7. Even at the current elevated production levels, current sugar prices are below the level necessary for HC&S to break even. *See* Volner Decl. ¶ 21. The present situation is not unlike the sudden spike in sugar prices in 1980, a year in which the annual average price of sugar nearly doubled from the preceding year to 30.11 cents per pound, only to decline precipitously the following year to 19.73 cents per pound. *See* Exhibit E-R7. Sugar prices did not rise again to levels anything near 30 cents per pound until the recent spike between 2010 and 2011. *See id.* Sudden increases in sugar prices such as the one that recently occurred last only briefly, and do not mitigate the fragile nature of HC&S's business. The only manner in which HC&S can offset the variability in the unit pricing of sugar is by reducing unit costs, which is accomplished by either

lowering total costs or increasing production volume.

Cost reduction opportunities are limited because of the high fixed costs associated with the significant infrastructure and processing requirements of the agricultural industry, as well as the inability to control costs where prices are driven by commoditized inputs, (e.g., fuel, fertilizer, drip irrigation tubing). This in turn makes high production levels a necessary precursor to lower unit costs. As a result, factors that impact yields, such as water availability, tend to have a disproportionate impact on the ability of HC&S to generate a profit. *See* Volner Decl. ¶ 24. As such, shortfalls in the amount of available irrigation water—whether due to continuously low rainfall or regulatory reductions in deliveries of East Maui and Nā Wai 'Ehā surface water to satisfy amended IIFS—pose a realistic threat to the ongoing viability of HC&S. HC&S already has attempted to mitigate the shortfall in water by investing in capital improvements to Well No. 7 and other components of its irrigation infrastructure. *Id.* ¶ 25.

Regarding increased production, the appreciable benefit of past and anticipated future improvements in agronomic practices will not be enough to offset the impacts of water shortfalls. While HC&S clearly had room to make significant improvements in production in 2009, the majority of those improvements have since been made, resulting in a 40.6% increase in production and a 34.5% increase in yields over the last three years (i.e., 2009 vs. 2012). *See* Volner Decl. ¶ 22; Table 1. In 2013, HC&S anticipates production of approximately 191,000 tons of raw sugar with an average TSA of 12.4, which is at the high end of what HC&S has been able to achieve in the past decade. *Id.* Due to the steady decrease in raw sugar pricing in the last two years, however, HC&S is still expected to operate at a significantly lower level of operating profit in 2013 as compared to 2012, and the agribusiness segment of A&B is expected to incur an operating loss in the fourth quarter of 2013. *See id.* ¶ 20. In 2014, HC&S anticipates little

upside in production improvements, which means that HC&S's profitability will remain especially sensitive to sugar prices and the availability of irrigation water. *See id.* ¶ 22.

While considerable research has been undertaken as to the feasibility of growing an energy crop at HC&S, the development of a commercial scale, viable conversion technology to turn an energy crop into useable green energy remains over the horizon. HC&S believes that the development of this conversion technology will come in time and hopes that CWRM will support HC&S's efforts to remain viable and maintain its labor force and agricultural resources until the conversion technology emerges. *See id.* ¶ 26.

In partnership with the University of Hawaii College of Tropical Agriculture, HC&S continues to host and support biomass energy research grant activities on the plantation. Work has focused on growing alternative high-yielding tropical grasses in field plots at HC&S. Alternative crops such as napier grass and energy cane are being grown and are being compared against commercial sugarcane for annual biomass yield. Research activity also has involved characterizing these biomass feedstocks for physical properties important for certain biofuel conversion technologies. *Id.* ¶ 28.

HC&S also continues to explore alternative uses for the various biomass feedstock it currently produces, i.e., sugarcane and all of its byproducts. This work has focused on converting these into "drop-in advanced biofuel," i.e., fuel such as marine biodiesel that is in a form that can be commercially sold without the need for further conversion. Over the last few years, HC&S has partnered with biofuel energy conversion technology providers and responded to solicitations for biofuel supply. As energy conversion technology is still evolving and none has yet proven to be viable on a commercial scale, there are risks involved with proceeding with large-scale biofuel production at this time. As a result, some energy conversion companies that

HC&S has worked with in the past no longer exist or have moved away from Hawaii. However, HC&S continues to be approached by energy companies seeking a biomass feedstock partner to produce advanced biofuels. Thus, HC&S remains active on this front, evaluating each proposal on its own merits as well as in relation to how it might enhance HC&S's future operations and profitability. Volner Decl. ¶ 27.

HC&S has already felt the impacts of the reduction in surface water deliveries for its 5,460 cultivated acres in the Nā Wai 'Ehā resulting from the amended IIFS for Waihe'e and South Waiehu Streams, as well as reductions in deliveries from its East Maui irrigation system. *See* Volner Decl. at ¶ 25. Given the inability to now improve production in any substantial way, the downward trend of already low sugar prices, and increasing challenges on other fronts that reduce production or increase costs (e.g., the opposition to cane burning, which forces HC&S to adopt more costly green harvest methods; the cost of compliance with increased environmental regulation; finding alternatives for molasses carriage), HC&S has little leeway to deal with greater variability in one of its core essential inputs for sugar production: irrigation water. *Id.*

V. CONCLUSION

HC&S reserves further evidence and argument pending review of the submissions of other parties and such other evidence or argument as is otherwise presented in the hearing.

DATED: Honolulu, Hawai'i, January 7, 2014.

CADES SCHUTTE LLP

DAVID SCHULMEISTER
ELIJAH YIP
Attorneys for HAWAIIAN COMMERCIAL AND SUGAR COMPANY

COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII

Iao Groundwater Management Area High-Level Source Water Use Permit Applications and Petition to Amend Interim Instream Flow Standards of Waihee, Waiehu, Iao & Waikapu Streams Contested Case Hearing	Case No. CCH-MA06-01 DECLARATION OF GARRET HEW

DECLARATION OF GARRET HEW

I, GARRET HEW, hereby declare:

1. I am the President of East Maui Irrigation Co., Ltd. ("***EMI***"), a subsidiary of Alexander & Baldwin, Inc. ("***A&B***"). I am also the Water Resources Manager for Hawaiian Commercial and Sugar Company ("***HC&S***"), which is the division of A&B that operates A&B's sugar cultivation operations on Maui.

