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REPORT ON THE MANAGEMENT OF HURRICANE INIKI DEBRIS

ISLAND OF KAUAI, HAWAII

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1.0 BACKGROUND

Hurricane Iniki struck the Island of Kauai on September 11, 1992. Hurricane force winds were experienced beginning about 1:00 p.m. and the storm abated about six hours later. The eye of the storm passed directly over the island, from Waimea on the west side to Haena on the north shore. No part of the island was spared. Sustained wind speed was 130 mph, with gusts to 160 mph.

A brief survey of the town of Lihue that evening showed clearly that a solid waste crisis of major proportions had been visited upon the island. All electric power, telephone service, and water service had been knocked out. Travel was severely restricted by downed trees and utility poles and lines.

In the coming days, it was learned that access to Kekaha Landfill was blocked. In addition, the Hanalei, Kapaa, and Hanapepe Refuse Transfer Stations were inoperable due to loss of electric power. The Lihue Refuse Transfer Station was capable of only limited operation due to equipment damage and shortage of personnel. It was also clear that residents had begun cleaning up debris immediately and were creating many spontaneous dumps in the absence of instructions to do otherwise.

Approximately 1,400 homes were destroyed and another 9,000 sustained damage. Approximately 2,000 commercial structures were either damaged or destroyed. About 7,000 utility poles were down. Many trees had been uprooted and those left standing had been denuded of their leaves and many branches.

Cleanup efforts were hampered by roads clogged with debris and sightseers, and by lack of utilities. County workers also were experiencing the effects of their personal losses. On the positive side, many volunteers donated labor and equipment to the cleanup effort.

Department of Public Works personnel recalled that temporary dump sites had been established after Hurricane Iwa ten years earlier, and initiated a search for such sites to receive Hurricane Iniki debris. Within a few days, five sites were operational at Hanapepe (Olokele Sugar), Puhi, Wailua, Anahola, and Kalihiwai. A short time later two sites for receipt of greenwaste only were opened at Moloaa and at Waipa Farm near Hanalei. Waste and debris were initially burned or buried at the mixed debris sites.

Attempts to establish a site in the Koloa/Poipu area, one of the hardest hit, were ultimately unsuccessful. A large landowner offered a site, arrangements were made to operate it, and its availability was publicized. On opening day, however, the public was met by security guards who turned them away. It seems the company attorneys, who were concerned about long-term environmental liability, had had the last word.

The Kalihiwai site had to be closed approximately three weeks after opening due to complaints and threatened legal action from nearby subdivision residents affected by burning debris. Attempts to find a replacement site were unsuccessful. A landowner in Kilauea did offer a site and a right-of-entry was executed. When town residents learned of the agreement, however, the resulting opposition was strong enough to cause the landowner to ask the County to not use his site.

A Princeville site was also sought as a replacement for the Kalihiwai site. After initial agreement with the landowner for use of a site, the County and the landowner were unable to reach agreement on a right-of-entry which adequately identified the site boundary.

On September 16, 1992, Mr. John Harder, Coordinator of the Office of Solid Waste Management in the Hawaii Department of Health, visited Kauai. He and the County Solid Waste Coordinator toured the island by military helicopter and discussed debris management strategies. It was agreed that:

- The amount of debris would quickly exhaust the remaining capacity of Kekaha Landfill Phase I.
- Much of the debris, including greenwaste and metals, could be easily recycled.
- Although no precedents existed on Kauai, programs could be implemented to recycle other types of debris.
- Recycling debris would in many cases be less expensive than landfilling.
- The keys to successfully recycling hurricane debris would be an immediate and aggressive public education and information campaign to get residents to segregate debris, conversion of the temporary dump sites to sites for receipt and stockpiling of source-segregated debris only, and a ban on burning of debris.
- Development of additional landfill capacity must also be a top priority.

At this point, with enthusiastic support of Mayor JoAnn Yukimura, the County made a firm commitment to halting the burning of debris and to recycling as much as possible. Mayor Yukimura initiated plans for an island-wide cleanup, to be known as Operation Garden Sweep. Military units, 27 private contractors, and County and State road crews systematically swept the entire island to collect source segregated debris placed curbside by residents. This effort was assisted greatly by a Damage Survey Report from the Federal Emergency Management Agency (FEMA) for an emergency media campaign. Residents were asked to segregate debris into four piles curbside: greenwaste, metals and appliances, wood debris, and mixed debris.

Although not originally planned, a second sweep, Operation Final Sweep, was conducted shortly after Operation Garden Sweep concluded, since residents were still placing debris curbside. The

name "Final Sweep" and advance publicity were intended to give a clear message that this was the last opportunity for curbside pickup.

Underlying the County's efforts was a strong intent that debris management efforts be consistent with long-range solid waste management strategies to the greatest extent possible. There was extreme pressure from many sources to buy into quick-fix solutions. Almost immediately after the winds subsided, vendors descended upon the island, offering every imaginable technology. Some proposed solutions had merit; many clearly did not. Some vendors resorted to political pressure in attempts to gain hastily drafted sole source contracts. The County, however, insisted on a planned response consistent with its long-range goals. Although this stance slowed ultimate disposition of the debris, it was in retrospect a wise decision. Kauai has avoided many of the debris management problems experienced by other localities in disaster situations.

Again with FEMA assistance, the County contracted with Harding Lawson Associates (HLA) to prepare a debris management plan, even while debris was being stockpiled at the temporary sites. HLA had been working with the County on preparation of an Integrated Solid Waste Management Plan and was thus uniquely qualified to assist due to its thorough understanding of the County's solid waste system and the County's long-range goals. HLA's debris management report was presented in early December, 1992.

On December 14, 1992, representatives of the County, HLA, State Civil Defense, and FEMA met to discuss long-range debris management strategies. The County presented a plan which requested FEMA assistance for the following:

- Continued management and operation of the temporary debris sites, now renamed Temporary Hurricane Debris Receiving Sites (THDR Sites).
- Replacement of the THDR Sites with appropriately sited and equipped Permanent Debris Diversion Sites (PDDS). The permanent sites were later renamed Debris Recycling and Processing Sites (DROP Sites), and finally Debris Recycling Stations (DRS). Funding was requested for engineering and design, construction, and operation of five sites.
- Maximum diversion and recycling of debris, including composting of greenwaste, shipment of scrap metals off-island for recycling, and production of biofuel from wood debris.
- Replacement of lost landfill capacity through design and construction of Kekaha Landfill Phase II.
- Closure of Kekaha Landfill Phase I.

FEMA representatives agreed with the County's plan and immediately initiated preparation of Damage Survey Reports totaling nearly \$70,000,000. Although FEMA had little experience with recycling of disaster debris, it was agreed that no other alternative was available and HLA assured FEMA that all recycling projects would be less expensive than landfilling. State Civil Defense was and continues to be supportive of the County's plan.

In the ensuing months, the County and HLA initiated aggressive measures to design and construct Kekaha Landfill Phase II, plan for the closure of Kekaha Landfill Phase I, upgrade management of the THDR Sites, select sites for the PDDS, and begin processing materials stockpiled at the THDR Sites. These initiatives are discussed in greater detail later in this report.

A detailed chronology of debris management events is included in Appendix A.

2.0 SOLID WASTE FACILITIES RECEIVING HURRICANE DEBRIS

2.1 Kekaha Landfill Phase I

2.1.1 History. Kekaha Landfill began receiving waste in the early 1970s. The State-owned site was transferred to the County by executive order for as long as it is needed for landfill purposes. In 1983 a landfill siting study was conducted. The existing Kekaha site was identified as the most suitable of three sites considered. The existing landfill was identified as Phase I and two adjoining parcels were identified as Phases II and III. An environmental impact statement covering all three phases was prepared and approved. When Halehaka Landfill was closed in June, 1991, Kekaha became the County's sole disposal facility. Shortly before Hurricane Iniki, the County had verified with the State Office of Environmental Quality Control that the 1983 EIS was still valid for the Phase II parcel.

2.1.2 Current Status. Kekaha Landfill Phase I ceased receiving waste on October 7, 1993, prior to implementation of RCRA Subtitle D regulations. Final closure construction began in early May, 1994 under contract with Kiewit Pacific Company, and was completed on February 1, 1995.

2.1.3 Operations. The Phase I landfill was owned and operated by the County. The influx of hurricane debris was too great to be handled by County forces, so two private contractors, Roger Taniguchi and Okada Trucking, were brought in to assist. FEMA approved DSR No. 15530 to reimburse the County for expenses incurred in managing hurricane debris at the landfill.

2.1.4 Materials Received. The Phase I landfill received only municipal solid waste (MSW). Hurricane debris and waste consisted of putrescible waste, household refuse, blown debris, greenwaste, and construction and demolition (C&D) debris from demolition and reconstruction of damaged structures.

2.1.5 Challenges.

- Inaccessibility was a problem after Iniki until the main highway to Kekaha was cleared. With the loss of the island's only disposal facility, putrescible waste and mixed refuse had to be buried or burned at the THDR Sites.
- County forces managed approximately 220 tons of MSW per day prior to Hurricane Iniki. When it reopened, the waste flow was several times that amount, overwhelming available personnel and equipment. Thus, incoming debris received little or no compaction, wasting valuable air space.

- FEMA required documentation of hurricane debris entering the facility. Since there were no scales, however, quantities had to be estimated based upon vehicle volumes and size of loads.
- Closure construction was delayed by discovery of asbestos during refuse regrading, need to relocate refuse buried beyond the landfill boundaries, and a shortage of reasonably-priced sand for landfill projects.
- Several fires were discovered in the landfill during closure. Each had to be thoroughly uncovered and extinguished before construction could proceed.

