UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

June 25, 2012

Pa'ina Hawaii, LLC
ATTN: Michael Kohn,
President
P.O. Box 30542
Honolulu, Hawaii 96820

SUBJECT: Pa'ina Hawaii, LLC - NRC INSPECTION REPORT 030-36974/2012-001

Dear Mr. Kohn:

This letter refers to the inspections conducted at Clayton H. Landis Company, Inc. on August 16-17, 2011, and at your facility in Kunia, Hawaii, on April 20-25, 2012. Additional in-office inspections were also performed when reviewing concrete test data through May 25, 2012. During these inspections, the NRC staff examined activities conducted under your license as they relate to public health and safety, compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of a selected examination of procedures, drawings and representative records; observations of activities and interviews with personnel. A preliminary exit briefing was conducted with you at the conclusion of the on-site inspection on April 26, 2012. A final telephonic exit briefing was conducted with you on May 31, 2012.

No violations were identified during the inspection. However, the inspection identified a potential vulnerability. During the placement of the concrete into the annulus space of the irradiator pool, the inspector noted that the method of concrete placement could contribute to voids beneath the irradiator pool stainless steel liner plate (reference Section 2.2.3 of the enclosed report). As a result, by email dated May 9, 2012 (ML12145A455), you committed to an inspection of the irradiator pool bottom to determine if voids are present underneath the pool's stainless steel liner plate before sources are loaded into the pool. The NRC is concerned about this issue because voids in the concrete could affect the long-term structural integrity of the pool. If voids are present, you also committed to determine remediation measures before sources are loaded. This issue will be reviewed during a future inspection.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

Should you have any questions concerning this inspection, please contact Ray Kellar at (817) 200-1121 or the undersigned at (817) 860-8130.

Sincerely,

/RA/

G. Michael Vasquez, Chief
Nuclear Materials Safety Branch A

Docket: 030-36974
License: 53-29296-01

Enclosure:
Inspection Report 030-36974/2012-001

cc w/Enclosure:
Hawaii Radiation Control Program Director

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KEYWORD:			
MSB-B	ACES	C:MSB-A	C:MSB-A
RJTorres	RKellar	JEWhitten	GMVasquez
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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	030-36974
License:	53-29296-01
Report:	030-36974/12-001
Licensee:	Pa'ina Hawaii, LLC
Facility:	Pa'ina Hawaii, LLC P.O. Box 30542 Honolulu, Hawaii, 96820
Dates:	August 16-17, 2011 April 20-26, 2012
Inspectors:	R. Kellar, PE, Inspector, RIV
Approved By:	G. Michael Vasquez, Chief Nuclear Materials Safety Branch A

Enclosure

EXECUTIVE SUMMARY

Pa'ina Hawaii, LLC
NRC Inspection Report 030-36974/12-001

Pa'ina Hawaii, LLC (Pa'ina) is licensed to possess and use sealed sources containing cobalt 60 in a pool irradiator designed by GRAY*STAR as the Genesis II Irradiator pool. The Genesis II Irradiator pool and associated components were fabricated at the Clayton H. Landis Company, Inc. (CHL) located in Souderton, Pennsylvania. The licensee plans to install the irradiator pool near Kunia, Hawaii. The inspection reviewed fabrication activities at CHL's site on August 16-17, 2011, as well as construction activities near Kunia, Hawaii on April 20-26, 2012.

As part of the overall inspection activities planned for the Pa'ina GRAY*STAR, Genesis II Irradiator pool, the NRC inspected the fabrication activities for the irradiator pool and the initial construction related activities. At the time of the August 16-17, 2011, inspection, the fabrication shop was in the process of fabricating the surge tank as well as other components that were necessary for the project. The inspector reviewed the fabrication activities associated with the irradiator pool, including the material selection, welding requirements and testing specified for the pool.

