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William A. Bonnet
Vice President
Government & Community Affairs

November 1, 2006

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PUBLIC UTILITIES
COMMISSION

The Honorable Chairman and Members of the
Hawaii Public Utilities Commission
465 South King Street, First Floor
Kekuanaoa Building
Honolulu, Hawaii 96813

Dear Chairman Caliboso and Commissioner Cole:

Subject: Docket No. 2006-0431
October 15-16, 2006 Outage Investigation

Pursuant to Order No. 22986, filed October 27, 2006, Hawaiian Electric Company, Inc. ("HECO"), Hawaii Electric Light Company, Inc. ("HELCO") and Maui Electric Company, Limited ("MECO") (collectively the "Companies") respectfully submit a copy of the following documents from the October 19, 2006 briefing to the Commission and the Division of Consumer Advocacy:¹

1. Notes from Thomas Joaquin, HECO Senior Vice President, Operations (Attachment 1),
2. HECO PowerPoint presentation on October 15-16, 2006 Earthquake Event (Attachment 2),
3. October 15, 2006 Oahu Earthquake Outage Restoration Chronology (Attachment 3),
4. Oahu Generating Unit Capability (Attachment 4),
5. HELCO PowerPoint Presentation on October 15, 2006 Power Interruption (Attachment 5), and
6. MECO PowerPoint Presentation on Earthquake Event Response, October 15, 2006 (Attachment 6).

Sincerely,

Enclosures

cc: Division of Consumer Advocacy (with Enclosures)

¹ Ordering Paragraph 5, Order No. 22986, requires the Companies to file all documents provided at the October 19, 2006 Commission briefing and the October 23, 2006 public briefing. Material from the October 23, 2006 public briefing will be filed under a separate transmittal.

**Earthquake Event
October 15 and 16, 2006
Thomas L. Joaquin, Senior Vice President, Operations**

- **Good afternoon. I am Thomas Joaquin, senior vice president for operations at Hawaiian Electric Company.**
- **First, all of us at HECO apologize and empathize for the inconvenience the October 15 outage caused. We know it was frustrating and sincerely appreciate your understanding.**
- **The presentation that follows is the initial stage of our investigation and is far from complete.**
- **I will give you a brief overview, and then Tom Simmons, vice president of power supply; Chris Shirai, VP special projects, and Dan Giovanni, manager for power supply operations and maintenance will give you the details. Warren Lee, President of HELCO, and Ed Reinhardt, President of MECO, will then give a brief review of what happened on their islands.**
- **October 15 started off as a normal Sunday morning.**
- **Staffing was normal. One operator per pair of units, six trouble men, a few additional people at Kahe for maintenance going on there.**
- **Two units were in maintenance. Because it was a weekend, five units were not scheduled to run and so stood cold.**
- **Then, an earthquake struck west of the Big Island. Thirty-four second later, buildings on Oahu began to shake and did not stop for 15 seconds.**
- **At Kahe Unit #3 and Honolulu Unit #8, seasoned operators felt buildings shake, and they saw sensors and heard alarms which told them their units were facing potential severe damage. They responded, as their authority and responsibility trained them to, and tripped off their units.**
- **As a remote island utility, our philosophy is always to protect the system for the long run and avoid the risk of catastrophic failure that could leave us in the dark for weeks or even months, and cost ratepayers millions to repair.**
- **The earthquake set two other large units on course to loose power and trip automatically.**

- **As these units tripped off line, others followed as they detected low frequency or other alerts that lead to automatic trip to prevent potentially catastrophic damage to the units.**
- **Valiant efforts were made to save the system from complete shut down. In particular, as automatic load shedding ran its course without saving the system, operators tried to shed load manually to restore stability to the system and keep the generators going...**
- **At Kahe, when the last unit remained online, an operator tried to isolate the unit and keep power to its Nanakuli neighbors, keeping some power on the grid, which would have saved four hours of restoration time. But ultimately, the instability of the system made it impossible to keep the unit on and avoid damage.**
- **We then had an island-wide blackout.**
- **Even before power went off at my home, Harold Kageura VP of Energy Delivery, called me, already enroute to Ward Avenue. Hundreds of other HECO employees were soon reporting to their stations.**
- **Restoration began immediately following the blackout.**
- **We immediately tried to contact and stay in touch with state and city authorities and the media. With the media especially, we ere working through problems with intermittent and clogged phone service.**
- **To cite one example of our coordination with the state, we knew Monday would be a school day and were in touch with the DOE. When they asked about school, though the system was less than half restored, we made an assessment and advised them NOT to cancel school the next day. Power was restored to all but a handful by 2 a.m. Monday morning.**
- **Crews worked around the clock – some for 30 plus hours – to bring generators back and restore service to customers.**
- **This investigation began at once and we are retaining a mainland industry expert to assist in finishing a report to the Public Utility Commission and the public before the end of the year. We hope to learn more and make improvements accordingly.**
- **And now, I want to introduce Tom Simmons, VP of Power Supply.**

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Earthquake Event

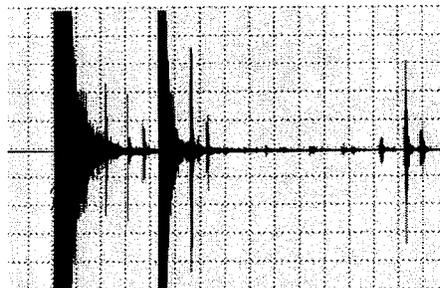
October 15 and 16, 2006

1



October 15, 2006 – Two Major Earthquakes West of Big Island

- 6.7 Quake (Actual Origin Time at Epicenter: 07:07:49.25)
– Arrival at Oahu Station: 07:08:23.75



2



Incident Chronology

- 7:08:23 6.7 magnitude quake arrives at Honolulu
- 7:08:23+ Quake triggers automatic shutdown of hydraulic fluid pumps on Kahe 5 and Kahe 6, setting in motion eventual loss of output on these units.
- 7:08:58 Kahe 3 operator feels building trembling, sees and hears many alarms. Operator responds as trained to initiate a trip of the unit.
- 7:09:06 Koolau-Wailupe #1 46 kV line trips due to insulator failure.
- 7:09:08 Honolulu 8 operator feels building trembling, sees and hears many alarms. Operator responds as trained to initiate a trip of the unit.

3



Earthquake Damage

10/15/2006 07:09:06 46KV OCB 4467 (KOO1) TRIP

- The earthquake causes damage to the Koolau-Wailupe #1 46kV circuit causing it to trip off-line at 7:09 am



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Incident Chronology

(continued)

- 7:09+ Kahe 5 and 6 and other units pick up load lost by Kahe 3 and Honolulu 8. System stabilizes.
- 7:11+ Kahe 5 output declining rapidly due to loss of hydraulic pressure resulting from earlier automatic shutdown of pumps due to the quake. System frequency declining.
- 7:11:51 Automatic load shedding removes about 13,100 customers from the system and stabilizes system frequency
- 7:12:48 Kahe 5 trips automatically to protect generator.
- 7:13+ Kahe 6 output declining rapidly due to loss of hydraulic pressure resulting from earlier automatic shutdown of pumps due to the quake. System frequency declining even further.