2. I was born and raised on Maui and attended Oregon State University, where I received a Bachelor of Science degree in Horticulture in 1978. Following receipt of my degree, I returned to Maui where I operated a truck farm in Kula from 1978 to 1983. From 1983 to 1985, I was employed by HC&S in various supervisory positions, including ditch supervisor and senior ditch supervisor. In 1985, I was employed by EMI as a senior supervisor, administration, and I have been continuously employed by EMI ever since.

3. Over the course of the thirty years that I have been employed by HC&S and EMI, I have become intimately familiar with the operations of HC&S, the physical components of the irrigation facilities servicing HC&S' sugar plantation, and the management of the flows that are collected and transported by the irrigation facilities. I am familiar with the manner in which

water from watersheds in both East Maui and West Maui is collected and delivered to service HC&S' sugar fields.

4. Implementation of the amended interim instream flow standards ("***IIFS***") stated in the Commission on Water Resource Management's ("***CWRM***") Findings of Fact, Conclusions of Law, and Decision & Order issued on June 10, 2010 (the "***2010 D&O***") commenced on August 9 and 10, 2010. In accordance with the amended IIFS, Wailuku Water Company, LLC ("***WWC***") currently diverts Waihe'e River at a level that ensures at least 10 mgd remains in the stream below the Spreckels diversion. WWC no longer diverts North Waiehu Stream, leaving the entire flow to combine with South Waiehu Stream below HC&S's Spreckels Ditch diversion.

5. With respect to South Waiehu Stream, shortly after the implementation of the amended IIFS, Hui O Nā Wai 'Ehā and Maui Tomorrow Foundation, Inc. ("***Hui/MT***") and the Office of Hawaiian Affairs ("***OHA***") raised concerns that "full implementation of the amended IIFS for South Waiehu Stream has and/or will result in certain offstream users who use water from the ditch system on their kuleana lands to cultivate kalo or for other agricultural or domestic purposes . . . being harmed due to the loss of or a serious reduction in their current water supply," as stated in the fifth "Whereas" clause of Exhibit E-R15, which is a true and correct copy of the Fourth Stipulation and Order executed by the parties, approved by CWRM and filed in this proceeding on January 4, 2012. These concerns arose because the increased IIFS for South Waiehu Stream, which was based on annualized daily averages, failed to adequately anticipate the impact the IIFS would have on the ability of Kuleana users to receive water from the South Waiehu diversion ditch operated by HC&S during low flow conditions. To respond to these concerns, Hui/MT, OHA, the County of Maui Department of Water Supply ("***MDWS***"), WWC, and HC&S entered into a series of stipulations to ensure the continuous

availability of diverted water to the Kuleana users – even if the amended IIFS of 0.9 mgd for South Waiehu Stream is thereby not achieved – and to provide for gaging by CWRM to develop better data on actual stream flows at and below the diversion.

6. Currently, and as a result of the collaborative efforts of the parties, the situation at the South Waiehu Stream diversion is that the sluice gate remains partially open at a setting arrived at by trial and error that results in a sufficient amount of water being diverted into HC&S's diversion ditch to result in approximately 250,000 gallons a day being released through a grate in the bottom of the ditch located over the intake to the pipe that feeds the kuleana ditch in question. To minimize the diversion ditch flow needed to accomplish this, and with the consensus of all the parties and CWRM staff, HC&S installed a deflector in the bottom of the ditch to direct as much of the water in the ditch as possible over the grate. This, to my knowledge, has been acceptable to all parties concerned, including the users of the kuleana ditch. While this does result in some water flowing over and past the grate and into the Spreckels Ditch, most of the low flow remains in the stream.

7. HC&S Well No. 7, as explained in the earlier hearings in this matter, is capable of pumping groundwater from the Kahului aquifer to the HC&S Waihe'e Ditch that is internal to the plantation (not to be confused with the Waihee Ditch operated by WWC).

8. Before CWRM issued the 2010 D&O, Well No. 7 consisted of Pumps 7A, 7B, and 7C.

9. Pumps 7A and 7B are the primary pumps, and they are located at the bottom of the well at water level. Pump 7C is a booster pump located on the surface that can pump water up to the Waihe'e Ditch.

10. Since the entry of the 2010 D&O, HC&S spent $1,658,369 to upgrade Well No. 7 by installing a second booster pump (Pump 7D) and a 4,000 foot pipeline extending from the Well No. 7 wellhouse to the Waihe'e Ditch. I planned and supervised the project with outside contractors and HC&S General Manager, Rick W. Volner, Jr, which was substantially completed to the point of being able to run the new pump on or about October 3, 2012, and which was finally completed and financially closed in August of 2013.

11. Following the upgrade, the theoretical combined pumping capacity of the four pumps in Well No. 7 is approximately 32 mgd. Pumps 7A and 7C, running together, can pump approximately 13-14 mgd up to Waihe'e Ditch. Similarly, pumps 7B and 7D, running together, can pump approximately 18.5 mgd up to Waihe'e Ditch.

12. However, on or about October 5, 2012, when HC&S first attempted to operate all four pumps simultaneously, after approximately a day and a half, the sump level in the well had lowered to the point of tripping the pumps' automatic sump shut off feature, which protects the equipment from damage due to the introduction of a mixture of air and water into the pumps. Operation of only one set of pumps (7A/7C or 7B/7D) has not triggered the pump shut off feature. HC&S is continuing to monitor sump levels in relation to tidal fluctuations and pumping rates in order to develop more data regarding how to best manage its pumpage.

13. HC&S's current working assumption, however, is that 18.5 mgd is the maximum amount that can be pumped from Well No. 7 on a sustained daily basis without excessive draw down of the sump level. This gives HC&S the following two options: 1) HC&S can either pump Well No. 7 at the rate of 14 mgd (Pumps A and C), or 2) HC&S can pump it at the rate of 18.5 mg (Pumps B and D). These are the two alternative practices that HC&S has in fact been employing as needed to supplement ditch flows.