2.1.6 Closure. A closure plan was approved by the Department of Health and closure construction has been completed. The completed closure cap supports a permanent Debris Recycling Station. The Department of Land and Natural Resources approved continued use of the site for this purpose, and the Planning Commission issued a Special Management Area Use permit.

2.2 Kekaha Landfill Phase II

2.2.1 History. On November 20, 1992, the Board of Land and Natural Resources granted permission for the County to develop the Phase II landfill on State land. A contract with HLA for design of the new facility was executed in December, 1992. HLA had determined that it would be to the County's advantage to open the new facility prior to implementation of the RCRA Subtitle D regulations on October 9, 1993. A construction contract was executed with Hawaiian Dredging Construction Company and construction commenced in June, 1993. The first four refuse cells were completed in time to accept the first loads of waste on October 8, 1993.

2.2.2 Current Status. The Phase II landfill is operational, and construction is complete. This facility initially had an estimated life of five years from October, 1993, based on a compaction rate of 1,100 pounds per cubic yard. Landfill life has been extended to about September 30, 1998 because the private operator has consistently achieved a compaction rate of about 1,500 pounds per cubic yard. The County is investigating vertical expansion to gain additional capacity. A supplemental environmental impact statement is the next step in that process.

2.2.3 Operations. Beginning in January, 1993 the County Administration and HLA conducted an analysis of public versus private operation of the Phase II landfill. It was determined that private operation would likely be cheaper and would definitely relieve the County of much of the liability of operating a Subtitle D landfill. The cost benefit was confirmed when bids from private operators were opened, with the lowest qualifying bid approximately \$9 million lower than the estimated cost of County operation over a five-year period. In July and August of 1993, the County Council authorized a five-year contract with

Sanifill of Hawaii for operation and closure of the Phase II landfill.

Implementation of the contract was delayed by legal action initiated by a disqualified bidder. The County prevailed in court and Sanifill began operations on October 8, 1993. The delay created extra mobilization costs for Sanifill by compressing the startup time from four months to ten days. As a result, Sanifill requested contract amendments totaling \$235,216. FEMA agreed to pay most of this amount.

Commercial haulers must pay a tipping fee of \$30 per ton. Tipping fees were suspended immediately after Iniki struck. In April, 1993 tipping fees were reinstated, but waivers were granted for hurricane-related debris. The waiver system expired on December 31, 1995. The method of charging tipping fees changed on December 1, 1994 from a volumetric basis (paid by coupons) to an actual scale weight basis (charged to customer accounts).

2.2.4 Materials Received. The Phase II landfill receives only MSW. Hurricane debris consists of construction and demolition (C&D) debris from demolition and reconstruction of damaged structures, and small amounts of greenwaste.

2.2.5 Challenges.

- The major challenge relative to the Phase II landfill was compressing a design and construction schedule which would normally have required three years or more into ten months.
- Available water supply from the town of Kekaha is insufficient to serve all needs of the new landfill. Therefore, the town system provides potable water only for domestic uses (via an 8" main owned by the U. S. Navy). A separate nonpotable system, supplied by Kekaha Sugar irrigation ditches, provides water for firefighting, dust control, and landscape irrigation. Kauai Electric, by its own admission, "dropped the ball several times" on providing permanent power to the nonpotable water pump station, delaying completion of the project by about six months.
- As with closure of the Phase I landfill, shortage of reasonably-priced sand was an issue.
- Highway entrance modifications took two years to complete due to lengthy review time by the state Department of Transportation and changes in the state's design criteria after the initial plans were drawn by HLA.

2.2.6 Closure. Closure of this facility will be performed by Sanifill in accordance with RCRA Subtitle D regulations.

2.3 Refuse Transfer Stations

2.3.1 History. Four refuse transfer stations are located at Hanapepe, Lihue, Kapaa, and Princeville. A fifth is proposed for the Koloa area. The four existing stations were operational at the time of Iniki's arrival.

2.3.2 Current Status. The four existing stations are currently operational. The last hurricane damage, replacement of the roof on the Lihue facility, was recently repaired.

2.3.3 Operations. All refuse transfer stations are owned and operated by the County. They accept MSW from residential and nonresidential self-haulers in automobiles and pickup trucks. Commercial users must pay a tipping fee, which was waived for hurricane debris until December 31, 1995. Waste is dumped onto a tipping floor at the Lihue facility, and then is pushed into transfer trailers. At the other three facilities, waste is dumped into a chute and then hydraulically compacted into the transfer trailer.

2.3.4 Materials Received. Refuse transfer stations accept MSW, with the exception of some bulky items. Tires and white goods are accepted at the Lihue and Kapaa facilities from residential self-haulers only. Greenwaste is accepted from residential and nonresidential haulers at the Hanapepe, Lihue, and Kapaa facilities. Tires and white goods are stockpiled for recycling by contractors hired by the County. Greenwaste is processed by a County crew.

2.3.5 Challenges.

- Three of the refuse transfer stations are equipped with compactors, which were inoperable for several weeks after the hurricane due to lack of electrical power. Obtaining the large generators required to operate the compactors was difficult.
- One of the transfer trailers at the Lihue facility was blown over and suffered minor damage. Some method of securing the trailers in high wind is needed.
- Loss of three transfer stations probably contributed to illegal dumping. Their loss, plus inaccessibility of the Kekaha Landfill, shut down County residential collection service for several days after the hurricane.

2.4 Molooa and Waipa Farm Greenwaste-Only Sites

2.4.1 History. It was apparent from the beginning that greenwaste would constitute a major portion of hurricane debris and that much of the greenwaste was concentrated on the North Shore. The County had contracted with Eco-Logic Effects to operate a greenwaste composting program prior to the storm. The contractor offered his compost facility as a greenwaste-only receiving site. At the same time, lessees of Waipa Farm west of Hanalei offered a portion of that site for the same purpose.

2.4.2 Current Status. Iniki greenwaste was processed at both sites. Neither site is currently used by the County.

2.4.3 Operations. Both sites received greenwaste from September 14, 1992 until October 15, 1992. Eco-Logic Effects was contracted to operate the sites and process the greenwaste. Processed greenwaste was left at Waipa Farm for the lessee's use per the right-of-entry. The contractor retained rights to the processed greenwaste at Moloaa.

2.4.4 Materials Received. Both sites accepted only clean loads of greenwaste. HLA reports a total of 21,700 cubic yards or 6,532 tons of material processed at the two sites.

2.4.5 Challenges.

- Due to lack of communications, confusion developed over the right-of-entry for Waipa Farm. A community volunteer who was shuttling messages and documents between the lessee and County offices apparently failed to deliver a right-of-entry from the landowner to the County. Consequently, a right-of-entry from the lessee was executed, but not one from the landowner. An attempt was made to rectify the oversight after the fact, but the landowner decided not to pursue the matter.

2.4.6 Closure. After the sites ceased receiving debris, the contractor processed stockpiled greenwaste. Since the Moloaa site was under the control of the contractor, who maintained an ongoing composting operation there, no closure was required. Upon completion of processing at the Waipa Farm site, the site was graded by the contractor. An on-site meeting was conducted, at which the lessee approved the completed work.

2.5 Anahola THDR Site

2.5.1 History. This site is located on approximately 10 acres of fallow sugar cane land just south of the community of Anahola. When the County began using the site, it was owned by the State Department of Land and Natural Resources (DLNR) and leased to Lihue Plantation Company. Ownership was disputed by the State Department of Hawaiian Home Lands (DHHL), and title has since been transferred to DHHL. The site was offered to the County for use as a temporary dump site by Lihue Plantation and began operation on September 14, 1992. A right-of-entry was granted by DLNR.

2.5.2 Current Status. This site ceased receiving debris on March 31, 1994. Some scrap metals and greenwaste, and all scrap gypsum wallboard, were removed from the site under separate contracts. Okada Trucking began removing all remaining materials from the site in February, 1995. Scrap metal and tires were hauled directly to recyclers. Other recyclable materials were to be hauled to Kekaha Debris Recycling Station (KDRS), where wood debris was to be processed into a biofuel for use by Gay & Robinson (formerly Olokele Sugar Co.).

Due to cancellation of the biofuel project by FEMA (see Section 3.4), only a small amount

of wood went to KDRS. All other debris went to Kekaha Landfill Phase II. The site is awaiting final closure.

2.5.3 Operations. Site operations were initially conducted by two local contractors, Roger Taniguchi and Arthur Palama. Putrescible wastes and mixed debris were buried in large trenches. The dump site was closed on September 27, 1992 for reorganization and reopened the following day as a THDR Site for source-segregated materials only. Waste Management of Hawaii was contracted to manage and operate the site from December 21, 1992 through July 15, 1993. County forces operated the site from July 16, 1993 through March 31, 1994.

2.5.4 Materials Received. Until September 27, 1992, the Anahola THDR Site received mixed hurricane waste and debris. After that date it accepted only source-segregated greenwaste, metals, white goods, wood waste, gypsum wallboard, plastic sheeting and other plastic materials, aggregates, roofing materials, mixed C&D debris, and bulky items.