During the April 20-26, 2012, inspection of the construction-related activities near Kunia, Hawaii, the inspector reviewed the overall geotechnical properties of the site as well as the licensee activities associated with the pool excavation, the initial receipt of the pool at the site, the placement of the pool into the excavation, the pool leak test, and the placement of the concrete inside the pool annulus. The inspector also conducted in-office reviews of the concrete strength tests of the concrete for the pool foundation, pool annulus and pool backfill.

No violations were identified. However, the inspector identified a concern related to the long-term structural integrity of the irradiator pool. Specifically, the inspector was concerned that the method of concrete pour between the stainless steel liner and the carbon steel liner could result in voids under the pool. As a result, by email dated May 9, 2012, (ML12145A455) the licensee committed to an inspection of the irradiator pool bottom to determine if voids are present underneath the pool's stainless steel liner plate before sources are loaded into the pool.

REPORT DETAILS

The overall scope of the inspection was to review the fabrication activities associated with the GRAY*STAR, Genesis II Irradiator pool components being fabricated at Clayton H. Landis Company, Inc. (CHL) located in Souderton, Pennsylvania, and to observe installation activities of the Genesis II Irradiator pool conducted at the Kunia, Hawaii location. Title 10 of the Code of Federal Regulations (CFR) Part 36.33 requires that the irradiator pool have a water-tight stainless steel liner or be constructed so that there is a low likelihood of substantial leakage. The NRC's inspections of fabrication and construction activities were focused on the components and activities that could affect the water-tight steel liner and contribute to leakage.

1 Fabrication Activities

1.1 Inspection Scope

The scope of the fabrication inspection included a review of the materials specified for the irradiator pool, the welding requirements, and acceptance testing of the components.

1.2 Observations and Findings

The inspector reviewed several of the design drawings associated with the irradiator pool fabrication activities. The drawings were reviewed for material requirement details, weld specifications, and dimensional measurements. The bill of materials for the irradiator pool (Drawing POOLA-112-000, Revision 1) specified that the pool liner would be constructed of 0.25 inch, type 304 stainless steel plate. The fabricator provided the Mill Test Certificates for the 0.25 inch, stainless steel plate used for the irradiator pool liner that had been performed by Penn Stainless Products, Inc., which indicated that the plate met all the requirements for type 304 stainless steel. The inspector compared the weld dimensions specified on the fabrication drawings to the visually accessible welds on the irradiator pool structure, and determined there were no obvious differences in length or weld size detected. The certification test results for the type ER308L weld wire used on the stainless steel irradiator pool liner had been performed by Weld Wire Company, Inc., indicating that the test results were in full compliance with specification requirements.

The welding process used for fabrication activities on the stainless steel plate was reviewed. Although not required for the irradiator pool work, CHL Systems was qualified to perform ASME Code, Section VIII welding activities. The fabricator provided the certificates for each of the welders that had performed the stainless steel liner welding, and all were found to have been certified to perform welds on stainless steel surfaces. The welding supervisor performed the visual examinations of the welds for size requirements as well as defects including cracks and unacceptable amounts of undercut, porosity and lack of fusion. The welding supervisor that performed the visual weld inspection had approximately 30 years of welding experience and had recently been retested to ensure that his eyesight was satisfactory using an industry approved standard (Jaeger #2).

The inspector compared several of the dimensions depicted on the design drawings to the overall completed irradiator pool dimensions. The dimensions were within the allowed tolerances as shown on the design drawings.

Prior to pool installation, CHL Systems completed a Certificate of Compliance (CoC) dated April 5, 2012, for the pool and surge tank that indicated the material test reports, critical dimensions, welding, leak test and preparation/packaging were all satisfactory.

1.3 Conclusions

The fabrication activities associated with the GRAY*STAR, Genesis II Irradiator pool, including the material used, welding activities performed, and testing conducted were within the specifications and drawings included with the license application as supplemented and in accordance with acceptable fabrication practices.