14. Attached hereto as Exhibit E-R16 is a spreadsheet reporting the monthly total of water pumped from Well No. 7 (in million gallons) between January 2007 and November 2013. In 2007, HC&S pumped a total of 595.0 mg from Well No. 7; in 2008, a total of 59.2 mg; in 2009, a total of 690.1 mg; in 2010, a total of 2,211.6 mg; in 2011, a total of 4,327.2 mg; and in 2012, a total of 3,890.1 mg. From January to November 2013, HC&S has pumped a total of 3,542.6 mg from Well No. 7.

15. Attached hereto as Exhibit E-R17 is a spreadsheet reporting measurements of gage height and chloride levels in Well No. 7 taken between February 28, 2011 and November 9, 2013. The gage height is an indicator of the water level in the well. The chloride levels are monitored by HC&S, Director of Crop Control, Mae Nakahata.

16. I have consulted closely with Mr. Volner in connection with the preparation of the Model described in his written testimony which evaluates the impacts on HC&S of various levels of IIFS for Waihee, Iao and Waikapu Streams. I have provided my input to Mr. Volner regarding matters such as the approximate loss rate in Iao Stream between the upper and lower diversions, the significance of the amount of water contributed to the Spreckels Ditch under status quo conditions at the South Waiehu Diversion, the relative contribution of Iao and Waikapu Streams to water received by HC&S for the Iao Waikapu fields, and other matters pertaining to the operation of the ditch system. My input was based on my personal observations, my working knowledge of the system, and my periodic consultations with WWC regarding how they monitor and operate the portions of the system under their control. In many cases there is no way to come up with precise measurements or figures to project what happens under different flow conditions, but I have tried in good faith to provide Mr. Volner with my best opinion on these matters.

I, GARRET HEW, declare, verify, certify, and state under penalty of perjury that the foregoing is true and correct.

DATED: _____, 2014.

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GARRET HEW

ImanageDB:2621982.3

COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII

'Iao Groundwater Management Area High-Level Source Water Use Permit Applications and Petition to Amend Interim Instream Flow Standards of Waihe'e, Waiehu, 'Iao & Waikapu Streams Contested Case Hearing	Case No. CCH-MA06-01 DECLARATION OF MAE NAKAHATA

DECLARATION OF MAE NAKAHATA

I, MAE NAKAHATA, hereby declare:

1. I am the Director of Crop Control at Hawaiian Commercial & Sugar ("***HC&S***") where I have been employed in that capacity continuously since 1984.

2. I am familiar with the soils conditions and agronomic and irrigation practices of HC&S in general as well as specifically with regard to the suitability of HC&S's cultivation of sugar cane on Fields 921 and 922.

3. Fields 921 and 922 are former pasture lands that HC&S began cultivating in 1997 after having been approached by, and then entering into an agreement with, Maui Land and Pineapple ("***MLP***") to receive and dispose of wastewater from its cannery facility. When HC&S was first approached by MLP to make use of its mill water, I investigated the feasibility of adding Fields 921 and 922 to HC&S's seed cane farm. Among other things, I dug test pits to determine soil conditions. The soil pits revealed that rich loam soil lay two feet underneath the sandy surface which led me to conclude that these fields could be viably cultivated, particularly for seed cane. HC&S cleared and chipped the Kiawe trees on these fields and tilled them back into the soil to enhance its fertility and moisture retention. MLP shut down its cannery and

HC&S no longer has access to any MLP wastewater as of June, 2007. HC&S has continued to cultivate these fields, however, as part of its seed farm.

4. "Seed cane" is sugar cane that is grown and cut into sections when harvested. The sections, which contain "eyes" from which new shoots develop, are then taken to other fields to be planted as "crop cane," which is grown and harvested for processing in the Puunene mill into sugar, molasses, and bagasse. Fields known to have significant amounts of sand are used as seed fields by HC&S. Our operations result in the leafy biomass being left in the field after the cutting and removal of the stalks for planting material. The leafy biomass, called "trash," is left in the field to retain moisture as well as to add organic content to the sandy soil. Incorporation of the organic matter is important to improve soil structure and moisture retention. The ground is covered by the trash, thereby minimizing evaporative losses from bare ground. Unirrigated sugarcane areas around the world utilize this practice to conserve soil moisture. Exhibit E-R18 is a photograph of a seed cane field after harvesting, in which the trash can be seen covering the soil.

5. Seed fields are "ratooned." Ratooning means the plants are cut, but the base of the plants, including the root systems, are left in place instead of being plowed and prepared for a new planting. This operation is possible due to the mechanized seed cutting process, which can be used on the erect, 7-9 month old cane plant, that does not dislodge the cane plant so much of the underground root structure remains intact. This allows the rapid reestablishment of the cane plants and new growth within a week of cutting. This occurs prior to application of irrigation. Often, when reinjection of the irrigation tubing is delayed due to mechanical problems, the plants continue to grow, albeit, at a slower rate than if water is available. Exhibit E-R19 is a photograph in which seed cane can be seen regenerating without drip tubes having been

installed. No irrigation had been applied to the field after cutting and before the photograph was taken. While cane growth occurs, it is at a significantly slower rate and eventually will stop as the crop water demand exceeds the moisture stored in the soil.

6. In contrast, newly planted fields must be irrigated frequently to keep the seed piece moist to allow it to germinate and grow. Fields are drip irrigated. Unlike flood or sprinkler irrigation which places the water on the plant, there is distance between the drip emitter and the seed piece. In ratooning, this additional water is not needed, thereby reducing the overall water requirement for the crop.

7. The soils profiles of Fields 921 and 922 are similar to each other, and to other fields within HC&S's Waihe'e-Hopoi fields, but are significantly different from that of Field 920, which HC&S has ceased cultivating. Exhibit E-R20 is a photograph of a pit in Field 920 showing that it is predominantly sandy. Sand can be seen uniformly through the depths with small amounts of organic matter dispersed through the sand, resulting from roots of grasses and other plant material that grew on the land over time.