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Incident Chronology

(continued)

- 7:14:02 Automatic load shedding removes about an additional 32,200 customers from the system to try to stop declining frequency
- 7:14:04 Kalaeloa steam turbine trips automatically on low frequency.
- 7:14:13 Automatic load shedding removes about an additional 29,700 customers from the system to try to stop declining frequency
- 7:14:21 H-Power trips automatically due to low frequency.
- 7:14:23 Automatic load shedding removes about an additional 59,000 customers from the system to try to stop declining frequency

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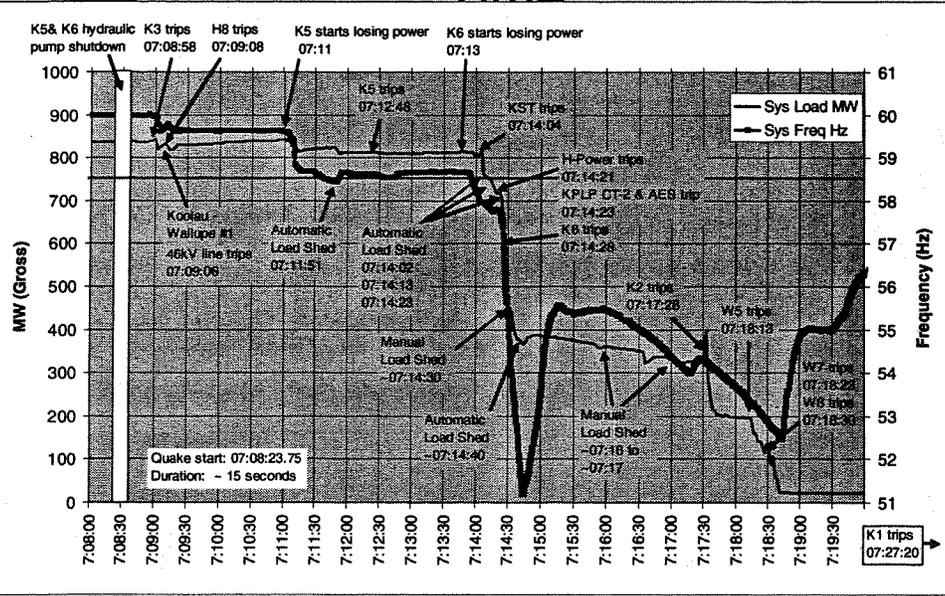
Incident Chronology

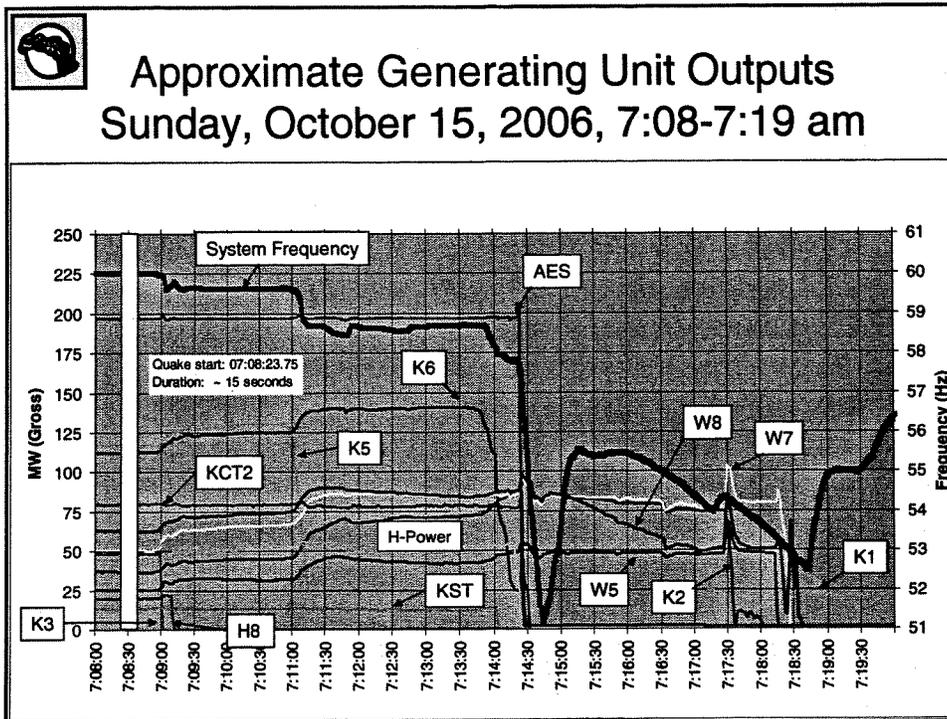
(continued)

- 7:14:23 Kalaeloa CT2 and AES trip automatically due to low frequency.
- 7:14:28 Kahe 6 trip initiated by operator at near zero output.
- 7:14:30+ Kahe 1, Kahe 2, Waiiau 5, Waiiau 7 and Waiiau 8 continue operating despite severely depressed system frequency (< 56 Hz).
- 7:14:33 Operators initiate manual load shedding to try to raise frequency and prevent total system outage
- 7:14:50 About an additional 4,700 customers automatically shed from the system on low voltage
- 7:17:28 to 7:18:30 Kahe 2, Waiiau 5, Waiiau 7 and Waiiau 8 all lost on automatic boiler trip
- 7:27:20 Last remaining unit, Kahe 1, lost on automatic boiler trip
- 7:27:20 Island-wide blackout, less than nineteen minutes since the quake hit Honolulu



System Generation & Freq. vs. Time





Preparing the System for Restoration

- Shortly after outage, black start units started up
- Began configuring the system for restoration
- Began mobilizing field crews
- Began inspections and damage assessments

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Strategic Objectives

- Safety of public, employees and assets
- Restoration of generators
- Orderly restoration of system
- Verify integrity of transmission and distribution system
- Verify integrity of substation/switchyard
- ***Our actions shall be to operate for the long run***

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Coordination with Government Agencies

- State of Hawaii
 - Governor's Office
 - Energy Council
 - State Civil Defense
 - Public Utilities Commission
 - Department of Transportation
 - Department of Commerce and Consumer Affairs
 - Department of Education
- City and County of Honolulu
 - Oahu Civil Defense
 - Honolulu Police Department
 - Honolulu Fire Department



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Communications with Media

- Started trying to call the media as soon as island-wide blackout occurred
- Continued to update media throughout the day
- Press release – some hand delivered

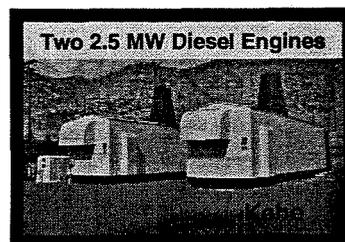
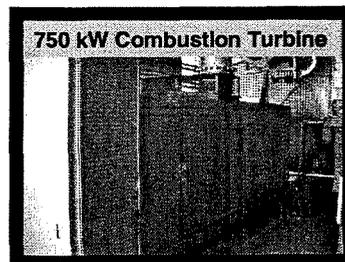
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Waiau and Kahe Black Start Generators

Black starting energizes the grid at 60 Hz by connecting the first unit to a de-energized grid.