2 Construction Activities

2.1 Inspection Scope

The scope of the construction inspection included a review of the soil conditions that existed in the excavation at the Kunia road location, reviewing the irradiator pool foundation information, observing the unloading of the irradiator pool, observing the rigging and placement of the irradiator pool into the excavation, observing the irradiator pool leak test, and observing placement of concrete into the irradiator pool annulus space.

2.2 Observations and Findings

2.2.1 Excavation Activities

The Kunia road facility was proposed as the alternate location for the Pa'ina Hawaii irradiation facility location. The irradiator facility was being installed within an existing building. A geotechnical study of the soil conditions existing at the site was conducted by Weidig Geoanalysts in a geotechnical report dated February 17, 2011. The report consisted of soil borings, laboratory test results, and recommendations for site work. The soil conditions near the surface were determined to have low to marginal expansive tendencies and capable of supporting anticipated floor loads imposed through the concrete floor at grade level. The soil conditions from approximately 6 feet below grade down to 26.5 feet consisted of a very hard layer of weathered lava material called saprolite. This material is very stiff and was found to progressively increase in hardness down to the depth of the irradiator pool foundation level, where unconfined compressive strength results indicated a bearing capacity of 27,800 pounds per square foot. This bearing capacity is much greater than the bearing capacity necessary to safety support the irradiator pool.

The inspector observed the soil that was visible along the sides of the excavation. The soil was composed of a stiff brown clay material, which appeared to closely match the soil conditions described in the Weidig geotechnical report. The soil conditions observed near the bottom of the excavation were identical to the very hard layer of saprolite discussed in the geotechnical report. As an independent observation, the inspector utilized an industry recognized field tool capable of providing an estimate of the strength of clay type soils, specifically a Soiltest CL-700A Pocket Penetrometer. The inspector used the penetrometer to verify the soil strength properties at the level of the excavation

where the pool foundation was located. The penetrometer indicated that the unconfined compressive strength of the soil was well above the maximum value that the instrument was capable of measuring, which was 9,000 pounds per square foot. The inspector determined that the soil conditions present at the Kunia road location would be capable of providing sufficient support for the irradiator pool.

During the construction process, the licensee decided to over-excavate the size of the foundation proposed for the irradiator pool. The thickness specified for the irradiator pool concrete foundation was 6 inches, with a specified minimum 28-day compressive strength of 4,000 pounds per square inch (psi). The licensee originally intended to build up compacted base material in layers from the bottom of the excavation up to the level of the bottom of the irradiator pool concrete foundation and then place the concrete foundation on top of the compacted base material. However, the licensee elected to extend the thickness of the irradiator pool foundation down to the bottom of the excavation, thereby eliminating the compacted base material layers. This had been reviewed and approved by the licensee's structural engineer. Prior to the onsite inspection, the inspector reviewed photos of the foundation construction which included two layers of reinforcing steel mats that were placed in the concrete foundation. The overall thickness of the concrete foundation was approximately 4 feet. The licensee provided the results of the 6-day concrete cylinder break tests that had an averaged strength of 5,117 psi for the 3 cylinders. This indicates that the required minimum concrete compressive strength at 28-days of 4,000 psi will be achieved.

2.2.2 Pool Receipt and Installation

On Friday, April 20, 2012, the Genesis II Irradiator pool was delivered to the Kunia road location. The rigging and offloading of the pool from the transportation trailer was accomplished without incident. The fabricator had loaded structural steel for other components associated with the Genesis II Irradiator inside the pool for shipment purposes. The licensee attempted to unload the bundled structural steel from the inside of the pool and observed that portions of the steel were scraping against the inner stainless steel liner of the irradiator pool. Unloading efforts were halted and the licensee decided to unload the steel piece by piece to minimize any damage to the stainless steel liner.

After the structural steel components had been unloaded the inspector examined the interior of the irradiator pool and noted that there were several scratches in the bottom and sides of the stainless steel irradiator pool liner. The scratches appeared to be approximately 1/64 to 1/32 of an inch deep and varied in length up to a maximum of approximately 6 inches. The inspector noted that none of the indications appeared to challenge the integrity of the 0.25 inch thick stainless steel liner, however, there were no receipt instructions that provided guidance for how to disposition the indications. The licensee contacted the fabricator and obtained an email indicating that it was satisfactory to continue with construction activities as these indications would be reviewed and repaired as necessary by the fabricator during inspections that would occur prior to loading the sources.