8. Fields 920, 921 and 922 were all classified by the Natural Resources Conservation Service of the U.S. Department of Agriculture ("***NRCS***") as composed of Puuone and Jaucas sand in its Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii issued in August 1972, (the "***1972 Soil Survey***"). A copy of the 1972 Soil Survey downloaded from the NRCS website is attached hereto as Exhibit E-R21 (URL: http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/hawaii/islandsHI1972/Five_islands_SS.pdf). The 1972 Soil Survey is not determinative of actual field conditions, however. The 1972 Soil Survey was completed by the NRCS in cooperation with the University of Hawaii Agricultural Experiment Station and is used as a general guide to farmers and ranchers of soil

characteristics on their lands. As the 1972 Soil Survey expressly acknowledged on page 3 of its introduction:

> A map showing soil associations is useful to people who want a general idea of the soils on the Hawaiian Islands, who want to compare different parts of the islands, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. ***It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.***

(Emphasis added).

9. The appropriateness of this disclaimer is exemplified by the conditions actually encountered in Fields 920, 921 and 922 as compared with the general soil classifications in the NRCS maps. While the maps indicate Puuone and Jaucas sand for all three, the actual field conditions are different, as recently reconfirmed by HC&S and verified in detail by the NCRS with specific reference to Field 921.

10. In October of 2013, I dug test pits in Field 921 to validate my earlier findings that loam lay underneath the sandy surface. The recently dug pits confirmed more loamy soil material and less sand material than mapped and identified in the 1972 Soil Survey. Based on these findings, HC&S requested NRCS to reclassify the soil types of Fields 921 and 922.

11. In November 2013, Michael Kolman, a NRCS Soil Scientist, and Carl Hashimoto, a NRCS Soil Conservation Technician, conducted an onsite soil investigation of Field 921. They photographed, described, and classified the soil in seven pits dug by HC&S. They also augered three additional holes in which they made and recorded further observations. Exhibit E-R22 is a true and correct copy of Mr. Kolman's December 18, 2013 report. The report clearly illustrates that the soil conditions in Field 921 are complex in nature with high variability. The majority of

the area has loam and other soil characteristics providing it higher water holding capacity than if it were composed principally of sand. If this were not true, ratoons would not grow as seen in Exhibit E-R19, and nutrient deficiency symptoms, such as the yellow leaf characteristic of iron deficiency under high pH conditions, would be common. As set forth in his report, Mr. Kolman has concluded that the 1972 Soil Survey does not accurately describe the soil composition, landform, or soil type of Field 921 leading him to propose that NRCS reclassify the soil composition of Field 921.

12. Mr. Kolman will also be conducting an on-site soil investigation of Field 922 this month in preparation for which I recently dug pits at random locations on Field 922. Exhibits E-R23-26 are photographs of four pits in Field 922 showing significant levels of loam mixed with sand. The general fertility of Field 922 is illustrated by the contrasting appearance of a small area of the field that is transected by a sand river, as evidenced by the poorer cane growth shown in Exhibit E-R27. This represents 10% or less of Field 922. Even within this area, however there is a significant amount of loam within the soil profile, as shown in Exhibit E-R28 a photograph of a pit that was dug in this area.

13. Not surprisingly, given the actual soils profile of these fields and HC&S's cultivation practices with regard to the seed cane, HC&S's rates of water usage on Fields 921 and 922 compare favorably to that on other Waihe'e-Hopoi fields. Exhibit E-R29 is a table that I prepared from HC&S's irrigation records comparing irrigation water applied to Fields 921 and 922 to the Hoopoi Seed Fields of which they are a part from 2009 through 2012. The table shows that Fields 921 and 922 have actually had somewhat less water applied to them per acre per day than the average for the balance of the seed farm.

14. Among my responsibilities at HC&S is the monitoring of the quality of the well

water that HC&S uses to irrigate its fields. HC&S has substantially increased the use of Well No. 7 since 2010. The salinity data for Well No. 7 obtained since 2010 indicates that chlorides generally rise during periods of pumping and then recover, but with a gradual upward trend over time. It is too soon to draw any definitive conclusions regarding what the long term effects of this increased pumping will be. I am paying close attention to the level of magnesium chloride in Well No. 7, however, because a long term increase in deposits of magnesium on the Waihe'e-Hopoi fields will eventually lead to clumpiness of the soil that, unless remedied, will result in soil degradation and eventual yield decline. In addition to affecting soil structure, high levels of magnesium compete with nutrient absorption by the cane roots, resulting in artificial calcium and potassium deficiencies. Historical records document this problem as a regular occurrence in HC&S fields when pumping levels are high without significant leaching of salts from surface water. Many of the Hopoi fields are high in pH, so traditional amendments with calcareous sand will result in minor element imbalances. A soil amendment such as gypsum (calcium sulfate) is the only alternative at this time. This material must be imported with significant transportation costs.

I, MAE NAKAHATA, declare, verify, certify, and state under penalty of perjury that the foregoing is true and correct.

DATED: _____, Maui, _____, 2014.

_____

MAE NAKAHATA

ImanageDB:2633022.3

COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII

'Iao Groundwater Management Area High-Level Source Water Use Permit Applications and Petition to Amend Interim Instream Flow Standards of Waihe'e, Waiehu, 'Iao & Waikapu Streams Contested Case Hearing	Case No. CCH-MA06-01 DECLARATION OF RICK W. VOLNER, JR.

DECLARATION OF RICK W. VOLNER, JR.

I, RICK W. VOLNER, JR., hereby declare:

1. I am General Manager of Hawaiian Commercial & Sugar ("***HC&S***"), and have served in that position since April 1, 2011. I began working for HC&S in 1997, first as an agricultural engineer, and later as Senior-Vice President of Agricultural Operations before being promoted to my current position.

2. Attached hereto as Exhibits E-R1 to E-R6 are selected excerpts from the Form 10-K Annual Reports that Alexander & Baldwin, Inc. ("***A&B***") filed with the Securities and Exchange Commission for calendar years 2007 to 2012.

3. The agribusiness segment of A&B is comprised of HC&S, Kahului Trucking & Storage, Inc., Kauai Commercial Company, McBryde Resources, and Kauai Coffee Company until it was sold in 2011. In its public filings, A&B reports financial results of its agribusiness segment in the aggregate, and does not report financial data for HC&S separately.