2.5.5 Challenges.

- The Department of Hawaiian Home Lands and the Hawaiian community strongly objected to the use of this site for burial of waste, as it is viewed as a future expansion area for the Anahola Hawaiian homestead community.
- Operations had to be shut down occasionally due to mud.
- The site lacks run-on/run-off controls.
- Residents near the site complained of an increase in the number of rodents in and around their homes. They feared that children and pets were unnecessarily exposed to injury and disease. An investigation by Department of Health vector control personnel revealed a large population of rodents at the site. A control program was initiated and continued until all debris had been cleared from the site.
- Residents also expressed fears that another hurricane might blow debris off the site and into their homes before it could be removed.
- The site reached capacity and had to be closed even though a need still existed for the facility. There were occasional conflicts between materials processors due to cramped conditions.
- The site could not be secured against scavengers and motorcyclists on dirt bikes.

2.5.6 Closure. A closure plan was approved by the Department of Health. All materials buried and stockpiled on site were processed and removed. Soil from the trench bottoms was tested and found to be free of contamination. The Department of Health no longer classifies

the site as a solid waste facility. Trenches will be backfilled and then the site will be graded and finished per owner instructions. Bids for final closure were opened in December, 1994. A contract for final closure was executed, but was later canceled after it was determined that the contractor did not possess the proper license for that type of work. The County is preparing to rebid the project.

2.6 Kalihiwai THDR Site

2.6.1 History. The Kalihiwai THDR Site is situated adjacent to the Kalihiwai Ridge Subdivision, an area of large lots and expensive homes. The site is owned by Kilauea Agronomics, a subsidiary of C. Brewer Properties. It began operation on September 15, 1992 and ceased operation on October 3, 1992. The site was formerly a freshwater prawn farm.

2.6.2 Current Status. Final closure of the site has been completed. All hurricane debris was removed and environmental testing indicated no contamination of the site. The contractor, Goodfellow Bros., hauled recyclable debris to the Anahola THDR Site for future processing, and waste to Kekaha Landfill Phase II.

2.6.3 Operations. The site was initially operated by Pacific Hydroelectric under contract with the County. Incoming waste was burned in large trenches until a "no burn" order was issued by the Department of Health. Thereafter, debris was buried, except for three surface stockpiles of greenwaste, metal, and mixed waste. Site operation was transferred to Delta Construction shortly before the site was closed to the public.

2.6.4 Materials Received. Until September 27, 1992, the Kalihiwai THDR Site received mixed hurricane waste and debris. After that date it accepted only source-separated greenwaste, metals, white goods, wood waste, gypsum wallboard, plastic sheeting and other plastic materials, aggregates, roofing materials, mixed C&D debris, and bulky items.

2.6.5 Challenges.

- Subdivision residents complained vigorously to the landowner, the County, and the Department of Health about the burning of mixed waste. Some became ill from the smoke and had to leave home. Their complaints were largely responsible for the Department's "no burn" order. The subdivision residents eventually initiated legal action against the landowner as a result of the burning and fears of groundwater contamination. The landowner ordered a cessation of County activities after less than three weeks due to complaints.
- This site, being a former prawn pond, is very wet. Rain and muddy conditions hampered operations. During closure, the empty trenches filled with rainwater and groundwater from natural springs and had to be pumped.

- Buried material was underestimated by HLA because trench locations had not been accurately recorded by the County or its contractors, and a large portion of one trench was covered by surface stockpiles.

2.6.6 Closure. See 2.6.2 Current Status above.

2.7 Kilauea THDR Site (Proposed)

2.7.1 History. Although this site never materialized, it is included here because it affected Waste Management's contract for THDR Site management and operation, necessitating a contract settlement. After the Kalihiwai THDR Site closed on October 3, 1992, the County searched for a replacement site to serve the North Shore. After approximately two months, a site in Kilauea town was offered by its owner. A right-of-entry was executed and Waste Management was contracted to develop and operate the site, in addition to the Anahola THDR Site. Prior to start of work, the landowner notified the County of substantial public opposition to the site and requested that the site not be developed. Waste Management agreed and gave the County one month to find an alternate site. No suitable site was ever found, so all the debris which would have gone to the Kilauea site was diverted to Anahola. Waste Management filed a claim for additional operating expenses incurred at Anahola as a result. The claim was paid by the County after approval by FEMA.

2.8 Olokele THDR Site

2.8.1 History. This site is situated on State land leased to Olokele Sugar Company, which was purchased by Gay & Robinson (G&R) shortly after the THDR Site closed, near the town of Hanapepe. It is used by G&R for disposal of trash from cane processing. Hurricane debris operations began on September 13, 1992 and continued through October 19, 1992, when sugar cane operations resumed.

2.8.2 Current Status. G&R was contracted by the County to remove remaining materials and perform final closure. Work is complete and use of the site for cane operations has resumed.

2.8.3 Operations. The site was operated by Olokele Sugar Company. All mixed waste was burned in surface piles under an exception to the "no burn" order from the Department of Health. Although no burning was initiated after October 19, 1992, piles ignited prior to that date continued to smolder until December, 1992. After September 27, 1992, segregated greenwaste, aggregates, and metal were stockpiled. No trenches were excavated at this site.

2.8.4 Materials Received. The Olokele THDR Site received mixed hurricane waste and debris and source-separated greenwaste, metals, white goods, wood waste, aggregates, roofing materials, and mixed C&D debris.

2.8.5 Challenges.

- The Olokele THDR Site was too small for the amount of debris received. If debris had not been burned, the site would have had a much shorter life span.
- An accidental fire resulting from cane operations spread to the greenwaste pile and consumed it completely on August 4-5, 1993. Stockpiled hurricane debris hindered Olokele Sugar's ability to fight the fire.
- THDR Site operations and sugar operations were in conflict from the time sugar operations resumed in October, 1993 until final closure was completed. Severe restrictions placed on outside contractors by G&R forced the County to negotiate a sole source contract with G&R for the THDR Site closure.

2.8.6 Closure. A closure plan was approved by the Department of Health. The County negotiated a contract with G&R for final closure of this site. Hurricane materials remaining on site at the start of closure were mixed in a large pile containing ash, partially-combusted wood and greenwaste, and scrap metal. Recyclable materials and trash were screened from the ash. Trash was taken to Kekaha Landfill; wood debris was delivered to Kekaha Debris Recycling Station for future processing into biofuel; and scrap metal was removed by a recycler. Two truck loads of tires were hauled to the Wailua THDR Site for future delivery to a tire recycler. Closure work is complete.

2.9 Puhi THDR Site

2.9.1 History. The Puhi THDR Site is situated on Grove Farm land just west of Puhi, leased to Lihue Plantation. Prior to the hurricane it was planted in sugar cane. The site is approximately five acres in size. Debris operations began on September 17, 1992 and continued through July 15, 1993.

2.9.2 Current Status. Okada Trucking removed all remaining materials from the site. Metals, scrap gypsum wallboard, and greenwaste were removed under separate contracts before Okada Trucking began work. The site is awaiting final closure.

2.9.3 Operations. The site was initially operated by Goodfellow Bros. Browning-Ferris Industries of Hawaii (BFI) took over management and operations on December 15, 1992 and continued through July 15, 1993. Putrescible waste and rubbish were buried in a large bowl-shaped trench until September 27, 1992, when the site was reorganized as a THDR Site. Metals, greenwaste, and wood debris were stockpiled uncovered in the open trench. Other materials were stockpiled outside the trench.

2.9.4 Materials Received. Until September 27, 1992, the Puhi THDR Site received mixed hurricane waste and debris. After that date it accepted only source-separated greenwaste,

metals, white goods, wood waste, gypsum wallboard, plastic sheeting and other plastic materials, aggregates, roofing materials, mixed C&D debris, and bulky items.

2.9.5 Challenges.

- There is a stream immediately adjacent to the trench in which waste was buried. This site required more extensive environmental testing during final cleanup than other THDR Sites.
- The right-of-entry for this site was difficult to negotiate due to the landowner's concerns over long-term environmental liability. The County was forced to totally indemnify the landowner and to promise to return the site to its pre-hurricane condition.
- Lihue Plantation submitted a claim for crop damage, which was paid through a Damage Survey Report from FEMA.
- The landowner objected to the length of time required to process materials off the site and filed a claim for rent payments for the remaining life of the THDR Site. FEMA approved the rent payments and payment was made retroactive to January, 1994. Because final closure has been delayed, FEMA has threatened to deobligate funding for rent payments.
- Storage of wood debris in the open bowl-shaped trench exposed it to excessive water. Wood debris at this site deteriorated to such an extent that it was reclassified as trash and sent to Kekaha Landfill Phase II.

2.9.6 Closure. A closure plan was approved by the Department of Health. All materials buried and stockpiled on site were processed and removed. Soil from the trench bottom was tested and found to be free of contamination. The Department of Health no longer classifies the site as a solid waste facility. The trench will be backfilled and then the site will be graded and finished per lessee instructions. The latest information on post-closure use indicates that Grove Farm will lease the site to Kauai Nursery & Landscaping for expansion of its adjoining compost operation. Bids for final closure were opened in December, 1994, and a contract was executed. The contract was later canceled after it was determined that the contractor did not possess the proper license for this type of work. The County is preparing to rebid the project.

2.10 Wailua THDR Site

2.10.1 History. The Wailua THDR Site covers approximately 16 acres. It is owned by the State Department of Land and Natural Resources and leased to Lihue Plantation. Site operations began on September 14, 1992 and continued through September 30, 1993. The

site is located just south of the Wailua River, mauka (toward the mountains) of Kuhio Highway. Prior to Hurricane Iniki, the site was planted in sugar cane.

2.10.2 Current Status. Okada Trucking has removed all remaining debris and completed final closure. Metals, scrap gypsum wallboard, and greenwaste were removed earlier under separate contracts.

