United States Department of the Interior

FISH AND WILDLIFE SERVICE

Hawaiian and Pacific Islands National Wildlife Refuge Complex
300 Ala Moana Blvd., Room 5-231
Box 50167
Honolulu, Hawaii 96850

July 11, 2011

Re: Response to Comments Submitted for the Engineering Evaluation/Cost Analysis (EE/CA) Report for the Midway Atoll National Wildlife Refuge (NWR)

Attn: Parties interested in lead-based paint at Midway Atoll NWR

The U.S. Fish and Wildlife Service (Service) prepared an EE/CA report in January 2011 to address lead contamination at Midway Atoll NWR. The EE/CA described alternatives under consideration for removal of lead-based paint from structures and lead-contaminated soil at Midway Atoll NWR.

We received comments from seven individuals regarding the EE/CA Report. Enclosed with this letter is the Service response to those comments. In an effort to minimize repetitive answers for similar questions, we have grouped comments (see attached) into similar categories. When a question did not fit into a general group, the specific question is addressed. Overall, each of the 5 comments addressing the proposed cleanup level for lead of 75 milligrams per kilograms (mg/kg) supported the proposal and no comments objected to the use of on-site disposal options or the hazard ranking assigned to each Decision Unit.

If you have additional questions regarding the EE/CA contact MaryAnn Amann, Service Project Manager @ 503-231-2346 or MaryAnn_Amann@fws.gov. We thank you for your continued involvement and support of the Midway Atoll NWR project and for taking the time to submit comments on the EE/CA.

Sincerely,

Donald Palawski

Donald Palawski
Acting Project Leader

Enclosure

TAKE PRIDE IN AMERICA

cc: Dr. Jessica Hardy Norris (ABC)
Barbara A. Maxfield
Anna Weinstein (Audubon CA)
Shaye Wolf, Ph.D. (CBD)
Gerald W. Winegrad
Pua Aiu (HI HPD)
Myra Finklestein, Ph.D. (UCSC)
Midway Atoll Administrative Record

FWS Response to Comments Submitted for the Engineering Evaluation/Cost Analysis (EE/CA) Report for the Midway Atoll National Wildlife Refuge (NWR)

PROPOSED REMOVAL ACTION TIME FRAME

Three respondents expressed a concern that a six-year implementation time frame is unacceptable. One respondent stated that the six-year cleanup timeline was reasonable. Two respondents felt that a two-year implementation timeframe should be considered.

The following is a portion of the responses that objected to the proposed timeline.

> "The proposed timeline for completion of the cleanup of six years or more is unacceptably long and will result in unneeded harm to Midway's wildlife..."

> "The six year phase of remediation is the major flaw in the EE/CA. After many years in delaying comprehensive remediation, DOI needs to act much more quickly to prevent the imminent and substantial threat to the public health and welfare these buildings and their surrounding soils present to wildlife and potentially human resources...."

> "The six year phase of remediation is one of my major concerns with the EE/CA. I understand the logistical constraints with respect to working on Midway Atoll as well as the short annual window during the non-breeding season make the prompt removal of lead-based paint and lead contaminated soil challenging, but all efforts should be made to expedite the removal process to prevent further lead-induced mortalities on Midway...."

A six-year implementation schedule is necessary due to three constraining factors.

First is the availability of funding. The proposed removal action is anticipated to be funded using Central Hazardous Materials funds. This funding source is not guaranteed from year to year. The FWS will be required to submit justification for funding of the project each fiscal year. The funding of the removal action in a single allocation is not feasible because it would eliminate a large portion of the funds available for other needed cleanups at FWS facilities. A six year implementation phase provides an annual budget that will most likely be acceptable under the Central Hazardous Material fund.

The second constraint is the limited construction window on Midway. Due to the presence of ground nesting birds, excavation, hauling and abatement activities must be completed during a short work window (~4 months). This limited construction window does not allow for the completion of the removal action in all Decision Units in 2 years, as proposed by two respondents.

The third constraint is lodging and infrastructure restrictions. The proposed alternatives include the use of as many as 17 contactors at one time, which will put a significant strain on the housing and infrastructure (meals, transportation, lodging, heavy equipment availability, sanitary systems, etc.) at Midway. Any effort to expedite the proposed alternatives by increasing the crew size will adversely affect the operations of Midway.

If additional funding is available and awarded, the FWS will make every effort to shorten the implementation of the removal action. FWS must also consider in its implementation schedule permitting requirements and the outcome of its consultation about historic structures at Midway.

USE OF GEOMEMBRANES/GEOTEXTILES

Five respondents expressed a concern about the use of geomembranes/geotextiles as an institutional control. The following is a portion of the responses that expressed concern over the use of geotextiles.

> "....and that the soil be removed to such a depth so as not to have to use a membrane in Units 1, 6, and 9. These membranes will deteriorate over time and will lead to eventual contamination of trust resources again....."

> "....all soils be removed around the Units until these levels are met and that geomembranes not be used. The geomembranes have a limited life-time, and using them will simply push the problem into the future, and waste the opportunity at-hand to solve the problem in a permanent way."

> "Will the geotextile membrane prevent birds from burrowing beneath the top 12 inches of clean soil? Will it deteriorate over time?"

> "We are concerned that the use of geomembranes will result in significant hazards to Midway's wildlife that do not outweigh the potential benefits. Geomembranes are proposed for use in Units 1, 6, and 9 as part of preferred alternative 3 and in all units as part of alternative 4....."

> "The use of geomembranes on Sand Island is concerning with respect to their structural integrity in a harsh environment and that any deterioration of the membrane could pose a risk to wildlife through entanglement as well as other unforeseen issues."