- Waiau
 - 750 kW Combustion Turbine
 - Black start W5 or W6
- Kahe
 - Two 2.5 MW Diesel Engines
 - Black start two 90 MW units (Kahe 1 or 2 and Kahe 3 or 4)





Starting a Black System

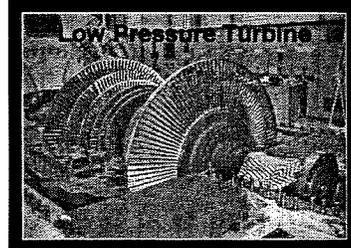
	<u>Approximate Time (hours)</u>
1 Generating units off line and secured. Conduct visual damage assessment.	0.5 - 1.0
2 Reconfigure auxiliary power systems and start black start diesel engine (Kahe)	2.0 - 3.0
3 Start up generating unit boiler and build steam pressure up to 600-800 psi; place turbine-generator on turning gear	0.5 - 2.0
4 Admit steam to turbine and roll turbine to 3,600 rpm	0.3 - 1.0
5 Synchronize main auxiliary transformer to auxiliary bus and unload black start diesel engine	0.4 - 0.8
6 Synchronize generating unit to de-energized grid	0.4 - 0.8
TOTAL	4.1 - 8.6

Actual time on Oct. 15, 2006 to start Waiau 6: 4.5 hours 15



Steam Units – Process for Starting and Loading

1. Start auxiliaries and purge boiler
2. Fires in, build steam pressure to 600 – 800 psi (turbine/generator on turning gear)
3. Pull condenser vacuum and roll turbine to 3600 rpm; verify acceptable vibration
4. Synchronize to system and stabilize at initial load
5. Increase firing to 20-30% capability; stabilize water chemistry and combustion conditions
6. Increase firing to 50-60% capability; stabilize water chemistry and combustion conditions
7. Unit good for 100% capability (“firm”); transfer to EMS control





Factors Affecting Steam Unit Starting and Loading Times

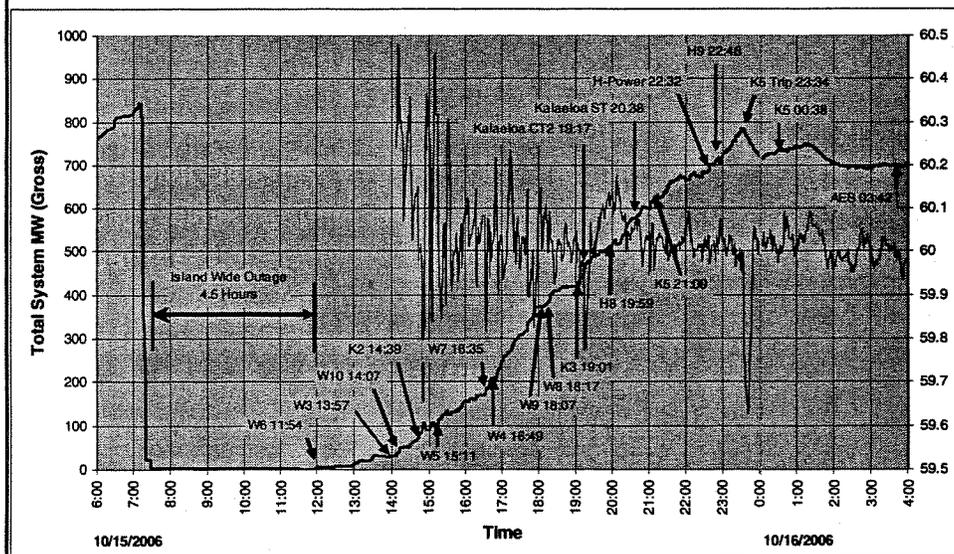
(Typically 2-24 hours total from cold start to firm status)

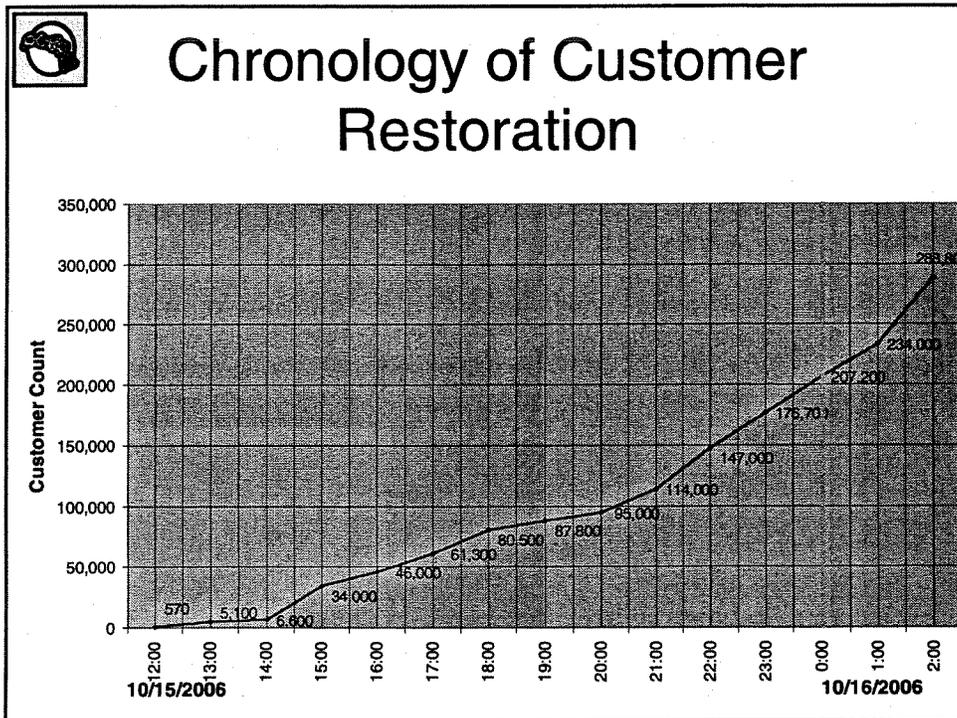
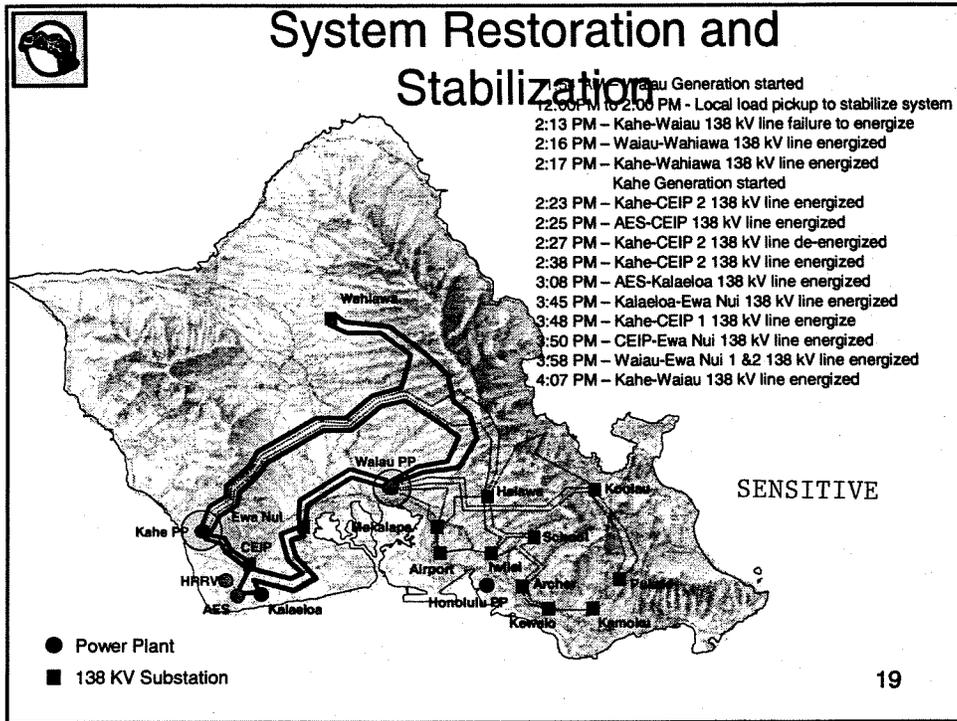
- Initial boiler drum level and pressure
- Cold, warm or hot condition of the turbine at the time of startup
- Boiler water chemistry determines permissible drum pressure and attemperation source
- Fuel oil temperature and viscosity prior to light-off
- Atomizing steam conditions for steam atomized burners
- Boiler purge sequence prior to ignition
- Number of burner guns in service
- Boiler combustion conditions
- Boiler steam conditions (pressure and temperature) before admitting steam to the turbine
- Boiler, turbine and voltage regulator controls on auto or manual
- Turbine eccentricity, differential expansion and vibration during the roll up to sync speed on startup