4. In 2006, the year before the beginning of the evidentiary phase of the hearing in these proceedings (the "***Hearing***"), the agribusiness segment of A&B earned an operating profit of $6.9 million. HC&S produced 173,600 tons of sugar, with average yields of 10.2 tons per sugar acre ("***TSA***").

5. In 2007, the agribusiness segment earned an operating profit of $0.2 million. HC&S produced 164,500 tons of sugar, with yields of 9.7 TSA.

6. In 2008, the agribusiness segment lost $12.9 million. HC&S produced 145,200 tons of sugar, with average yields of 8.6 TSA. Compared to 2007, both production and average yields decreased by approximately 12%.

7. In 2009, the agribusiness segment lost $27.8 million. Compared to 2008, production decreased by 12.8% (126,800 tons of sugar) and average yields decreased by 2.3% (8.4 TSA).

8. In 2010, the agribusiness segment earned an operating profit of $6.1 million, including $4.9 million in disaster relief funds. Compared to 2009, production increased by 35.5% (171,800 tons of sugar) and average yields increased by 20.3% (11.1 TSA).

9. In 2011, the agribusiness segment earned an operating profit of $22.2 million. Compared to 2010, production increased by 6.4% (182,800 tons of sugar) and average yields increased by 9% (12.1 TSA).

10. In 2012, the agribusiness segment earned an operating profit of $20.8 million. Compared to 2011, production decreased by 2.5% (178,300 tons of sugar) and average yields decreased by 7% (11.3 TSA).

11. Beginning in 2007, Maui experienced a drought that extended into and became extremely severe in 2008. In 2008, HC&S experienced the lowest East Maui water deliveries on record since A&B first began recording deliveries in 1925, and 2007-2008 marked two consecutive years of the lowest rainfall recorded.

12. HC&S has implemented various measures to improve its agronomic practices in an effort to reverse the declining sugar yields experienced from 2006 through 2009 and to cope

with the reduced water deliveries resulting from the amended IIFS determinations issued by CWRM in this proceeding and in the separate East Maui proceeding. The measures include a one-time harvesting delay in 2009 to increase the average crop age, increased deep tilling of fields before planting, improved fertilization and improved ripening practices. HC&S has also shifted some of its available power generation capacity from power sales to increased well pumping for irrigation.

13. With these improved agronomic practices and increased water availability as compared with the severe drought years of 2007 and 2008, HC&S was able to realize increases in total production of 18.3% from the 2008 to 2010 crop cycle (sugar in Hawai'i is produced on a two-year crop cycle) and 44.2% from the 2009 to 2011 crop cycle, and 3.8% from the 2010 to 2012 crop cycle. Production of 182,100 tons in 2011 was a 19.8% increase over average production between 2006 and 2009. Yields also improved in 2010 and 2011. As compared to the average of the four years preceding 2010, HC&S experienced 20.3% higher yields in 2010, *i.e.*, 11.1 TSA. Production continued to increase the next year (12.1 TSA) before returning to levels resembling 2010 (11.3 TSA) the next year.

14. Production improvements accounted for about half of the increase in revenues during this period, with dramatically improved sugar prices accounting for the other half. HC&S benefited from a highly providential spike in raw sugar prices extending from the last quarter of 2009 through the first quarter of 2012.

15. A chart of historical prices of U.S. raw sugar (Contract No. 14/16, duty fee paid New York) published by the Economic Research Service of the United States Department of Agriculture is attached hereto as Exhibit E-R7. The chart may be downloaded at

http://ers.usda.gov/datafiles/Sugar_and_Sweeteners_Yearbook_Tables/World_and_US_Sugar_and_Corn_Sweetener_Prices/Table04.xls

16. In 2009, the annual average price of sugar rose to 35.97 cents per pound, and in 2011, it further increased to 38.12 cents per pound. These were the highest prices the sugar industry had seen in over 50 years.

17. HC&S responded to the increase in sugar prices by shifting some of its production away from specialty sugars to raw sugar. HC&S also increased deliveries of pumped well water to its fields at the expense of higher power costs and reductions in power sales.

18. Due primarily to the increase in sugar revenues from higher total production and unit pricing, coupled with the lowering of unit costs attributable to higher production, the agribusiness segment of A&B experienced a return to profitability from 2010 to 2012. The profits earned in this period enabled HC&S to invest in long deferred infrastructure upgrades, including a major improvement to Well No. 7 to enhance its ability to cope with reductions in Nā Wai 'Ehā surface water resulting from the amended IIFS.

19. Sugar prices have been trending downward since 2012. The average annual price of sugar in 2012 was 28.90 cents per pound—a 24.2% reduction from 2011. However, sustained high production enabled the operation to maintain its profitability, albeit at lower levels than 2011. The price of sugar continued to fall in 2013. The average price of sugar for the year as of the third quarter is 20.41 cents per pound—nearly 49.2% below 2011's peak and approximately four cents less than the average annual price in 2009, the year that sugar prices began to ascend to record highs.

20. Due to the steady decrease in raw sugar pricing in the last two years, profitability has declined significantly from 2012 to 2013. Despite forecast production that would represent

the highest levels achieved since 2005, HC&S is currently expecting to operate at significantly lower operating profit in 2013 than 2013, and the agribusiness segment of A&B is expected to incur an operating loss in the fourth quarter of 2013.

21. HC&S continues to face the considerable challenge of transitioning away from its heavy reliance upon the commodity sugar business in which it remains subject to fluctuations in global sugar prices over which it has no control. As in the past, the inflated sugar prices have proven to be a spike and not a trend. Even at the current elevated production levels, current sugar prices are below the level necessary for HC&S to break even.

22. Benefits from improvements in agronomic practices have already been substantially realized. While HC&S clearly had room to make significant improvements in production in 2009, the majority of those improvements have since been made, resulting in a 22% increase in production and a 29% increase in yields over the last three years (i.e., 2009 vs. 2012). In 2013, HC&S anticipates production of approximately 191,000 tons of raw sugar with an average TSA of 12.4, which is at the high end of what HC&S has been able to achieve in the past decade. In 2014, HC&S anticipates little upside in production improvements, which means that HC&S's profitability will remain especially sensitive to sugar prices and the availability of irrigation water.