2.10.3 Operations. The site was initially operated by Koga Engineering, Roger Taniguchi, and Niu Construction. BFI managed and operated the site from December 15, 1992 through July 15, 1993. County forces operated the site from July 16, 1993 through September 30, 1993. Until September 27, 1992, debris was buried or burned in long trenches. After September 27, 1992, the trenches were covered and segregated debris was stockpiled on the surface.

2.10.4 Materials Received. Until September 27, 1992, the Wailua THDR Site received mixed hurricane waste and debris. After that date it accepted only source-separated greenwaste, metals, white goods, wood waste, gypsum wallboard, plastic sheeting and other plastic materials, aggregates, roofing materials, mixed C&D debris, and bulky items.

2.10.5 Challenges.

- This site presented more challenges than any other. The most persistent was underground fires caused by heat from decomposition of buried materials. BFI controlled the underground fires by regularly packing dirt on the trenches. After BFI left the site, fire got out of control in one trench, so it was completely excavated, the material was doused with water, and then hauled to Kekaha Landfill Phase I. This occurred between September 17, 1993 and October 1, 1993. A dispute arose between the County and the contractor over the quantity of debris removed from the site and the contractor initiated legal action against the County. Judgment was against the County. Smoldering continued in a second trench, necessitating regular inspections and sealing of air vents.
- The Wailua THDR Site is located immediately adjacent to an ancient Hawaiian heiau (temple), which is very sacred to Hawaiians. Hawaiians objected strenuously to the burning and burial of waste at this site.
- A major visitor resort, resort condominiums, a marina, numerous residences, and a major highway are located adjacent to or within a short distance of the site. The County and the Department of Health received numerous complaints concerning traffic congestion, smoke, odors, dust, visual impacts, and even mosquitoes allegedly breeding in the debris.

- Lihue Plantation submitted a claim for crop damage, which was paid through a Damage Survey Report from FEMA.
- Minor fires developed in the surface stockpiles at the Wailua THDR Site, probably from the heat of decomposition.

2.10.6 Closure. A closure plan was approved by the Department of Health. All materials buried and stockpiled on site were processed and removed. Soil from the trench bottoms was tested for contamination. Some lead contamination was found in one trench. Additional excavation was done until clean soil was encountered. The Department of Health closely monitored cleanup and no longer classifies the site as a solid waste facility. Trenches were backfilled and then the site was graded and finished per lessee instructions. Final closure was completed in July, 1996. Lihue Plantation will soon replant the site in sugar cane.

2.11 Permanent Debris Recycling Stations

FEMA initially agreed to fund development of permanent debris recycling stations to replace improperly sited and environmentally unsound THDR Sites, to complete the Iniki cleanup, and to be available for immediate use in the event of a future emergency.

Five debris recycling stations were originally proposed--North Shore, Kapaa, Lihue, Koloa, and Hanapepe. These facilities were intended to accept source-segregated recyclable debris such as wood debris, greenwaste, scrap metals and white goods, aggregates, gypsum wallboard, and mixed C&D debris. Each facility was intended to have improved internal roads, adequate debris storage and processing space, fencing, a vehicle scale facility for documentation of debris quantities, environmental protection measures, and landscaping and buffering. Two of the facilities, Koloa and North Shore, were to have composting sites.

2.11.1 Kekaha Debris Recycling Station. Located on top of the closed Kekaha Landfill Phase I, this is the only debris recycling station to become operational. It replaces the originally-proposed Hanapepe facility, for which a suitable site could not be located. Construction was completed on February 1, 1995. Approximately 11,000 tons of wood debris from the Anahola and Wailua THDR Sites was relocated to this facility for further processing into biofuel. Sanifill of Hawaii, operator of the adjacent Phase II landfill, has been contracted to manage the wood debris. Due to County budget limitations, the facility is currently inactive.

2.11.2 Lihue Debris Recycling Station. After investigating many sites in the Lihue, Wailua, and Kapaa areas as possible locations for two debris recycling stations, it was concluded that only one site could be found to serve both the Lihue and Kapaa areas. A 36-acre parcel adjacent to the Lihue Refuse Transfer Station was selected. The County had the site surveyed and appraised, began negotiations to purchase the site, and had HLA begin engineering and design work. Then FEMA withdrew funding on the grounds that too little

Iniki debris would likely enter the facility. The project was then canceled.

2.11.3 Koloa Debris Recycling Station. This facility was to be located adjacent to the planned Koloa Refuse Transfer Station for public convenience. After investigation of eight potential sites, public meetings, and meetings with the Koloa Community Association, a site owned by Knudsen Trusts was selected as the preferred location. The landowner refused to sell the site, however. Further consultation was held with the Koloa Community Association and the Poipu Beach Resort Association. The sense of the community was that the County should proceed with condemnation of the original transfer station site on Koloa Road, and the County Attorney proceeded in that direction. Before a decision on the site could be reached, the new County Administration which took office in December, 1994 decided to cancel the proposed Koloa and North Shore debris recycling stations due to operating budget concerns. About the same time, the Governor rescinded State funding for the refuse transfer station.

2.11.4 North Shore Debris Recycling Station. The County's first choice for location was the Princeville area, but Princeville Corporation indicated that no suitable sites were available. The search then centered on the Moloaa area, where two landowners offered sites. Area residents objected strenuously to both sites and promised opposition to any other site in or near Moloaa. The site search then moved back to Princeville. This time, Princeville Corporation offered its old C&D debris landfill site as a possibility. The site was considered to be suitable and the County made a proposal to the landowner. As in the case of Koloa, the current Administration decided to cancel this proposed facility.

2.12 Spontaneous or De Facto Dumps

Residents began cleaning up immediately after Iniki. There seemed to be an overwhelming desire to restore some order to their lives. Since refuse transfer stations were closed, the landfill was inaccessible, and County refuse collection service was suspended, residents created spontaneous dumps at convenient locations, many of which had been used after Hurricane Iwa. County and State road crews fought a losing battle to stop this practice, for as soon as a site was cleaned, more debris appeared. Finally, all sites were cleaned, roped off, and posted. Kauai Police Department watched the sites carefully and issued citations to dumpers.

2.13 Roll-Off Containers

The County contracted with BFI to place roll-off containers in approximately fifteen locations around the island to collect household debris. While this measure helped curb illegal dumping, the number of containers available was insufficient to prevent dumping. A contractual problem developed because the generic emergency services contract form developed by the County Attorney's office was not suitable for this particular service.

3.0 MATERIALS RECEIVED

3.1 Refuse and Putrescible Waste (Mixed Waste)

3.1.1 Receipt. Mixed waste was received at all five THDR Sites until September 27, 1992. It appeared at spontaneous dumps long after that date. It was burned at the Olokele, Wailua, and Kalihiwai THDR Sites and buried at the Puhi, Wailua, Anahola, and Kalihiwai THDR Sites. Mixed waste was delivered to the refuse transfer stations and Kekaha Landfill once those facilities reopened.

3.1.2 Storage.

3.1.2.1 Methods. Mixed waste that was not burned immediately was buried in unlined trenches and covered periodically.

3.1.2.2 Problems Encountered. Heat from decomposition has created underground fire problems at the Wailua THDR Site. Contamination of soil and groundwater is a possibility, although testing at the Kalihiwai THDR Site indicated no contamination there.

3.1.3 Processing. Remaining buried mixed waste will be excavated and screened to remove soil. Segregatable materials will be moved to appropriate stockpiles for further processing and transport to Kekaha Debris Recycling Station. Trash will be hauled to Kekaha Landfill for disposal.

3.1.4 Quantities.

- A total of 817,727 cubic yards of mixed waste was delivered to the five THDR Sites through October, 1993.
- Using density assumptions developed by HLA, delivered volume was converted to 179,546 tons.
- A total of 150,793 cubic yards of mixed waste was stockpiled at the THDR Sites as of November, 1993. The difference between delivered volume and stockpiled volume is explained by controlled burning at three THDR Sites and the greater density of stockpiled material.
- Using density assumptions developed by HLA, stockpiled volume was converted to 88,119 tons.

- A total of 97,584 tons of mixed waste were handled at the THDR Sites, excluding burned waste for which the County will not receive payment for processing or hauling, and excluding burning debris transferred from the Wailua THDR Site to Kekaha Landfill Phase I.
- Thirty-five percent or 31,508 tons of the mixed waste at the THDR Sites is expected to be recoverable (recyclable).
- The remaining 66,075 tons will have to be landfilled.
- HLA estimates that 120,000 tons of mixed debris were delivered to Kekaha Landfill Phase I; 4,000 tons were delivered to Kekaha Landfill Phase II through November 30, 1993; and 136,000 tons will be delivered to Kekaha Landfill Phase II after November, 1993.

MIXED WASTE SUMMARY
(All Quantities Estimated)

| | CUBIC YARDS | TONS |
|--|-------------|---------|
| <u>THDR Sites</u> | | |
| Delivered | 817,827 | 179,546 |
| Stockpiled at 11/30/93 | 150,793 | 88,119 |
| Recoverable | | 31,508 |
| Residue to Landfill | | 66,075 |
| <u>Kekaha Landfill Phase I</u> | | |
| Delivered | | 120,000 |
| Recoverable | | 0 |
| <u>Kekaha Landfill Phase II</u> | | |
| Delivered Prior to 11/30/93 | | 4,000 |
| To Be Delivered | | 53,000 |
| From THDR Sites Processing | | 83,000 |
| Recoverable | | 0 |

3.2 Greenwaste

3.2.1 Receipt. Segregated loads of greenwaste were accepted at all five THDR Sites and at the two greenwaste-only sites, Moloaa and Waipa Farm. The material at the Olokele THDR Site burned in an accidental fire in August, 1993.