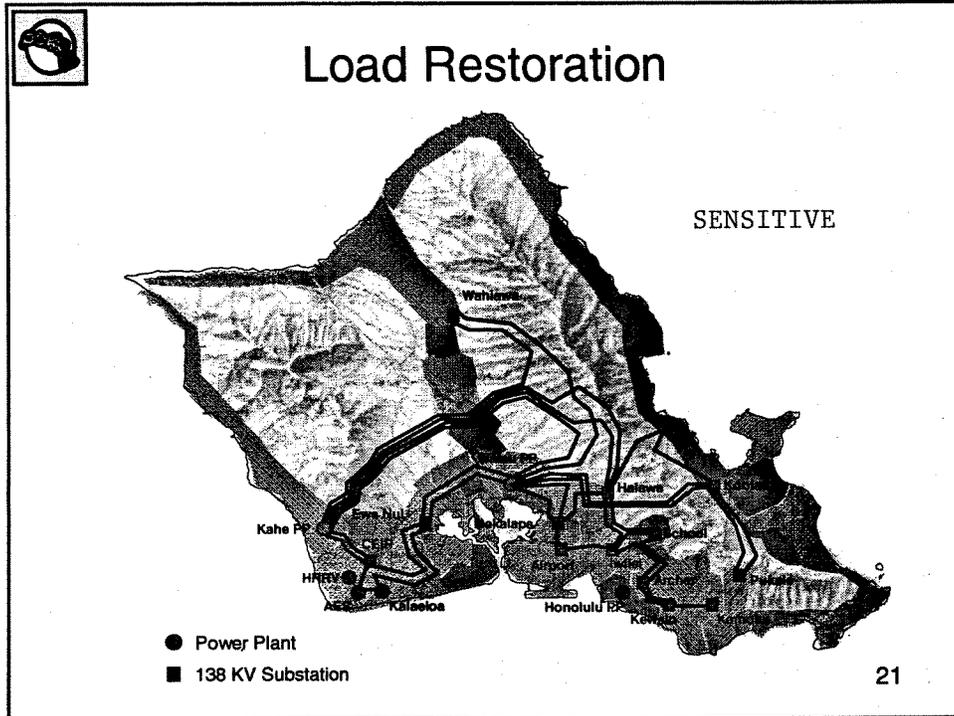
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Restoration Timeline October 15 and 16

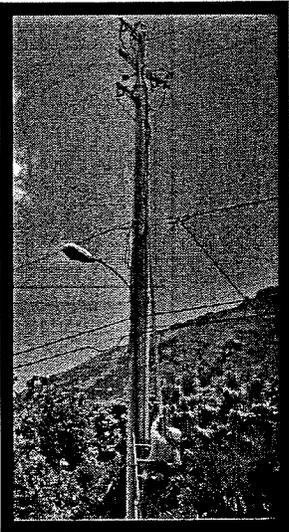
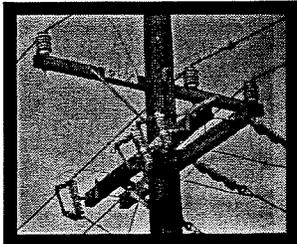






Pocket Outages

- At 1:55 am October 16th, all distribution circuits were energized
- More than 100 crew members worked through the rest of October 16th to get the approximately 2,200 customers affected by known pocket outages back in service



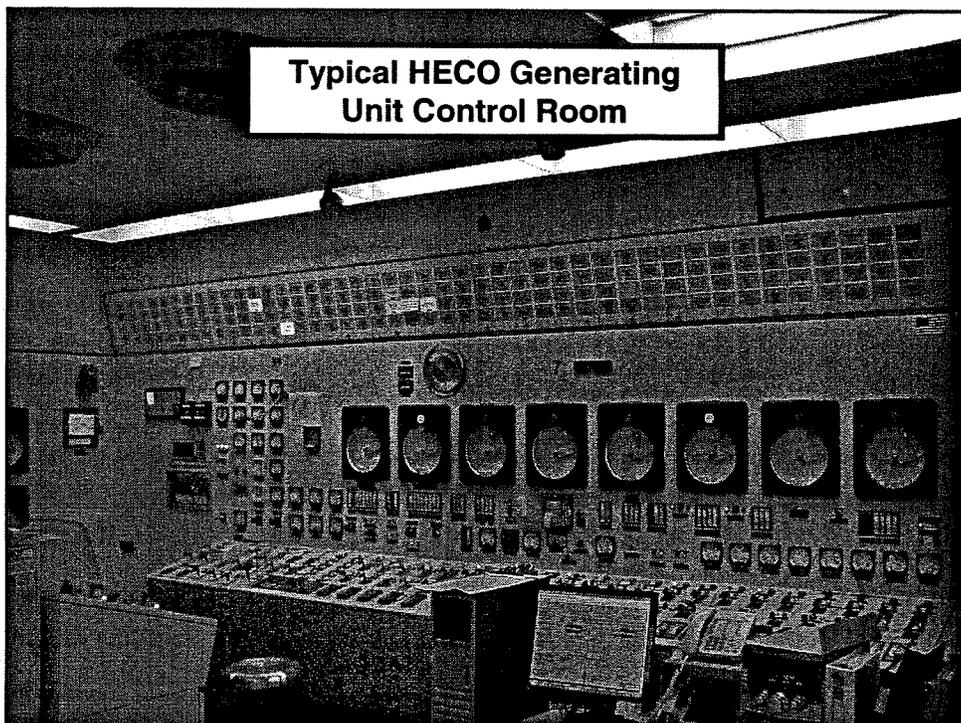
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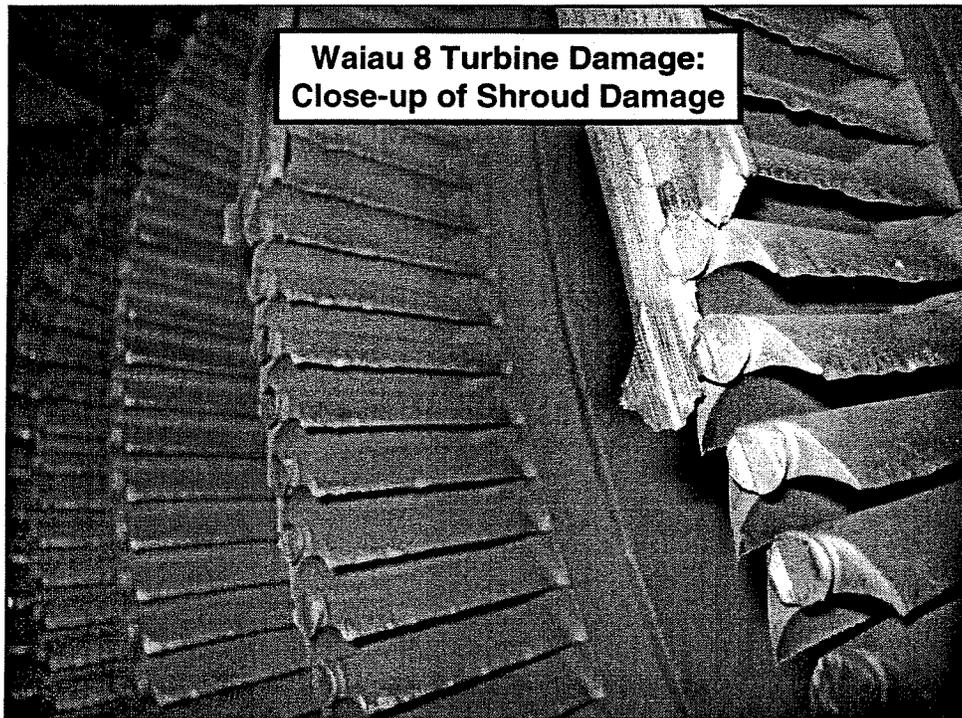
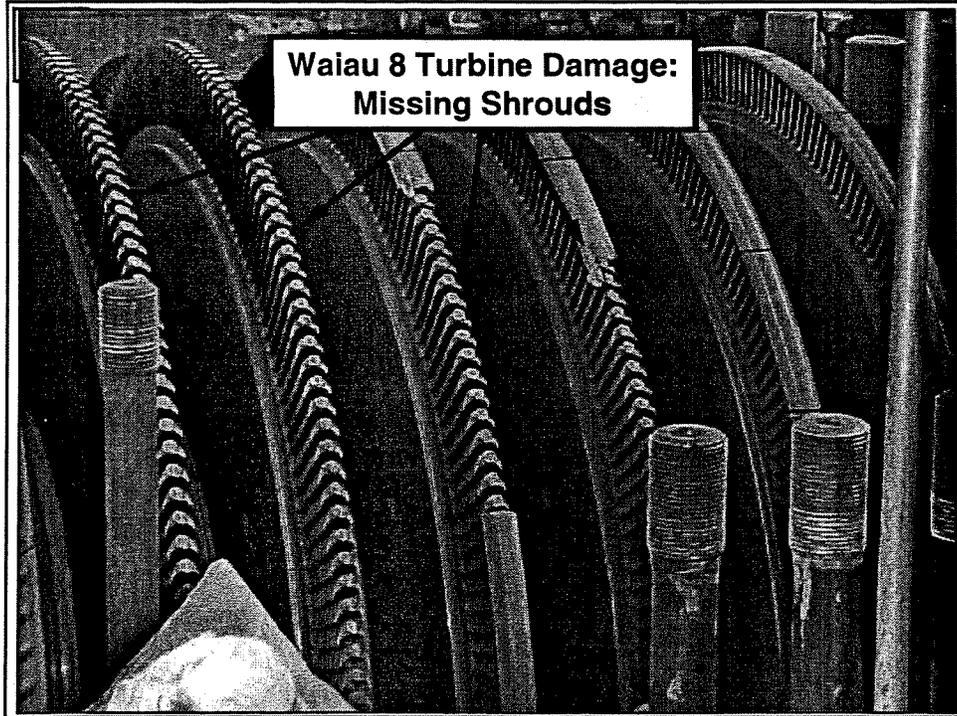