23. HC&S also faces challenges on other fronts such as opposition to cane burning; increased environmental regulation; and the need to find alternatives for molasses carriage. Such issues drive up the costs and/or reduce the production of sugar.

24. Cost reduction opportunities are limited because of the high fixed costs associated with the significant infrastructure and processing requirements of the agricultural industry, as well as the inability to control costs where prices are driven by commoditized inputs, (e.g., fuel,

fertilizer, drip irrigation tubing). This in turn makes high production levels a necessary precursor to lower unit costs. As a result, factors that impact yields, such as water availability, tend to have a disproportionate impact on the ability of HC&S to generate a profit.

25. Therefore, the supply of Nā Wai 'Ehā surface water for irrigation continues to be critical to HC&S's prospects of maintaining its business model and labor force while it explores longer-term alternatives to keep its 35,000 acres in agricultural cultivation. HC&S has already felt the impacts from the reduction in surface water deliveries for its 5,460 cultivated acres in the Nā Wai 'Ehā area resulting from the amended IIFS for Waihe'e and South Waiehu Streams, as well as reductions in deliveries from its East Maui irrigation system. Given the inability to now improve production in any substantial way, the downward trend of already low sugar prices, and increasing challenges on other fronts that reduce production or increase costs (e.g., the opposition to cane burning, which forces HC&S to adopt more costly green harvest methods; the cost of compliance with increased environmental regulation; finding alternatives for molasses carriage), HC&S has little leeway to deal with greater variability in one of its core essential inputs for sugar production: irrigation water.

26. While considerable research has been undertaken as to the feasibility of growing an energy crop at HC&S, the development of a commercial scale, viable conversion technology to turn an energy crop into useable green energy remains over the horizon. HC&S believes that the development of this conversion technology will come in time and hopes that CWRM will support HC&S's efforts to remain viable and maintain its labor force and agricultural resources until the conversion technology emerges.

27. HC&S also continues to explore alternative uses for the various biomass feedstock it currently produces, i.e., sugarcane and all of its byproducts. This work has focused

on converting these into "drop-in advanced biofuel," i.e., fuel such as marine biodiesel that is in a form that can be commercially sold without the need for further conversion. Over the last few years, HC&S has partnered with biofuel energy conversion technology providers and responded to solicitations for biofuel supply. As energy conversion technology is still evolving and none has yet proven to be viable on a commercial scale, there are risks involved with proceeding with large-scale biofuel production at this time. As a result, some energy conversion companies that HC&S has worked with in the past no longer exist or have moved away from Hawaii. However, HC&S continues to be approached by energy companies seeking a biomass feedstock partner to produce advanced biofuels. Thus, HC&S remains active on this front, evaluating each proposal on its own merits as well as in relation to how it might enhance HC&S's future operations and profitability.

28. In the meantime, HC&S continues to host and support biomass energy research grant activities in cooperation with the University of Hawaii, College of Tropical Agriculture. Work has focused on growing alternative high-yielding tropical grasses in field plots at HC&S. Alternative crops such as napier grass and energy cane are being grown and are being compared against commercial sugarcane for annual biomass yield. Research activity also has involved characterizing these biomass feedstocks for physical properties important for certain biofuel conversion technologies.

29. To assist CWRM in understanding the impacts on HC&S of the IIFS mandated by the 2010 D&O and any proposed modifications thereto, HC&S has developed a model to identify the general relationship between differing IIFS levels and the availability of irrigation water and resulting financial impacts to HC&S (the "***Model***").

30. The initial impetus for the development of the Model was an internal effort to evaluate the potential impacts on HC&S expected to result from implementation of the IIFS as initially recommended by the Hearing Officer. This was explained in the exceptions and supporting declarations and exhibits filed by HC&S on May 11, 2009.

31. Since then, working together with HC&S Water Resources Manager Garret Hew, I have sought to update and refine the Model, utilizing the best information available to HC&S, in an effort to make it as useful as possible for the purpose of this remand proceeding. It is important to understand that it would be impossible, even in the best of circumstances, such as where more and better data regarding actual stream flows and loss rates were available for specific stretches of stream beds and ditches, to do anything more than estimate what the impacts will be. It is also impossible to accurately forecast what future rainfall patterns and daily stream flows will be. General relationships between daily stream flow rates and the availability of irrigation water to HC&S can, however, be illustrated and that is what the Model is designed to do.

32. One of the main purposes of the Model is to account for the variability of daily stream flows in lieu of relying exclusively on annual average daily stream flows or annual average daily diversion amounts. Annual averages tend to obscure the daily impacts of changes to the IIFS by smoothing over or minimizing the effect of water shortages that occur during periods of low daily stream flows—creating a false impression that such shortfalls are remedied during periods of high daily stream flows. Crop growth that is lost during periods where daily irrigation requirements are not met cannot simply be recovered by applying more water later. This is one of the principal reasons why HC&S suffered so severely from several years of low sugar yields as the result of the drought conditions experienced in 2007 and 2008.

33. To estimate the number of days each year that specific IIFS levels will result in HC&S not being able to meet its irrigation requirements with stream water alone, HC&S imported into the Model daily stream flow measurements from the USGS stream gauges located above the diversions on Waihe'e Stream and 'Īao Stream for calendar years 2005 through September 2013. Utilizing these actual daily measurements from the two streams that supply the vast majority of all Nā Wai 'Ehā stream water used by HC&S during this period enables the Model to calculate the frequency that particular daily stream flows occur under a given IIFS scenario and to project the corresponding amounts that can be diverted. As explained further below, the Model then subtracts estimated seepage losses and deliveries to other users "upstream" of HC&S from the amounts diverted to arrive at the amount of irrigation water available to HC&S.

34. South Waiehu Stream, from which some water is diverted into the Spreckels Ditch, is not gaged by the USGS and, since the implementation of the IIFS in 2010, has not been a significant contributor to deliveries received by HC&S, particularly during low flows, at which time, as explained in the written testimony of Garret Hew, there has not been enough water in the stream to even satisfy the IIFS. Since the Model is most concerned with estimating impacts on HC&S during low flow periods, the Model assumes limited contributions from South Waiehu Stream, and only during high flow periods.