3.2.2 Storage.

3.2.2.1 Methods. Greenwaste was either stockpiled on the surface or placed in trenches. Due to space constraints at the Puhi THDR Site, greenwaste was stockpiled in the large trench in lifts, with a soil layer between lifts to enable machinery to operate on the pile.

3.2.2.2 Problems Encountered. Minor fires developed in the stockpiles at the Wailua THDR Site, probably from the heat of decomposition. Iniki greenwaste, as expected, was more contaminated than pre-hurricane material.

3.2.3 Processing. All segregated greenwaste has been ground and composted. A contract was executed with Eco-Logic Effects for processing greenwaste at the two greenwaste-only sites, and work has been completed. A second contract was executed with Eco-Logic Effects and Jay Jackson Associates, A Joint Venture, to process all greenwaste stockpiled at the THDR Sites. A small portion of the processed material is being composted by Kauai Nursery & Landscaping at Puhi. The remainder is being composted at Moloaa by Eco-Logic Effects.

Implementation of the second contract was delayed for several months by a legal action filed by a disqualified bidder. It was settled only when the contractor agreed to subcontract a large portion of the work to the plaintiff and one other bidder. This forced contractual relationship resulted in constant squabbles between the contractor and the subcontractors. One of the subcontractors took the contractor to arbitration over a payment claim. The case ultimately went to court and was resolved in the subcontractor's favor.

There were also allegations of impropriety on the part of the contractor, made by two disgruntled former employees of the contractor. The contractor was alleged to have ordered his employees to mix dirt in with processed greenwaste to inflate volumes for payment, and to load unprocessed materials along with processed greenwaste. An investigation was initiated by the County Attorney's office and sufficient evidence was found to investigate further. The investigation is ongoing at this time and final payment to the contractor is being withheld.

3.2.4 Quantities.

GREENWASTE SUMMARY

| | CU. YDS. | TONS | COST/ CU YD | COST/ TON |
|-------------------------------------|----------------|----------------|----------------|--------------|
| <u>HLA Estimates (THDRS)</u> | | | | |
| Delivered | 512,490 | 111,313 | | |
| Stockpiled at 11/30/93 | 56,494 | 32,474 | | |
| Handled Thru 11/30/93 | | 59,647 | | |
| Recoverable | | 57,804 | | |
| Residue to Landfill | | 1,843 | | |
| TOTALS | 568,984 | 263,081 | | |
| <u>Processed Greenwaste</u> | | | | |
| Moloaa and Waipa Farm | 21,700 | 6,532 | 11.00 | 36.54 |
| Anahola THDR Site | 48,418 | 26,194 | 26.67 | 49.30 |
| Kalihiwai THDR Site | 1,160 | 628 | 60.82 | 112.34 |
| Puhi THDR Site | 14,667 | 4,011 | 29.31 | 107.18 |
| Wailua THDR Site | 30,159 | 16,316 | 26.67 | 49.30 |
| TOTALS | 116,104 | 53,681 | | |

NOTE: The reduction from estimated delivered quantities to estimated stockpiled quantities at the THDR Sites was accomplished by compaction of stockpiles, processing and hauling. The "Total Handled" estimated quantities are indicative of the total amount of Iniki greenwaste.

3.3 Metals and White Goods

3.3.1 Receipt. Segregated loads of metals and white goods (large appliances) were accepted at all five THDR Sites.

3.3.2 Storage.

3.3.2.1 Methods. Metals were either stockpiled on the surface or placed in trenches.

3.3.2.2 Problems Encountered. No significant problems were encountered with storage of metals, except that nearby residents were concerned that lighter pieces (e.g., sheet metal roofing) could become airborne missiles should another

hurricane hit.

3.3.3 Processing. A contract for removal and recycling of metals and white goods was executed with Jenco shortly after the hurricane. Jenco failed to perform, so the contract was terminated. A second contract was executed with Hawaii Metal Recycling. The contractor hauled the small pile of metal at the Kalihiwai THDR Site to the Anahola THDR Site for processing. A portable baler was taken to the remaining four THDR Sites, where metals were baled. Some heavy items and others which did not lend themselves to baling were placed in bins. From the THDR Sites, metals were shipped to the contractor's recycling facility on Oahu. Refrigerants and oil were removed from appliances prior to baling as required by law. Upon completion of the project, the contractor commended the County for its segregation program. He noted that the metals were much cleaner than he had expected. Additional materials were delivered to the THDR Sites after the contractor had completed work. These are being recycled as part of the final site cleanup.

3.3.4 Quantities.

METALS AND WHITE GOODS SUMMARY

| | CU YDS | TONS | UNIT COST |
|--|---------------|-------------|----------------------|
| <u>THDR Sites (Estimated)</u> | | 4,125 | |
| Delivered | 117,345 | 2,728 | |
| Stockpiled at 11/30/93 | 10,910 | 6,699 | |
| Total Handled Thru 11/30/93 | | 6,439 | |
| Recoverable | | 260 | |
| Residue to Landfill | | | |
| <u>THDR Sites (Actual Through 11/30/93)</u> | | | |
| Metal Recycled | | 3,949 | |
| | | | \$36.27/T |

In addition to the metal, Hawaii Metal Recycling recycled 527 pounds of refrigerants, 92 gallons of compressor oil, and 23 quarts of gear oil.

3.4 Scrap Lumber and Other Wood Debris

3.4.1 Receipt. This category includes dimensional lumber, plywood, and other wood items such as doors, kitchen cabinets, and wood furniture. Wood is both treated or untreated. Segregated loads were accepted at all five THDR Sites.

3.4.2 Storage.

3.4.2.1 Methods. Wood was either stockpiled on the surface or placed in trenches.

3.4.2.2 Problems Encountered. Rapid deterioration of the wood stored at Puhi is attributed to its placement in a large depression. For reasons unknown, segregated piles of wood debris attracted far more rodents than piles of other materials.

3.4.3 Processing. Wood debris is proposed to be processed into a biofuel for incineration by Gay & Robinson (G&R). Biofuel incineration was discussed with all plantations on Kauai, but G&R was the only plantation with both interest and a suitable boiler. Due to the presence of heavy metals in wood preservatives, lead-based paint, and other potentially harmful substances, extensive testing was conducted. A small test burn of a representative sample was conducted at the University of California at Berkeley. This was followed by a full-scale test burn at the G&R boiler, using the wood debris from the Olokele THDR Site as feed stock. Results were then modeled by HLA to determine potential health risks to residents in the vicinity. Risks were determined to be negligible. The Department of Health, Clean Air Branch issued a clean air permit to G&R for incineration of biofuel. The biofuel must be burned in a controlled ratio of three parts bagasse to one part biofuel.

Originally, biofuel processing was to have been conducted at the THDR Sites as part of a single contract to process and remove all remaining materials and close the THDR Sites. Estimated cost for processing the materials with one transportable biofuel processing system, hauling biofuel to Gay & Robinson, and incineration of the biofuel was \$15 million. Two weeks before bids were due, the County Council insisted that the bid process be cancelled because small local contractors were complaining that they had been eliminated from the process by bonding requirements. Council's intent was to have the project split into small pieces. Despite advice from Solid Waste Planning and HLA that this would increase costs and generate conflicts between contractors, Council prevailed. Cancellation of the bid process subjected the project to a new State procurement law, which delayed the project another four months. The biofuel project was split into nine bid items, each to be awarded separately, not including biofuel incineration at Gay & Robinson:

- Excavation, Screening, Shredding, & Hauling - Anahola
- Excavation, Screening, Shredding, & Hauling - Wailua
- Excavation, Screening, Shredding, & Hauling - Puhi
- Scrap Metal Recycling
- Final Closure - Anahola THDR Site
- Final Closure - Wailua THDR Site
- Final Closure - Puhi THDR Site

- Biofuel Processing
- Biofuel Hauling

As restructured, all segregated wood debris and mixed C&D debris containing mostly wood would be shredded at the THDR Sites and then hauled to Kekaha Debris Recycling Station for processing into biofuel. Total project cost escalated to \$31 million due to extra equipment, handling, and hauling, requiring submission of a supplemental funding request to FEMA. As a result, FEMA is seriously considering cancellation of the biofuel project and requiring that all debris from the THDR Sites, except segregated recyclables, be landfilled.

Predicted contractor conflicts have also materialized. BFI, the sole bidder for biofuel processing, claims that Okada Trucking is not meeting specifications for preshredding wood debris. Okada Trucking has requested releases from certain specifications, which BFI will not agree to. Okada Trucking has also clashed with Sanifill of Hawaii, manager of the Kekaha Landfill and Debris Recycling Station.

The original project concept would have taken longer to complete, but it would have avoided project-threatening cost increases and contractor conflicts. Abandonment of that concept for political reasons may cost the County a substantial amount of scarce and expensive landfill capacity.

3.4.4 Quantities.

SCRAP LUMBER AND OTHER WOOD DEBRIS SUMMARY (All Quantities Estimated)

| | CUBIC YARDS | TONS |
|-----------------------------|-------------|--------|
| <u>THDR Sites</u> | | |
| Delivered | 259,165 | 32,957 |
| Stockpiled at 11/30/93 | 109,735 | 93,305 |
| Total Handled Thru 11/30/93 | | 94,110 |
| Recoverable | | 81,469 |
| Residue to Landfill | | 12,642 |
| Processed To Date | | 0 |

Numbers in the Table do not include 649 tons of wood debris from the Olokele THDR Site used in the biofuel test burn. **HLA estimates that 225,046 tons of wood, mixed C&D debris, and bulky materials will be processed through the biofuel processing system. This will yield an estimated 135,972 tons of specification boiler fuel.** The remainder will consist of recyclables and residue.