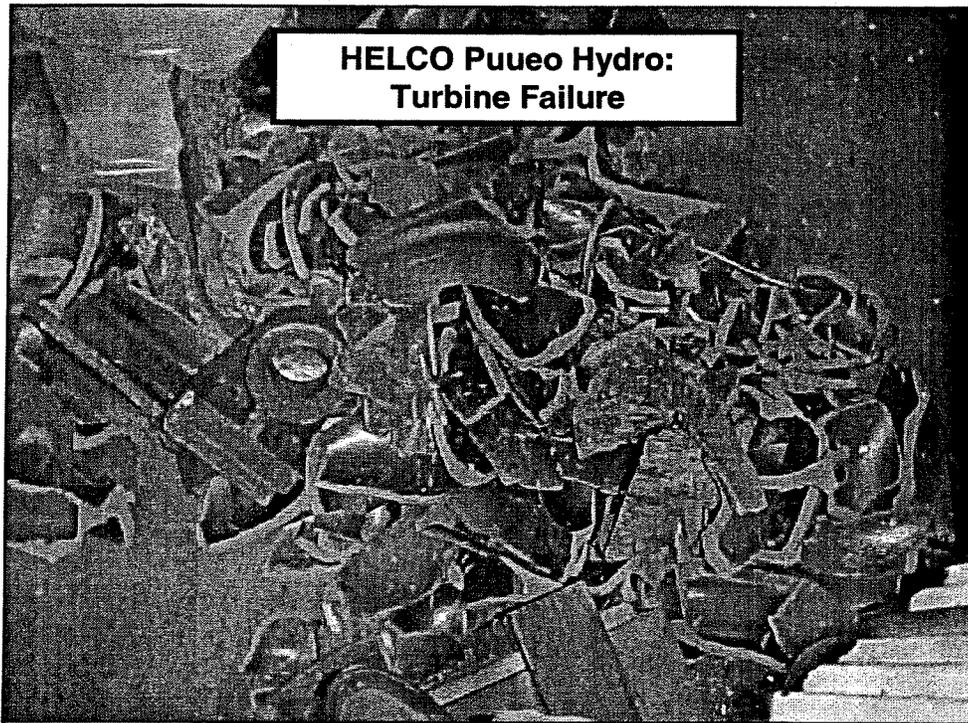
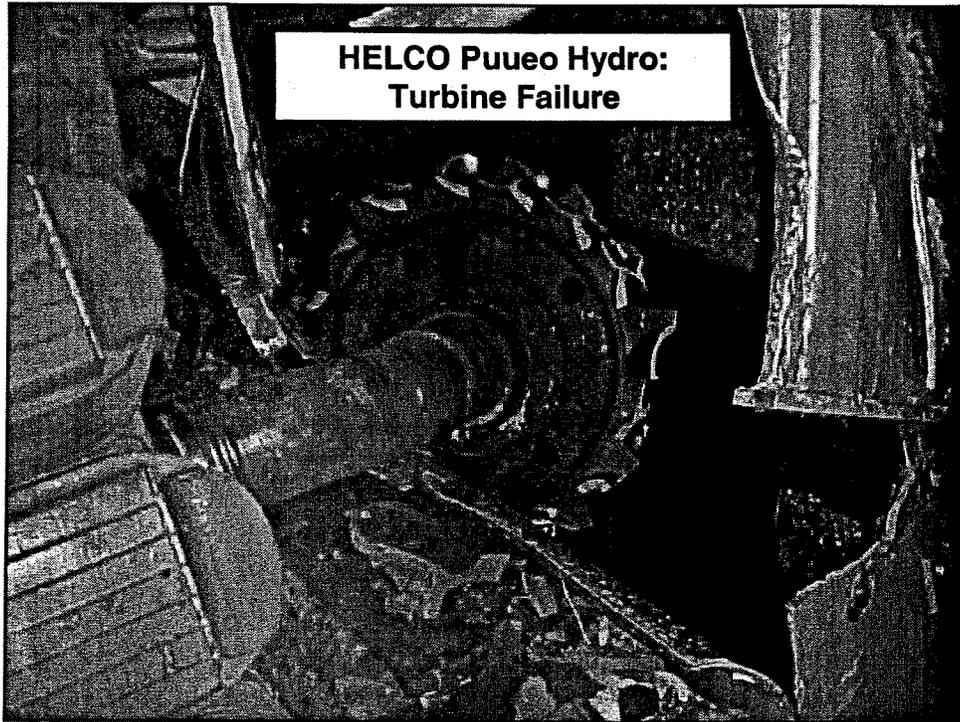
Next Steps

- Retain an industry expert organization to assist with our investigation
- Complete investigation and file report with PUC in December 2006

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October 15, 2006
Oahu Earthquake Outage Restoration Chronology

MAJOR AREAS RESTORED
(broad categories of areas only)
ESTIMATED RUNNING TOTAL AS OF TIME INCREMENTS INDICATED