35. Waikapū Stream, from which water is diverted by Wailuku Water Company ("***WWC***") and, together with water diverted from 'Īao Stream, is made available via the Waihe'e Ditch to irrigate HC&S's 'Īao-Waikapū fields, is also not gaged by the USGS. For purposes of the Model, HC&S has assumed that the average daily contribution of Waikapū Stream to the irrigation of the 'Īao-Waikapū fields is 2 mgd. As with all assumptions upon which the Model is

based, this assumption is subject to further review and modification to the extent more and better information becomes available.

36. Other key assumptions contained in the Model are as follows:

A. Regarding Waiheʻe Stream at the Waiheʻe Ditch intake, the Model assumes that the daily flow recorded at the USGS station is equal to the stream flow at the point of the intake, that the IIFS amount (currently 10 mgd) is left in the stream, that the balance, up to the current gate setting of 30 mgd, is taken into the Waiheʻe Ditch, and the remainder, if any, is left in the stream.

B. Regarding Waiheʻe Stream at the Spreckels Ditch intake, the Model assumes that the first 10 mgd is left in the stream and any remaining balance up to the current gate setting of 15 mgd is taken into the Spreckels Ditch. The Model further assumes that 6.84 mgd from the Spreckels Ditch, supplemented as needed by WWC from the Waiheʻe Ditch, is delivered by WWC to Kuleana users and that the balance continues in the ditch and eventually reaches the Waiale reservoir.

C. Regarding ʻĪao Stream at the ʻĪao-Waikapū Ditch, the Model assumes that the daily flow recorded at the USGS station, up to the current gate setting of 18 mgd, is available for diversion

i. less any IIFS amount;

ii. less the amount delivered to the Maui County Department of Water Supply, currently estimated to be 1.5 mgd;

iii. less an estimated aggregate amount of 2.7 mgd to cover deliveries to other WWC customers, Kuleana users of ʻĪao and Waikapū water, and WWC system losses;

iv. less the average daily requirement for the ʻĪao-Waikapū fields remaining after first applying the assumed 2 mgd contribution from Waikapū Stream.

Any remaining ʻĪao Stream water is assumed to remain in the stream.

D. The Model further assumes that Iao stream loses 5 mgd between the WWC diversion and the HC&S diversion at the Spreckels Ditch and that any remaining flow, less the IIFS for this point (currently 0 mgd) is taken into the Spreckels Ditch and delivered to the Waiale Reservoir.

37. For the Waiheʻe-Hopoi fields, the Model calculates the number of days that the deliveries to HC&S's Waiale reservoir are expected to be less than the average annual daily requirement of those fields as determined in the 2010 Decision & Order, (***"D&O"***) including 2 mgd for systems losses. To cover the shortfall between the average daily irrigation requirement and the delivery amounts for those days, the Model assumes that Well No. 7 will be operated up to its maximum sustainable capacity of 18.5 mgd. The Model further calculates 1) the expected number of days when the shortfall will be greater than what can be replaced with the 18.5 mgd available from Well No. 7 and 2) the aggregate annual volume of the expected shortfall. For days when the shortfall is made up with pumped water from Well No. 7, the financial impact to HC&S is calculated by adding the cost of the power needed to operate Well No. 7 to the amortized value of the infrastructure improvements made in 2012. For days when operating Well No. 7 at its maximum sustainable capacity of 18.5 mgd still leaves a shortfall, the financial impact is calculated by multiplying the amount of the shortfall by the estimated loss in net sugar revenues per million gallons of water unavailable to the crop. The factor used in this latter calculation is 2.16 tons of sugar per millions gallons of water, which was derived as a plantation-

wide average from water delivery and sugar production data for the ten year period from 2003 through 2012.

38. The ʻĪao-Waikapu fields, the elevation of which physically precludes them from being served by water delivered to the Waiale Reservoir or pumped from Well No. 7, are currently irrigated principally with water diverted from ʻĪao Stream and, to a lesser extent, Waikapū Stream. .The Model calculates 1) the number of days where the water available for the ʻĪao-Waikapū fields will be less than the irrigation requirement for these fields determined in the 2010 D&O, and 2) the aggregate annual volume of the expected shortfall.

39. HC&S has run the Model for five IIFS scenarios, numbered 1 through 5 in ascending order of the impact of each on HC&S. The parameters and results for each are contained in Exhibits E-R8 to E-R12 attached hereto. As a check against reality, each exhibit compares the output of the Model under the given scenario to actual data for the average and median daily flow, under conditions preceding implementation of the amended IIFS (January 2005 to July 2010) as well as under conditions following implementation of the amended IIFS (August 2010 to September 30, 2013), at the following locations: (a) the Waiheʻe Ditch at the Hopoi Chute; (b) Spreckels Ditch at Mill Street; and (c) total inflows to the Waiale Reservoir.

40. Under Scenario 1, the Waiheʻe IIFS is 5 mgd at both the upper and lower diversions; the Īao IIFS is 4 mgd at both the upper and lower diversions; the IIFS for South Waiehu is the current status quo, i.e., the gate setting described in the written testimony of Mr. Hew which approaches but is less than the 0.9 IIFS of established in the 2010 D&O; and the IIFS for Waikapu is also current status quo, i.e., 0 below the lowest WWC diversion.

41. Scenario 2 represents the current status quo; i.e., an IIFS for Waiheʻe of 10 mgd with all other streams at the current status quo.

42. Scenario 3 is the same as Scenario 2, but adds an IIFS of 4 mgd for Īao at both the upper and lower diversions.

43. Scenario 4 is the same as Scenario 3 but adds an IIFS of 2 mgd for Waikapū below the last WWC diversion.

44. Scenario 5 assumes an IIFS of 14 mgd for Waihe'e at the Spreckels Ditch diversions, 13 and 8 mgd for Īao at the upper and lower diversions, with Waikapū and S. Waiehu remaining at the current status quo.

45. The estimated annual financial impact of each of these scenarios ranges from a low of $536,318 for Scenario 1, which approximates the HC&S proposal in its May 11, 2009 exceptions, to a high of $1,697,254, which approximates the IIFS levels proposed in the Recommended D&O (but assuming status quo for Waikapū Stream). Scenario 2 is intended to reflect the current status quo, and estimates an annual financial impact to HC&S of $747,917.