3.5 Gypsum Wallboard

3.5.1 Receipt. This category includes gypsum wallboard or sheetrock, painted or unpainted. Segregated loads were accepted at the Anahola, Puhi, and Wailua THDR Sites.

3.5.2 Storage.

3.5.2.1 Methods. Gypsum wallboard was stockpiled on the surface.

3.5.2.2 Problems Encountered. No significant problems were encountered with storage of gypsum wallboard.

3.5.3 Processing. Gypsum wallboard was hauled from the THDR Sites by Kauai Nursery & Landscaping under contract with the County. It was sorted to remove contaminants, pulverized, and used as an additive to greenwaste compost.

3.5.4 Quantities.

GYPSUM WALLBOARD SUMMARY

| | CU YDS | TONS | UNIT COST |
|--------------------------------------|--------|-------|--------------|
| <u>THDR Sites (Estimated)</u> | | | |
| Delivered | 15,035 | 3,372 | |
| Stockpiled at 11/30/93 | 7,350 | 4,544 | |
| Total Handled Thru 11/30/93 | | 4,572 | |
| Recoverable | | 4,343 | |
| Residue to Landfill | | 229 | |
| <u>THDR Sites (Actual)</u> | | | |
| Total Processed Gypsum | 8,619 | 4,025 | \$41.74/T |

3.6 Aggregates

3.6.1 Receipt. This category includes concrete, asphalt, roofing tiles, and ceramic fixtures. Segregated loads were accepted at the Anahola, Olokele, Puhi, and Wailua THDR Sites.

3.6.2 Storage.

3.6.2.1 Methods. Aggregates were stockpiled on the surface.

3.6.2.2 Problems Encountered. No significant problems were encountered with storage of aggregates.

3.6.3 Processing. Aggregates are being processed into pieces suitable for riprap, and stockpiled for use in County erosion control projects.

3.6.4 Quantities.

AGGREGATES SUMMARY
(All Quantities Estimated)

| | CUBIC YARDS | TONS |
|-----------------------------|-------------|--------|
| <u>THDR Sites</u> | | |
| Delivered | 89,647 | 66,984 |
| Stockpiled at 11/30/93 | 15,960 | 21,761 |
| Total Handled Thru 11/30/93 | | 21,873 |
| Recoverable | | 20,780 |
| Residue to Landfill | | 1,094 |
| Processed To Date | | 0 |

3.7 Plastic Sheeting and Other Plastic Items

3.7.1 Receipt. This category includes plastic sheeting used by residents to cover roofs, vinyl siding, drain pipe, toys, and miscellaneous plastic items. Segregated loads were accepted at the Anahola, Puhi, and Wailua THDR Sites.

3.7.2 Storage.

3.7.2.1 Methods. Plastics were stockpiled on the surface, with no protection from the elements.

3.7.2.2 Problems Encountered. No significant problems were encountered with storage of plastics.

3.7.3 Processing. The County had intended to have plastic materials processed into plastic lumber and then returned to the County for use in public works projects. When this work was put out to bid, only one bid was received and the bid price was three times the project estimate. Failure of a plastic lumber manufacturing plant to start up in Hawaii as expected was at least partly responsible for the high cost. This cost could not be justified to FEMA, so a determination was made to include plastics in the C&D debris processing bid at a later

date. Okada Trucking was required to attempt to recycle plastic sheeting in good condition for use as ground cover, protective tarps, or other productive use as part of the THDR Sites cleanup. No one was interested in using the materials, so it is being landfilled.

3.7.4 Quantities.

PLASTIC SHEETING AND OTHER PLASTIC ITEMS SUMMARY (All Quantities Estimated)

| | CUBIC YARDS | TONS |
|-----------------------------|-------------|------|
| <u>THDR Sites</u> | | |
| Delivered | 8,484 | 490 |
| Stockpiled at 11/30/93 | 5,300 | 448 |
| Total Handled Thru 11/30/93 | | 448 |
| Recoverable | | 403 |
| Residue to Landfill | | 45 |
| Processed To Date | | 0 |

3.8 Roofing Materials

3.8.1 Receipt. This category includes asphalt shingles, wood shakes, and roofing paper. Segregated loads were accepted at the Anahola, Puhi, and Wailua THDR Sites.

3.8.2 Storage.

3.8.2.1 Methods. Roofing materials were stockpiled on the surface.

3.8.2.2 Problems Encountered. The County had intended to create stockpiles of asphalt shingles which could be chipped and mixed with aggregates in road base, or used as road patch. Wood shakes were to have been placed in the wood debris piles. In actual practice, however, these materials were mixed, along with roofing paper, in separate piles of roofing materials. The pile at the Puhi THDR Site was the most homogeneous, being predominantly asphalt shingles.

3.8.3 Processing. The Department of Health refused to permit processing or incineration of the asphalt shingles unless the County could prove to 95 percent confidence level that they are not asbestos-containing material (ACM), i.e., less than one percent asbestos. FEMA

agreed to fund an initial test to determine asbestos content. One hundred samples of asphalt shingles were taken from three THDR Sites and sent to a laboratory for analysis. One sample was found to contain a silver coating which contained one to three percent asbestos. Based on that one sample, the Department of Health, with concurrence from the Environmental Protection Agency, refused to permit incorporation of asphalt shingles into the biofuel. As a result, all roofing materials have been landfilled.

3.8.4 Quantities.

ROOFING MATERIALS SUMMARY

| | CUBIC YARDS | TONS |
|--------------------------------------|-------------|--------|
| <u>THDR Sites (Estimated)</u> | | |
| Delivered | 13,259 | 2,897 |
| Stockpiled at 11/30/93 | 26,650 | 10,871 |
| Total Handled Thru 11/30/93 | | 10,898 |
| Recoverable | | 9,370 |
| Residue to Landfill | | 1,529 |
| <u>THDR Sites (Actual)</u> | | |
| Mixed Roofing to Landfill | | 15,904 |

3.9 Mixed Construction and Demolition Debris

3.9.1 Receipt. This category includes mixed wood, metals, gypsum wallboard, plastic pipe, and other materials normally associated with construction and demolition of structures. Loads were accepted at all five THDR Sites.

3.9.2 Storage.

3.9.2.1 Methods. Mixed C&D debris was stockpiled both on the surface and in trenches.

3.9.2.2 Problems Encountered. Heat from decomposition contributed to the underground fire problems at the Wailua THDR Site. Many loads were delivered mixed simply because contractors did not want to segregate debris or because separation would have been prohibitively expensive.

3.9.3 Processing. Mixed C&D debris will be processed under the biofuel processing

contract discussed in Section 3.4.3. Wood debris and greenwaste will become biofuel, recyclable materials will be recycled, and residue will be disposed of at Kekaha Landfill.

3.9.4 Quantities.

MIXED CONSTRUCTION AND DEMOLITION DEBRIS SUMMARY (All Quantities Estimated)

| | CUBIC YARDS | TONS |
|-----------------------------|-------------|--------|
| <u>THDR Sites</u> | | |
| Delivered | 39,719 | 7,698 |
| Stockpiled at 11/30/93 | 39,600 | 19,817 |
| Total Handled Thru 11/30/93 | | 19,823 |
| Recoverable | | 13,494 |
| Residue to Landfill | | 6,330 |
| Processed To Date | | 0 |

3.10 Bulky Materials

3.10.1 Receipt. This category includes large furniture, mattresses, carpet, and other bulky items which are not easily recyclable on Kauai and which do not compact well in a landfill. Loads were accepted at the Anahola, Puhi, and Wailua THDR Sites.

3.10.2 Storage.

3.10.2.1 Methods. Bulky materials were stockpiled both on the surface and in trenches.

3.10.2.2 Problems Encountered. No significant problems were encountered with storage of bulky items.

3.10.3 Processing. Bulky materials were intended to be shredded at the THDR Sites for volume reduction and then hauled to Kekaha Landfill for disposal. Tests on mattresses and carpet proved disastrous for the contractor, however, as carpet fiber and mattress springs did

about \$50,000 worth of damage to a Stomas Mauler, which has now been out of service for two weeks. Although damage was avoided, results were no better using a Diamond Z tub grinder. Alternatives for volume reduction are being considered.

3.10.4 Quantities.

BULKY MATERIALS SUMMARY (All Quantities Estimated)

| | CUBIC YARDS | TONS |
|-----------------------------|-------------|-------|
| <u>THDR Sites</u> | | |
| Delivered | 13,826 | 829 |
| Stockpiled at 11/30/93 | 12,150 | 2,623 |
| Total Handled Thru 11/30/93 | | 2,630 |
| Recoverable | | 131 |
| Residue to Landfill | | 2,498 |
| Processed To Date | | 0 |

3.11 Total Debris Summary

3.11.1 Summary. Data in the following table were extracted from the HLA report Draft Estimate of the Quantity of Hurricane Iniki Debris, Kauai, Hawaii, Table 1-1 on page 1-2. Data include debris already landfilled or recovered (processed) plus debris yet to be collected.

TOTAL HURRICANE DEBRIS SUMMARY

| | TONS |
|--|---------|
| Disposed through burning at THDR Sites | 72,000 |
| Landfilled at Kekaha Phase I | 120,000 |

| | |
|--|---------|
| Landfilled at Kekaha Phase II | 140,000 |
| Recovered, including greenwaste-only sites | 293,000 |
| Total Hurricane Iniki debris collected | 625,000 |
| Debris requiring landfilling or recovery | 546,000 |

4.0 LESSONS LEARNED AND RECOMMENDATIONS

From the County's experiences there can be extracted a number of valuable lessons and recommendations which can benefit the County of Kauai and other jurisdictions in the event of a future disaster. These are summarized below.