12:05 p.m.	570 customers restored – parts of Waiau, Waimalu, Pearl City
1:00 p.m.	5,100 customers restored – includes pick up of additional customers in above areas and parts of Aiea
3:00 p.m.	34,000 customers restored – addition of parts of Kahe, Makaha, Nanakuli, Waikele and Ewa Beach areas
4:00 p.m.	46,000 customers restored – pick up of parts of Ft. Weaver Road, Kunia and Mililani
5:30 p.m.	74,000 customers restored – addition of parts of Mililani, Wahiawa, Haleiwa, Hickam, Waialua and Makakilo. The Honolulu International Airport, Pearl Harbor, and Hickam Air Force Base also are restored.
6:30 p.m.	87,000 customers restored – addition of parts of Keehi, Makalapa, Sand Island, Iwilei, and areas near Neal Blaisdell Center.
8:00 p.m.	95,000 customers restored – addition of parts of Kailua, Enchanted Lake, Olomana; more parts of Pearl City, Makakilo, Ft. Weaver, Ewa Beach, Waipio and Waiawa
9:00 p.m.	114,000 customers restored - addition of Kaneohe Marine Corps Station, more areas of Pearl City, Ewa Beach, Waiawa
9:15 p.m.	134,000 customers restored – pick up of parts of Kalihi, Piikoi, areas of Waipahu, Kapahulu.
10:00 p.m.	147,000 customers restored – addition of most of Waikiki and parts of Makaloa, Kapahulu, Puuloa. More areas of Aiea and Pearl City are restored.
11:30 p.m.	202,000 customers restored – areas include parts of Kakaako, Kewalo, McCully, Manoa, Kaimuki, St. Louis Heights, Niu Valley, Hawaii Kai, Kahala, Waialae. On the windward side, parts of Kaneohe, Aikahi, Hauula and Punaluu. Leeward: parts of Mililani.

October 16, 2006

- 12:30 a.m.** 222,000 customers restored. More parts of Kailua, Waimanalo, Kaneohe, Keehi, Kapalama, Waiakamilo, Aina Haina, Waialae are restored
- 1:01 a.m.** 234,000 customers restored. Leeward areas include more areas of Waipahu, Mililani, Waiawa, Kunia, Makaha. Windward: Kailua – Lanikai, Waihee, Kalaheo, Kuilima. Honolulu: Nuuanu, Lakeside, Mapunapuna, Waiakamilo, McCully, Manoa
- 1:55 a.m.** Power restored to remaining circuits*. Honolulu: more parts of Kalihi, Liliha, Nuuanu, Punchbowl, Kahala, Kaimuki, Sand Island, Makiki, McCully, Moiliili, Pauoa, Downtown areas. Windward: more parts of Kaneohe. Leeward: Kunia, Waipahu.

***Important note: small pockets of customers in various locations may still have been out due to individual problems at their sites, requiring trouble personnel to travel to each location to troubleshoot.**

OAHU GENERATING UNIT CAPABILITY

Unit	Normal Capability* Gross MW
Honolulu 8	56
Honolulu 9	57
<hr/>	
Honolulu Power Plant Sub-total:	113
Waiau 3	49
Waiau 4	49
Waiau 5	57
Waiau 6	56
Waiau 7	92
Waiau 8	94
Waiau 9	53
Waiau 10	50
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Waiau Power Plant Sub-total:	500
Kahe 1	92
Kahe 2	89
Kahe 3	92
Kahe 4	93
Kahe 5	142
Kahe 6	142
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Kahe Power Plant Sub-total:	650
HECO-sited Distributed Generation:	15
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HECO-owned Generating Units	1278
H-POWER:	46
Kalaeloa Partners, L.P.:	208
AES Hawaii:	180
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Independent Power Producers:	434
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HECO System Total	1712

*Values are approximate. Actual capability on any given day may vary.

Hawaii Electric Light Company

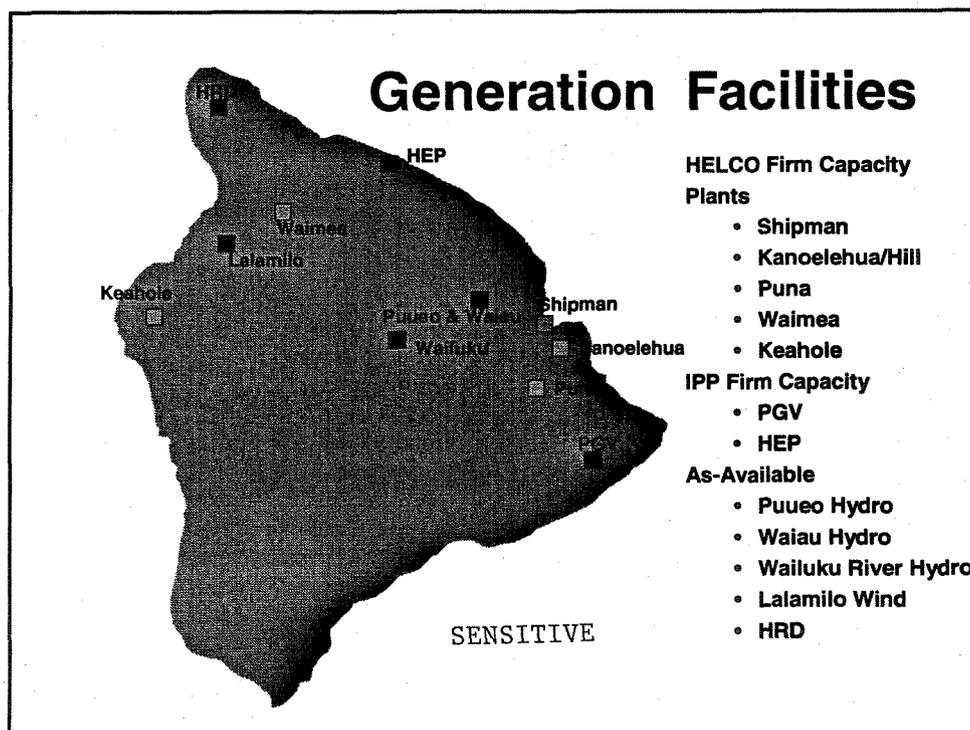
Power Interruption October 15, 2006

Status Prior to the Earthquake

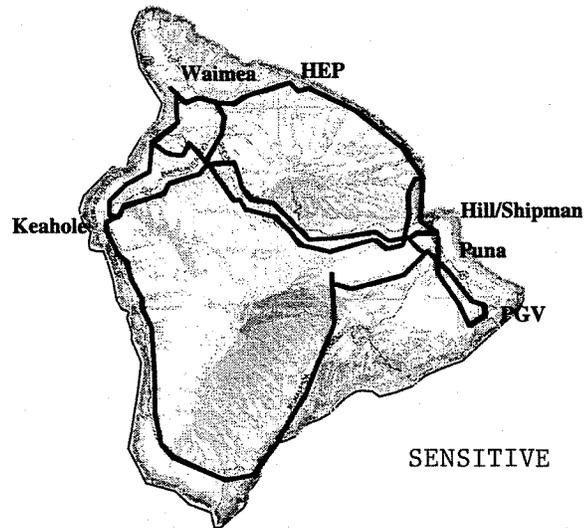
- On line at 0708 hrs - 125 MW
(approximately 76,000 Customers)
- Firm Generation Status
 - Total capability - 270 MW
 - Available capacity - 234 MW
 - Scheduled outage - 21 MW
 - De-ratings - 15 MW
- As Available Generation Status
 - Hydro Plants - 5 MW
 - Wind Farms - 0.0 MW

Status Prior to the Earthquake

- Transmission system
 - All operational & in service
- Distribution system
 - All operational & in service
- Switching station system
 - All operational & in service
- Substation system
 - All operational & in service