The pool placement activities occurred on Monday, April 23, 2012. An opening had been cut in the roof of the building over the irradiator pool excavation in preparation for the crane to lower the pool into the excavation. However, the opening was not centered

over the excavation, due to an interference with one of the building roof beams, which the licensee elected to leave in place. The licensee arranged for a 300-ton capacity mobile crane to upend the irradiator pool and place the pool into the excavation. The inspector observed that the rigging for the pool upending process and placement activities of the pool into the building were within acceptable industry standards. The licensee was able to lower the irradiator pool through the roof opening with a minimal amount of difficulty. However the standard rigging used on the irradiator pool would not allow for placement of the irradiator pool into the excavation, due to the interference with the roof beam that had been left in place. The licensee had to set the irradiator pool onto the concrete floor of the building and reposition the rigging twice before the irradiator pool could be safely lowered into the excavation in the correct position. To accomplish the placement of the irradiator pool into the excavation, the licensee had to attach the slings to unapproved rigging points inside the irradiator pool to achieve the desired rigging configuration that was necessary to set the pool. After the pool had been set into the excavation the inspector examined the rigging points located inside the irradiator pool and did not observe any deformed components or other deficiencies. The licensee determined that an inspection of the interior irradiator pool components used as rigging points would be examined by the fabricator and repaired as necessary prior to loading the sources.

The licensee leveled and braced the irradiator pool to minimize any movement that could occur during upcoming construction related activities. On Tuesday, April 24, 2012, the licensee filled the irradiator pool with water for the leak test of the stainless steel liner. License Condition 22.L, required a visual inspection of the annulus for any leaks between the irradiator pool inner liner and the annulus space, that may have been created during transit. A portion of the pool annulus was observed by the licensee on Wednesday, April 25, 2012, and no leakage was noted. The inspector independently viewed each quadrant of the pool annulus and confirmed that no water leakage was observable.

2.2.3 Concrete Pouring Activities

The inspector observed the concrete placement activities for the irradiator pool annulus space on April 25, 2012. The irradiator pool is a double-walled rectangular box component prefabricated at CHL Systems facilities. The inner walls are made from 0.25 inch thick stainless steel and the outer walls are made from 0.25 inch thick carbon steel. The inner and outer walls are 6 inches apart. The longer pool walls are joined by 3 steel “I” beams welded together and the shorter sides are joined by 2 steel “I” beams welded together. The bottom of the pool has 3 “I” beams welded between the stainless steel and carbon steel plates. After the prefabricated pool had been placed in the excavation, a leak test was performed by filling the inner stainless steel pool with water. Following a successful leak test, the 6 inch annulus area between the inner and outer walls was filled with concrete.

The inspector observed the set-up activities in advance of concrete placement, which consisted of the concrete pump preparation and the concrete sampling preparation. The inspector verified that the concrete test lab technician had been certified by American Concrete Institute. The concrete test lab technician obtained strength samples of the concrete and performed a slump test. The slump test results of 5 inches indicated that the concrete slump was within the mix design parameters of 4 inches, plus or minus 1

inch. The inspector observed the licensee placing concrete into each quadrant of the pool annulus followed with vibration of the concrete with a vibrator sufficiently long to adequately consolidate the freshly placed concrete. Midway through the concrete placement activities, one of the licensee's contractor staff noted that there were sections underneath the irradiator pool stainless steel liner that needed to be filled with concrete. The licensee attempted to lower a camera into the annulus to observe the area, but it was indeterminate as to the condition of the space beneath the stainless steel liner as concrete had already been placed into each of the vertical annulus spaces surrounding the pool. The contractor attempted to lower the concrete vibrator into the space beneath the stainless steel liner to consolidate the concrete. As a result, the inspector was concerned that the licensee had not determined whether there were voids in the concrete beneath the stainless steel irradiator pool liner.