- It pays to adhere to long-range plans. Quick solutions will be attractive, but in the long run they may produce very costly problems such as mixing of hazardous wastes with otherwise recyclable debris. Recovery measures should be consistent with long-range goals and programs. If necessary, take time to plan even as you are implementing. Opportunists flock to disaster scenes. Follow your own plan; not theirs!
- Residents will begin to dump immediately. Quick action to open solid waste facilities or to provide alternatives, such as roll-off containers, is essential to preventing wide-spread illegal dumping. Once an illegal dump is established, everyone will use it.
- Prior planning and preparation for recycling of disaster debris will certainly help, but it is not essential. With absolutely no advance preparation, the County of Kauai expects to recycle approximately one-half of the debris which was not burned in the first two weeks, assuming completion of the biofuel processing as planned.
- Source separation is the key to recycling disaster debris. Once debris is mixed it is very difficult to separate, and may have become contaminated with hazardous materials.
- Residents will respond to calls for debris segregation. Frequent, clear, and sustained communication will produce results. Kauai's results were obtained through information broadcast by one radio station on Oahu, newspapers, signs, and bulletin board notices.
- If curbside pickup of debris is offered, residents must be instructed to place debris away from utility poles, mailboxes, and especially water meters. A number of water meters were pulled out of the ground by equipment scooping up debris.
- Private contractors may need to be educated about debris recycling. There were instances of contractors dumping segregated piles of different types of debris into the same truck during Operation Garden Sweep. Some of the contractors operating the THDR Sites directed loads of segregated debris to be dumped into trenches of mixed debris. Penalties can be included in contracts to ensure that segregation is maintained.
- The military can be of invaluable assistance if available. Disciplined troops did an excellent job of maintaining material segregation. They were generally not as well equipped for this type of work as private contractors, however.

- FEMA will require documentation of hurricane debris. All incoming materials at solid waste facilities must be logged in detail (vehicle ID, vehicle capacity, weight if scales are available, type of material, date, time). Positive measures must be implemented to distinguish disaster debris from the normal waste stream.

This is one of the most problematic issues with which the County of Kauai has had to contend. Short of placing a County inspector at every hurricane recovery construction site, there simply is no definitive way to identify debris logged at various solid waste facilities as either hurricane debris or non-hurricane debris. When loads arrive at solid waste facilities, a load of hurricane C&D debris looks exactly the same as a load of non-hurricane C&D debris.

An honor system for identification of hurricane debris works with some people, but there are others who will claim for various reasons that all their loads are hurricane-related. The County Council enacted a tipping fee waiver for all hurricane debris. A procedure was developed whereby persons claiming the waiver must have a project certified by the Office of Emergency Permitting as being hurricane-related. A copy of the certification must accompany each load from that project. This system, too, was not perfect and was abused. It was revised to make the certification forms difficult to copy and to control the number of forms issued.

Some non-hurricane debris has probably been accepted at solid waste facilities. Offsetting this, however, is a certainty that some hurricane debris entering the solid waste stream has not been accounted for. This is probably true for most of the hurricane debris delivered to refuse transfer stations.

HLA has addressed this problem in a number of ways. Daily logs of incoming/outgoing material were summarized and analyzed. Hurricane debris identified by tipping fee waivers at Kekaha Landfill was considered. Data from the Office of Emergency Permitting on the number of structures repaired/rebuilt and the number yet to be repaired were used. Revised visitor/resident population estimates were developed as a measure of non-hurricane waste generation. Drivers of incoming trucks at Kekaha Landfill were questioned. Because the issue of debris classification was approached from multiple angles, it is felt that the quantities reported by HLA represent as accurate a statement of hurricane debris as can be developed.

- Measurement of debris by volume is subjective at best. Disputes with contractors and loss of FEMA reimbursement may result from volumetric measurement. For large quantities of debris, it is cost effective for contractors to provide temporary scales if facilities with permanent scales are not available.

- Provisions must be made for putrescible wastes immediately after the disaster. If solid waste facilities are inoperable, burial at a temporary dump may be the only option. There are many problems associated with this alternative. "Hardening" solid waste facilities against damage and decentralizing the system will increase the odds that the system will be operable after the disaster. Hardening may include disaster-resistant new construction, installation of emergency generators, and provisions to tie-down equipment.
- If temporary sites will be needed to manage debris, rights of entry should be drafted in advance. Landowners will be especially concerned about long-term environmental liability and will probably demand complete indemnification and a return of the site to its pre-disaster condition. If possible, execute rights-of-entry prior to beginning operations. Obtain rights-of-entry from both landowners and lessees.
- The Department of Public Works initially used a fill-in-the-blank contract geared toward road clearing for all recovery-related projects. It was not compatible with the scopes of work of some projects. As a result, payments to contractors were delayed. Planning ahead for the types of services that may be needed and preparation of contracts tailored to those services is recommended.
- Residents will tolerate improperly located temporary dump sites for only a short time. If long-term use is anticipated, be prepared for complaints, legal action, and cancellation of the right-of-entry. Properly sited and constructed permanent debris recycling facilities will not only aid in disaster recovery, but can be an integral part of normal solid waste operations.
- Open burning of mixed debris is a quick and inexpensive method of disposing of debris. It will, however, bring complaints, legal action, and cancellation of the right-of-entry. Ash may have to be handled as a hazardous waste. Open burning is environmentally and socially unacceptable.
- Spontaneous combustion is likely with debris which is buried or stockpiled for a long period. Take steps to process the debris quickly or be prepared to deal with the fires.
- Plan ahead. Prepare contracts and rights-of-entry, become familiar with locally-available resources, and maintain your own resources prior to any disaster. Without electric power, telephones, and clear roads, implementation will be slowed.
- Be prepared to supplement landfill personnel and equipment immediately. Inadequate operational resources will result in poor compaction, waste of air space, and possibly acceptance of hazardous materials.
- If debris must be stored for long periods, be prepared to control vectors.

APPENDIX A

CHRONOLOGY OF EVENTS

MANAGEMENT OF HURRICANE INIKI DEBRIS

| Chronology of Key Events | |
|--------------------------|---|
| Date | Event |
| 9/11/92 | Hurricane Iniki strikes island of Kauai. |
| 9/12/92 | County Public Works/Solid Waste staff begin locating temporary dump sites, planning emergency solid waste services, and contacting contractors about emergency solid waste contracts. |
| Week of 9/13/92 | County and State road crews and private contractors begin clearing and stockpiling debris. |
| 9/13/92 | Olokele THDR Site opens near Hanapepe. Debris is initially burned. |
| 9/14/92 | Anahola and Wailua THDR Sites open. Some debris at Wailua THDR Site is burned; other debris at both sites is buried in trenches. |
| 9/15/92 | Kalihiwai THDR Site opens. Some debris is initially burned. |
| 9/16/92 | <p>Moloaa Compost Site, a private facility, opened as a greenwaste-only drop-off site.</p> <p>A second greenwaste-only drop-off site is opened at Waipa Farm within the same week.</p> <p>Department of Health issues permit for open burning of hurricane debris at temporary dump sites.</p> <p>County Solid Waste Coordinator and Coordinator of State Office of Solid Waste Management tour island by military helicopter to assess debris situation. They formulate general debris management strategy to be recommended to Mayor: minimize landfilling of debris to conserve capacity in Kekaha Phase I landfill; maximize recycling of wood, greenwaste, metal, and other materials; and develop new landfill capacity as quickly as possible.</p> |
| 9/17/92 | <p>Fifth and final THDR Site opens at Puhi.</p> <p>Kekaha Landfill Phase I re-opens.</p> <p>Monitoring of vehicle traffic by DPW personnel begins at Anahola, Kalihiwai, and Wailua THDR Sites. Operators record capacity and content</p> |

| Date | Event |
|------------------|--|
| | of vehicles. |
| 9/18/92 | Under contract with DPW, BFI places rolloff containers in various neighborhoods to compensate for inoperable refuse transfer stations and suspended residential collection service. |
| 9/20/92 | DPW staff meet with road clearing contractors and dump site operators to announce "no burn" and material segregation policies. |
| 9/22/92 | Operation Garden Sweep officially begins. |
| 9/27/92 | THDR Sites closed for one day to reorganize for materials segregation program. |
| 9/28/92 | THDR Sites reopen. Operation Garden Sweep continues, now collecting source-separated debris. Monitoring of vehicle traffic begins at Puhi THDR Site, similar to monitoring at other THDR Sites. |
| 9/29/92 | Department of Health issues extension to the open burning permit for the Olokele THDR Site only; no burning is allowed at other THDR Sites after this date. |
| 10/92 | Greenwaste delivered to Moloaa and Waipa Farm is ground for composting. |
| 10/3/92 | Last day Kalihiwai THDR Site accepts debris. |
| 10/3-4/92 | State Department of Health conducts a FEMA-funded household hazardous waste collection event at four sites. |
| 10/10/92 | Monitoring of vehicle traffic begins at Kekaha Landfill. Operators record capacity of trucks and number of truck trips. |
| 10/15/92 | Last day greenwaste is accepted at Moloaa and Waipa Farm. Due to resumption of household rubbish collection service, BFI begins removing rolloff containers from neighborhoods. |
| 10/18/92 | Last day Olokele THDR Site accepts debris. Burn pile continues to smolder. |
| Week of 10/19/92 | First estimates of stockpile volumes at all five THDR Sites by RIS and HLA. |
| Week of 10/26/92 | Aerial photographs taken of Puhi, Wailua, Anahola, and Kalihiwai THDR Sites and Kekaha Landfill. |
| 11/4/92 | Operation Final Sweep officially ends. |
| 11/20/92 | Board of Land and Natural Resources approves use of the Phase II parcel at Kekaha for construction of a new landfill. |
| 11/25/92 | As requested by the County, HLA submits proposal for design of Kekaha Landfill Phase II. |
| 12/92 | Fire at Olokele THDR Site finally extinguished. Mixed ash, dirt, metals, and |