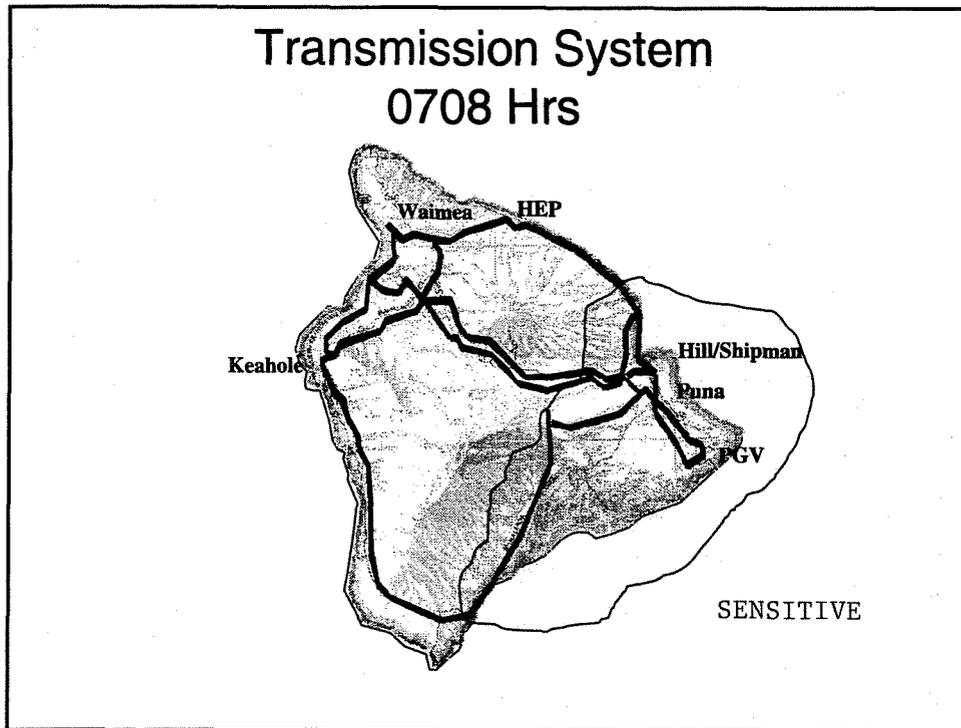


Transmission System



Incident – 0708 Hrs

- Earthquake occurs at 7:08 a.m.
- 19 transmission circuits trip open
- 60 distribution circuits to trip open
- 10 substation transformers fuses open
- Capacitor bank at Ouli Switching Station damaged
- Ten (10) spans on 3200 line (34 kv transmission line from Honokaa serving Paauilo substation) fail
- Insulator on 3300 line (34 kv transmission line from Waimea serving North Kohala) fails
- Transmission switches at Honokaa Substation damaged
- CT-5 generator locks out
- Waimea diesel generators locked out



Incident plus 30 seconds
0708.30 Hrs

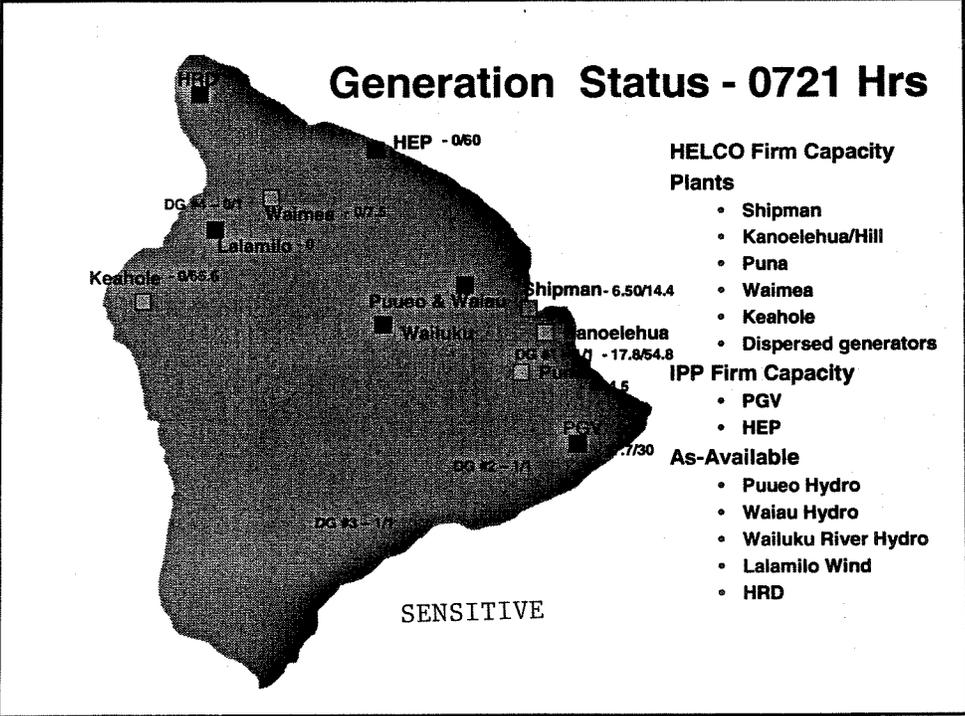
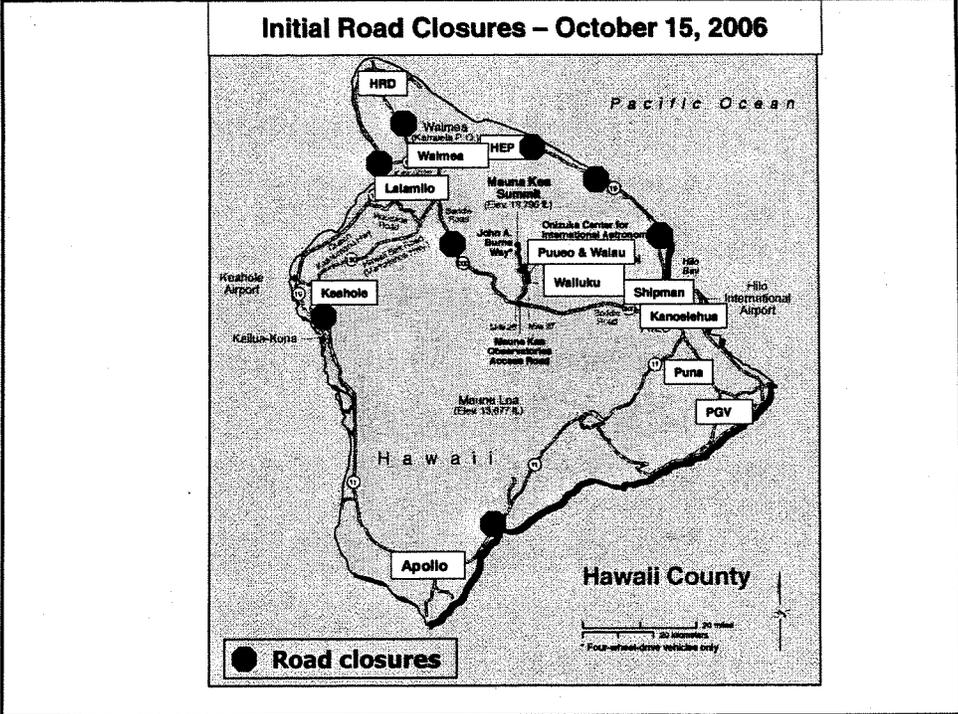
- HEP at 60 mw trips off-line due to islanding condition
- Approximately 40,000 customers without electric service
- East Hawaii Generators remain on line – Hill 5, Hill 6, PGV, Puna Steam and Shipman 3
- Generation imbalance exists – more generation on line than load

Incident plus 13 minutes 0721.00 Hrs

- Generation status
 - On line at 0721 hrs - 37 MW
 - Available firm capacity - 45 MW
 - Forced outage - 189 MW
- Transmission status
 - Seven (7) of nineteen (19) transmission circuits restored