46. Neither the Model nor any other predictive tool can perfectly estimate what the actual impacts will be, and HC&S continues to review and refine the formulas and assumptions contained in the Model. A conservative feature of the Model, however, is its measurement of the expected annual water shortfalls to the crop against the annual average daily irrigation requirement per the 2010 D&O, rather than the actual daily requirement which. Since days with shortfalls tend to be concentrated in the summer months, when evapotranspiration is at its highest, a seasonal calculation would likely result in greater impacts.

47. HC&S has significantly increased its usage of Well No. 7 since the 2010 D&O and has upgraded its capacity, as explained in the written testimony of Mr. Hew. HC&S expects to continue to use Well No. 7 to help meet the irrigation requirements of the Waihe'e-Hopoi

fields, especially during the months of May through September when irrigation demands are higher and deliveries of surface water lower.

48. In addition to the cost to operate Well No. 7, there are some practical and physical constraints on the ability of HC&S to rely more heavily upon Well No. 7. Total generation available varies throughout the year as the need for live steam fluctuates to support factory operations. In the summer months when irrigation demand is the highest, steam demand for the factory is also the highest, which puts a limit on electrical generation. Total maximum generation at HC&S is 36 MWH (30 from Puunene steam plant and 6 MWH from hydroelectric). Maximum availability varies seasonally with factory demand. Factory and power plant usage varies from 10 to 12 MWH leaving 13 to 20 MWH of available steam produced electricity for irrigation and/or MECO power sales. HC&S currently has 19.2 MW of available irrigation pumps and will have over 22 MW of pumps after completion of two additional irrigation infrastructure projects early next year. Na Wai Eha Surface Water and Well No. 7 are thus part of a larger system and cannot be viewed in isolation. On any given day, it may be more prudent to expend limited power generation on pumps other than those in Well No. 7. In addition, while factory demand for power diminishes with the cessation of harvesting in the Winter months, bagasse is also no longer being produced to fuel the power plant, which means that expensive fossil fuels must be burned to generate power. Under these circumstances, HC&S does not believe that it would be reasonable for HC&S to be expected to run Well No. 7 365 days of the year, i.e., even when stream flows are high.

49. The 2010 D&O allowed for only 2 mgd of system losses for HC&S with respect to Na Wai Eha waters received by HC&S. This was arrived at by assuming that lining Waiale Reservoir would eliminate the 6-8 mgd of system losses HC&S estimated were lost from the

Waiale Reservoir, and that HC&S could "halve" the 3-4 mgd it estimated for the balance of its irrigation system for its West Maui fields. [cite COL 229].

50. System losses are an inherent component of any water conveyance system. In closed systems that rely on piping, similar to municipal water systems, conveyance loss rates of 10% or higher are not uncommon. This is supported by Exhibit E-R13, which is a printout of a page from the California Department of Water Resources website, which can be found at http://www.water.ca.gov/wateruseefficiency/leak, indicating that, among California's 47 municipal water systems, loss rates average 10% and range from 5% to 30%. For agricultural water systems that rely on open canals, ditches and reservoirs, loss rates are expected to be much higher. Exhibit E-R14 is a copy of a USGS report which estimated average conveyance losses in 1995 for irrigation systems across the United States at 19% [cite]. It would be reasonable to expect HC&S to have total system losses comparable to other open agricultural water conveyance systems of approximately 20%, or 4-5 mgd.

I, RICK W. VOLNER, JR., declare, verify, certify, and state under penalty of perjury that the foregoing is true and correct.

DATED: _____, Maui, _____, 2014.

_____

RICK W. VOLNER, JR.

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COMMISSION ON WATER RESOURCE MANAGEMENT

OF THE STATE OF HAWAII

IAO GROUND WATER MANAGEMENT AREA HIGH-LEVEL SOURCE WATER USE WUPAS AND PETITION TO AMEND INTERIM INSTREAM FLOW STANDARDS OF WAIHEE, WAIEHU, IAO, & WAIKAPU STREAMS CONTESTED CASE HEARING & COMPLAINT C04-31 REGARDING WASTE OF SURFACE WATER, WAILUKU MAUI CONTESTED CASE HEARING	Case No. CCH-MA-06-01 CERTIFICATE OF SERVICE

CERTIFICATE OF SERVICE

The undersigned hereby certifies that, on this date, a true and correct copy of the foregoing document was duly served on the following parties by U.S. Mail:

D. KAPUA'ALA SPROAT, ESQ.
ISAAC H. MORIWAKE, ESQ.
Earthjustice
850 Richards Street, Suite 400
Honolulu, HI 96813
ATTORNEYS FOR PETITIONERS
HUI O NA WAI EHA AND MAUI
TOMORROW FOUNDATION, INC.

DR. LAWRENCE H. MIIKE
HEARING OFFICER
State of Hawaii, DLNR
Commission on Water Resource Management
P.O. Box 621
Honolulu, HI 96809

PATRICK WONG, ESQ.
Department of the Corporation Counsel
County of Maui
200 South High Street
Wailuku. Hawaii 96793

ATTORNEY FOR COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY

PAMELA W. BUNN, ESQ.
LINDSEY KASPEROWICZ, ESQ.
Paul Johnson Park & Niles
ASB Tower, Suite 1300
1001 Bishop Street
Honolulu, HI 96813
ATTORNEYS FOR OFFICE OF HAWAIIAN AFFAIRS

PAUL R. MANCINI, ESQ.
Mancini Welch & Geiger, LLP
Kahului Building
33 Lono Avenue, Suite 470
Kahului, HI 96732
ATTORNEY FOR WAILUKU WATER COMPANY, LLC

GILBERT S.C. KEITH-AGARAN, ESQ.
Takitani & Agaran
24 N. Church Street, Suite 409
Wailuku, HI 96793
ATTORNEYS FOR WAILUKU WATER CO., LLC

DATED: Honolulu, Hawaii, January 7, 2014.

CADES SCHUTTE LLP

DAVID SCHULMEISTER
ELIJAH YIP
Attorneys for HAWAIIAN COMMERCIAL AND SUGAR COMPANY