| Date | Event |
|------------|--|
| | partially combusted wood remains. |
| 12/10/92 | As requested by the County, HLA submits proposal for design of Phase I landfill closure and improvements to Phase I operations. |
| 12/11/92 | RIS and HLA submit plan for management of Hurricane Iniki debris. Solid waste impact estimated to be between 240,000 and 400,000 tons. |
| 12/14/92 | County staff (Mayor JoAnn Yukimura, Tom Batey, Mike Veith, Rudy Raralio, Dale Burton), RIS and HLA (Gerald Friesen) meet with State Civil Defense (Bill Dawson) and FEMA (Frank Kishton, Jim Calacal) in County EOC. County presents a detailed proposal to FEMA for management of hurricane debris. County asks for \$100 per ton for 400,000 tons of debris to develop Kekaha Phase II landfill and recycle debris. FEMA representatives promise to write a DSR for \$40,000,000 before leaving Kauai for the Christmas holiday. |
| 12/15/92 | BFI assumes management and operation of Puhi and Wailua THDR Sites. Second estimate of stockpile volumes at THDR Sites. |
| 12/18/92 | FEMA presents provisional DSR 95656 to County to enable County to begin emergency landfill work. |
| 12/20/92 | Waste Management assumes management and operation of Anahola THDR Site. |
| 12/21/92 | county signs Contract 4071I with HLA for design of Kekaha Landfill Phase II. |
| 1/13/93 | County signs Contract 4076I with HLA for design of Kekaha Landfill Phase I closure. |
| 2/18/93 | Third estimate of stockpile volumes at THDR Sites. |
| 3/23-25/93 | Full-scale test burn of biofuel conducted at Olokele Sugar Company boiler. Wood debris at Olokele THDR Site is used to produce biofuel for the test burn. |
| 3/24/93 | Construction of Phase II landfill advertised for bids. |
| 3/30/93 | Notice to Proceed issued to Hawaii Metal Recycling for removal of metals from THDR Sites. |
| 4/1/93 | Tipping fee for commercial haulers reinstated at Kekaha Landfill. |
| 4/7/93 | FEMA approves DSR 95656 in the amount of \$40,000,000 for landfilling and recycling of debris. |
| 5/93 | First phase of scrap metal removal from Puhi THDR Site. |
| 5/8/93 | County faxes request for \$9,265,014 for Phase II landfill operations to Jim |

| Date | Event |
|-----------------|---|
| | Calculation of FEMA. The amount is based on HLA's estimate of 120,450 tons of hurricane debris entering the Phase II landfill at a unit operating cost of \$76.92/ton. |
| 6/93 | County begins issuing tipping fee waivers to commercial haulers and non-residential self-haulers disposing of hurricane-related materials. Waivers must be certified by Office of Emergency Permitting. Hawaiian Dredging Construction Company begins construction of the Phase II landfill at Kekaha. |
| 7/93 | Scrap metal removed from Olokele THDR Site. |
| 7/6/93 | FEMA approves DSR 15527 in the amount of \$9,265,014 for Phase II landfill operations. |
| 7/15/93 | Last day Puhi THDR Site accepts debris. BFI and Waste Management turn operation of Wailua and Anahola THDR Sites back over to County. |
| 8/93 | Scrap metal removal begins at Wailua THDR Site. |
| 8/4-5/93 | Accidental fire consumes greenwaste stockpiled at Olokele THDR Site. |
| 9/93 | Scrap metal removal completed at Wailua THDR Site. Scrap metal removal begins at Anahola THDR Site. |
| 9/8/93 | Notice to Proceed for greenwaste processing at THDR Sites issued. |
| 9/11/93 | First loads of chipped greenwaste leave Wailua THDR Site. |
| 9/15/93 | First loads of chipped greenwaste leave Anahola THDR Site. |
| 9/17/93 | Contracted hauling of smoldering buried material from Wailua THDR Site to Kekaha Landfill begins. |
| 9/30/93 | Last day Wailua THDR Site accepts debris. |
| 10/93 | Scrap metal removal completed at Anahola THDR Site; contractor returns to Puhi THDR Site to remove metal delivered since first phase of work was completed at that site. |
| 10/1/93 | The Anahola THDR Site and the Kekaha Landfill Phase I are the only sites accepting hurricane debris. Contracted hauling of smoldering debris from Wailua THDR Site to Kekaha Landfill completed. |
| Week of 10/4/93 | Eco-Logic Effects completes hauling of chipped greenwaste from Kalihiwai THDR Site. |
| 10/7/93 | Last day Kekaha Landfill Phase I accepts waste. |
| 10/8/93 | Kekaha Landfill Phase II begins operation with four completed cells and |

| Date | Event |
|-------------|---|
| | temporary vehicle scales. Operation is contracted to Sanifill of Hawaii. Construction continues on remaining cells and infrastructure. |
| 10/22/93 | First loads of chipped greenwaste leave Puhi THDR Site. |
| 11/93 | Department of Health issues draft and final permits to Olokele Sugar Company for incineration of biofuel produced from Iniki wood debris. |
| 11/1/93 | Weight scales begin operation at Kekaha Landfill Phase II, allowing for first accurate measurement of incoming material. |
| 11/4/93 | Hawaii Metal Recycling completes removal of scrap metals from THDR Sites. Small quantity of metal remains at Puhi and Wailua THDR Sites (delivered after contractor completed work at the sites). Metal continues to be delivered to the Anahola THDR Site. |
| 11/11-12/93 | Densities of selected stockpiled materials are measured at Puhi and Wailua THDR Sites. |
| 11/11/93 | Most accurate survey to date of Olokele THDR Site and pile of burnt Wailua THDR Site debris at Kekaha Landfill Phase I. |
| 11/12/93 | Most accurate survey to date of Puhi THDR Site. Incoming trucks at Anahola THDR Site are surveyed for four hours to determine where incoming material originates. |
| 11/15/93 | Incoming trucks at Kekaha Landfill Phase II are visually observed to determine content and truck fullness; drivers are surveyed to determine origin of material. Observations are compared to weight records for same loads. |
| 11/16/93 | Most accurate survey to date of Wailua THDR Site stockpiles. |
| 11/18/93 | Most accurate survey to date of Anahola THDR Site stockpiles. |
| 12/1/93 | First full month of data from landfill weight scales available. |
| 12/15/93 | Notice to Proceed issued to Goodfellow Bros. for final closure of Kalihiwai THDR Site. Contract provides for excavation of all buried material, delivery of recyclables to Anahola THDR Site, and delivery of non-recyclables to Kekaha Landfill. |
| 3/31/94 | Last day Anahola THDR Site receives debris. All hurricane debris now going to Kekaha Landfill until permanent debris recycling stations are developed. |
| 4/25/94 | Greenwaste processing at all THDR Sites is complete. |
| 4/30/94 | Kalihiwai THDR Site closure is completed. |
| 5/2/94 | First advertisement for bids for biofuel processing. |
| 5/8/94 | Notice to Proceed issued to Kiewit Pacific for final closure of Kekaha Landfill Phase I, which includes construction of a permanent debris recycling station on top of the closed landfill. |

| Date | Event |
|-------------|---|
| 5/9/94 | First advertisement for bids for processing of gypsum wallboard at THDR Sites. |
| 6/23/94 | Biofuel processing bid is canceled after County Council requests revisions to enable small local contractors to better compete. |
| 7/1/94 | New State procurement law becomes effective. All bids not advertised before this date must comply. Most new projects are delayed for several months while new procedures and boilerplates are written. |
| 8/8/94 | Notice to proceed issued to Kauai Nursery & Landscaping for gypsum wallboard processing. |
| 10/7/94 | Gypsum wallboard processing is completed. |
| 10/12/94 | Notice to proceed issued to Gay & Robinson for Olokele THDR Site closure. |
| 10/24/94 | Revised biofuel processing bid is advertised. Project has been divided into nine bid items, to be awarded separately. Intent is to clean off and close the THDR Sites quickly and do biofuel processing at Kekaha Debris Recycling Station. |
| 12/12-21/94 | Bids are opened for debris removal from and final closure of the Anahola, Puhi, and Wailua THDR Sites, and for biofuel processing and hauling. |
| 2/1/95 | Closure of Kekaha Landfill Phase I and construction of Kekaha Debris Recycling Station certified substantially complete. |
| 2/16/95 | Notice to proceed for mobilization and equipment testing issued to Okada Trucking for cleanup of three THDR Sites. |
| 4/4/95 | Notice to proceed issued to Okada Trucking to begin processing and hauling at three THDR Sites. |
| 2/23/96 | FEMA writes its determination letter to State CD concerning eligible costs associated with debris deposited in the Phase II landfill. It states that it will de-obligate \$17,943,449. |
| 3/6/96 | State CD forwards FEMA's determination letter to the County. |
| 4/96 | County files appeal with State CD concerning FEMA's determination of eligible costs for DSRs 95656 and 15527. |