Incident plus 13 minutes 0721.00 Hrs

- System upset and Generation imbalance causes Hill 5, Hill 6, and Puna Steam to trip. PGV output declines
- Underfrequency load-shedding condition results and another 18,600 customers are disconnected from the system by underfrequency relaying. 58,600 customers out
- Diesel generating units fast started
- CT-1 started and brought on line
- System stabilized at 37 mw with Shipman 3, CT-1, PGV and diesel units on-line.
- Numerous distribution circuits remain open
- Numerous highway and road closures due to earthquake damage



Restoration Action 0721 Hrs to 2400 Hrs

- System operator re-establishes transmission circuits via Supervisory Control
- Puna Steam unit brought back on line 7:35:05
- Transmission path to Keahole established. CT-4 on line at 7:41:57
- CT-3 brought on line at 7:47:49
- System Operator begins to restore underfrequency circuits
- 8:08 a.m. system stable with load at 74.2 MW but at risk
- Waimea & Keahole diesel generators started as transmission and distribution circuits are restored for service
- Numerous distribution circuits and substations to be restored

Restoration Activity 0721 Hrs to 2400 Hrs

- 8200 line (Anaehoomalu to Mauna Lani) transmission path re-established
- 8300 line (Mauna Lani to Ouli) transmission path re-established
- 7300 line (Waimea to Ouli) transmission path re-established
- Fire at Honokaa switching station disables 8800 line (Honokaa to HEP) transmission path. HEP output is limited until 1530 hrs
- 8800 line transmission path re-established after repairs at Honokaa Switching station completed
- Hill 5 returns to service
- Problem with CT-5 transformer lockout cleared. CT-5 available at 1451 hrs
- Hill 6 turbine steam leak. Unit kept off-line for repair

Restoration Activity

0720 Hrs to 2400 Hrs

- Repairs to damaged insulators on 3200 line near Honokaa completed
- Repairs to damaged insulator on 3300 line completed
- HELCO power and transmission systems restored to normal operations by 1700 hrs
- Restoration to all customers completed by 2300 hrs

Post Incident – 2400 hrs

- Evening Peak, October 15 – 179.8 MW
- Firm Generation Status
 - Total capability - 270 MW
 - Available capacity - 214 MW
 - Scheduled outage - 21 MW
 - De-ratings - 15 MW
 - Forced outage (Hill 6) - 20 MW
- As Available Generation Status
- Hydro Plants - 5 MW
 - Wind Farms - 0.0 MW

Maui Electric Company

Earthquake Event Response

October 15, 2006



Maui Electric Company, Limited

Restoration Strategic Objectives

- Maintain the safety of the public and our employees.
- Verify integrity of transmission, distribution, and power plant infrastructures on Maui, Molokai, and Lanai.
- Restoration of generators - "Black start" process.
- Verify status of substation/switchyard breakers – reestablish systems communications.
- Orderly restoration of system based on industry best practices.



Maui Electric Company, Limited

Generation Trip Sequence

07:00:00 System Load 131.9 MWs

<u>Time</u>	<u>Unit No.</u>	<u>Unit Type</u>	<u>Cause</u>	<u>Load, MW</u>
7:07:17	M16	Combustion Turbine	High vibration	18.8
7:07:20	M14	Combustion Turbine	High vibration	18.8
7:07:30	M19	Combustion Turbine	High temperature	13.0
7:07:38	M15	Steam Turbine	Loss of heat from M14 and M16	12.8
0:21	4 units dropped off line		Total MW lost =	63.4

<u>Time</u>	<u>Unit No.</u>	<u>Unit Type</u>	<u>Cause</u>	<u>Load, MW</u>
7:08:43	K4	Steam Turbine	High vibration manual trip	12.5
7:08:45	HC&S	Steam Turbines	No SCADA	6.4
7:08:45	KWP	Wind Turbines	No SCADA	17.7
7:12:10	K3	Steam Turbine	Generator trip	11.3
7:12:48	K1	Steam Turbines	Over-current relay trip	2.5
7:15:36	M12	Diesel Engine	Over-current relay trip	6.6
7:16:52	M11	Diesel Engine	Manual trip	5.3
7:16:56	M10	Diesel Engine	Manual trip	6.2
			Total MW lost after 7:08 =	68.5



Maui Electric Company, Limited

Generation Restoration Sequence

<u>Time</u>	<u>Location</u>	<u>Unit</u>	<u>Type</u>	<u>Capacity in MWs</u>
7:53	Maalaea	M1	Diesel	2.50
8:53	Puunene	HC&S	Steam Turbine	16.00
9:02	Maalaea	M6	Diesel	5.60
9:04	Maalaea	M5	Diesel	5.60
9:17	Maalaea	M4	Diesel	5.60
9:20	Maalaea	M11	Diesel	12.50
9:23	Maalaea	M10	Diesel	12.50
9:28	Maalaea	M7	Diesel	5.60
9:39	Maalaea	M8	Diesel	5.60
9:40	Maalaea	MX2	Diesel	2.50
9:48	Maalaea	MX1	Diesel	2.50
9:58	Maalaea	M17	Combustion Turbine	21.20
10:14	Kahului	K1	Steam Turbine	5.00
10:41	Maalaea	M12	Diesel	12.50
11:11	Maalaea	M14	Combustion Turbine	20.00
11:25		KWP	Wind Turbine	30.00
12:18	Maalaea	M16	Combustion Turbine	20.00
12:27	Kahului	K3	Steam Turbine	11.50
12:51	Maalaea	M19	Combustion Turbine	21.00
14:07		Makila	Hydro	0.03
			Total Capacity Restored:	217.73



Delays in Raising Generation

- Combustion turbines internally locked out on temperature due to full power shut down. Requires two to three hours before internal locks clear and they can be restarted. Lockout prevents unit damage.
- M12 fuel system required purging and refueling with Bio-diesel fuel for start-up in order to meet DOH stack emissions opacity requirements.
- M14 and M16 required two one-hour step delays to check and maintain water/fuel ratio to meet DOH emissions requirements. Added two hours from start time to full unit capacity.



Maui Electric Company, Limited

Coordination, Communications, and Cooperation with First Responders



County of Maui



Maui Civil Defense



Maui Fire Department



Maui Police Department



Maui Electric Company, Limited

Customer Restoration

- | | |
|-------------|--|
| 09:45-10:15 | 9 Circuits restored, including Kaanapali – 5800 customers. |
| 10:15-10:45 | 10 Circuits restored, Lahaina, Wailea, Kula – 7500 customers. |
| 10:45-11:15 | 3 Circuits restored, Lahaina, Haiku, Peahi – 1700 customers. |
| 11:15-11:45 | 3 Circuits restored, Haiku, Napili, Kihei – 4200 customers. |
| 11:45-12:15 | 4 Circuits restored, Kihei, Waiehu, Kihei – 3900 customers. |
| 12:15-12:45 | 6 Circuits restored, Mahinahina, Wailuku, Kihei – 7500 customers. |
| 12:45-13:15 | 5 Circuits restored, Kihei, Kahului – 4900 customers. |
| 13:15-13:45 | |
| 13:45-14:15 | |
| 14:15-14:45 | 3 Circuits restored, Kula, - 2400 customers. Last customers restored. There were two non-quake related outages occurring during this same time, one vegetation related, one equipment failed in service. |



Maui Electric Company, Limited

Customer Restoration

- | | |
|-------------|--|
| 08:57 | CKT 1244 – FAA facilities |
| 09:03 | CKT 1245 – Kahului Airport facilities |
| 09:07 | CKT 1267 – Maui Memorial Hospital |
| 09:10 | CKT 1266 – Maui Civil Defense & Mayor |
| 09:21 | CKT 1264 – Maui Electric Dispatch facilities |
| 09:25 | CKT 1290 – Maui Police Department |
| 09:30-09:45 | 10 Additional circuits – approximately 9000 customers. |



Maui Electric Company, Limited