The licensee performed the remaining concrete backfill activities surrounding the irradiator on May 2-7, 2012. The inspector reviewed the results of the concrete cylinder test results and the compressive strength results ranged from 4,290 to 6,220 psi. The minimum compressive strength for the backfill material was specified as 3,000 psi. Therefore, all the compressive strength test results for the backfill exceeded the minimum strength test requirements.

Based on discussions between the licensee and the NRC, the licensee committed by email (ML12145A455) on May 9, 2012, to the following actions:

1. CHL Systems will inspect the installation of the pool prior to assembling the rest of the unit

2. CHL Systems will further inspect scratches observed from shipping and repair if necessary

3. CHL Systems will inspect pool components for lifting damage and repair if necessary

4. CHL Systems will inspect and test for air voids beneath the floor of the irradiator pool stainless steel liner and remediate if necessary

5. The licensee's Radiation Safety Committee will meet to approve all inspections, repairs and remediation described above

6. If any of the inspections, repairs and remediation require significant action, the Pa'ina Hawaii Radiation Safety Officer will notify the NRC prior to taking such action

7. The NRC will be notified when the inspections and tests are scheduled so that the NRC has an opportunity to observe the activities

8. The NRC will be notified of all test results, and

9. All findings and test results will be documented accordingly.

2.3 Conclusions

The initial construction activities associated with the installation of the GRAY*STAR, Genesis II Irradiator pool, were observed by the NRC and no violations were identified.

Several potential deficiencies were identified during the inspection dealing with the irradiator pool liner and components. The licensee will evaluate the potential deficiencies and coordinate the results of the evaluation along with any remedial actions with the NRC before loading licensed material.

3 Exit Meeting Summary

A preliminary site debriefing was held with the members of the fabrication staff at the conclusion of the CHL Systems inspection on August 17, 2011. A site debriefing was held with the licensee on April 26, 2012. A telephonic exit meeting was held with the licensee staff on May 31, 2012.

During the fabrication inspection, the irradiator drawings were identified as proprietary documents. The licensee did not identify any proprietary information provided to the inspector during the site inspection conducted April 20-26, 2012.

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSON CONTACTED

Licensee Personnel

M. Kohn, President, Pa'ina Hawaii, LLC
L. Wong, Pa'ina Hawaii, LLC

Contract Personnel

E. Demello, Construction Foreman, Emerald Isle
R. Durand, Hawaii Industrial Structures, Inc.
M. Fry, Welding Supervisor, CHL Systems
M. Fries, ASME Code Manager, CHL Systems
M. Stein, President GRAY*STAR, Inc.
R. Stein, Vice President, COO, GRAY*STAR, Inc.
J. Nyce, Manufacturing Project Manager, CHL Systems
R. Keiper, Project Engineer, CHL Systems

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

None

DOCUMENTS REVIEWED

Drawings:

POOLA-102-000, Revision 3; The Genesis II Irradiator Pool Assembly, Inner Wall Weldment
POOLA-103-000, Revision 4; The Genesis II Irradiator Pool Assembly, Outer Skin Weldment
POOLA-112-000, Revision 1; The Genesis II Irradiator Pool Assembly, Inner Skin Details
POOLA-111-000, Revision 1; The Genesis II Irradiator Pool Assembly, Inner Skin Details
POOLA-103-000, Revision 3; The Genesis II Irradiator Pool Assembly, Outer Wall Weldment

Procedures:

PO2 – ASME Dye Penetrant Certification Training, Revision 000
PO1 – ASME Dye Penetrant Inspection Procedure, Revision 000

LIST OF ACRONYMS

ASME	American Society of Mechanical Engineers
CoC	Certificate of Compliance
CHL	Clayton H. Landis Company, Inc.
psi	pounds per square inch