The FWS would like to clarify that geotextiles, not geomembranes, will be used. Within the EE/CA the terms geotextiles and geomembranes were incorrectly used interchangeably. A geotextile is a woven material that allows water to pass through. Geotextiles are not an impervious barrier and as such, will not cause a ponding or pooling of water. Geomembranes are relatively impermeable. We anticipate that any alternative that involves the use of an engineered barrier will use a geotextile.

Most of the concerns cited in responses are associated with geotextiles (or geomembranes) that are installed at the ground surface. When exposed to the sun and weather, geotextiles are known to degrade within 5 to 10 years. The proposed geotextiles in Decision Units 1, 6 and 9 will be installed below grade, where degradation is minimal. For clarification, geotextiles are not proposed to be used as surface barriers; at least three feet of clean fill will be placed on top of any geotextile. This will include two feet of clean fill to replace the soil that is removed and one additional foot of fill that will be sloped in a manner to minimize erosion and run-off concerns.

While we understand the concern of geotextiles and ultraviolet degradation, the use of geotextiles will be necessary to conduct the removal action in the most effective manner. The following summarizes the reasons why alternatives that use geotextiles are necessary:

- The excavation and management of all soils with lead at concentrations above the 75 mg/kg cleanup goal would generate more than 55,000 cubic yards (yd^3) of contaminated soil. This additional volume would cover an area the size of two football fields (300 feet by 300 feet) with over 15 feet of soil. The currently recommended alternative (using geotextiles in Operational Units 1, 6 and 9) generates only 28,000 yd^3 of soil. If full removal is completed, it would be necessary to construct an additional containment cell (similar to the R-2) unit. This would increase costs, implementation time and logistical challenges. Full removal in Decision Units 1, 6 and 9 could minimize or eliminate removal actions in other Units.
- The placement of 3 feet of clean fill provides more than adequate burrowing depth for Bonin Petrels. This includes the removal of 2 feet of contaminated soil and the placement of 3 feet of clean fill over the geotextile.
- The construction of a second containment cell and the additional removal of soil would potentially result in the loss of nesting habit.
- The geotextiles are going to be placed below at least 3 feet of clean sand. This clean sand will eliminate both chemical (ozone, oxidation, etc) breakdown and UV breakdown of the geotextiles.
- The life expectancy of a buried geotextile can be as great as 200 years. Additional documentation of geotextile life expectancies is included in Attachment B.
- The use of the clean soil (three feet) and the geotextiles eliminates the burrowing and ingestion exposure pathways. Bonin Petrels and Albatross are not expected to encounter soils with lead at concentrations greater than 75 mg/kg below 3 feet.
- Proper long term management will be required. The FWS will develop a long term operations and maintenance plan (O&M) plan to verify that clean fill over the geotextiles is maintained. Inspections will be required and preventative maintenance may be necessary. Long term management may also include the introduction of native plants to stabilize the soil covers and minimize deep rooting plants and/or trees in the vicinity of geotextiles. The implementation of these actions is more practical than full removal of soils with lead at concentrations greater than 75 mg/kg.
- Additional excavation would also mean additional disturbance to nesting birds.

Overall, geotextiles covered with clean fill will have a life expectancy of as great as 200 years, will not cause water to pond and, with the proper O&M, will provide protection to future exposure of deeper contaminated soils to ecological receptors. The FWS understands the need to address the environmental concerns caused by the lead based paint and does not plan to pass this requirement on to future stakeholders.

SOIL TESTING AND EXCAVATION

A number of concerns on the extent of the soil removal were identified. One of those concerns, the excavation of all soils with lead at concentrations greater than 75 mg/kg was addressed above. The following is a portion of the responses that expressed concerns over soil removal. We have divided our responses to this category into sub-sections.

Lead Testing at Distances and Depths from Structures

One commenter expressed a concern that the extent of contamination laterally from the buildings and at depth was not completely identified. The following is a portion of the response that expressed this concern.

> "The EE/CA does not provide a clear explanation for how the areas (distances from buildings and depths) proposed for soil removal were determined for each unit...."

Prior to the implementation of the removal action at Midway, the FWS will prepare a Removal Action Implementation Work Plan. The Removal Action Work Plan will detail the methods and procedures that will be used to implement the chosen alternatives. The Work Plan will also detail analytical testing frequencies and parameters. This will include additional lateral and vertical testing to identify the nature and extent of lead contamination in the vicinity of on-site structures.

During the EE/CA, systematic sampling was completed to identify the extent of contamination in an effort to identify and evaluate alternatives. The sampling conducted during the EE/CA was not designed to identify the full extent of contamination, rather to establish a baseline for preparing alternatives for the EE/CA. During the implementation of the chosen alternatives, additional fixed lab testing or field testing (x-ray fluorescence [XRF] Testing) will be conducted and documented to verify the extent of contamination near the structures. The analytical data gathered during the EE/CA will serve as a starting point for removal actions.

Testing of Proposed Backfill Material

One respondent noted:

> "The EE/CA did not ensure that the sand to be used to backfill excavated sites is free of harmful levels of contaminants...."

As previously mentioned, prior to the implementation of the removal action at Midway, the FWS will prepare a Removal Action Implementation Work Plan. The Removal Action Work Plan will detail the methods and procedures that will be used to complete the chosen alternatives. The Removal Action Work Plan will also detail analytical testing frequencies and parameters. This will include testing of the sand between the fuel and cargo pier for contaminants of interest (COI). If elevated concentrations of contaminants are identified, a different source of clean fill would need to be identified and the risk of the contaminants found will be addressed.

Testing for other COI for Disposal Requirements

One respondent noted:

> "The EE/CA must present a plan for disposal of the lead contaminated soil that is shipped off-island..... the soil samples were not tested for other contaminants of concern that might make it meet a "hazardous" designation... Accordingly, the EE/CA should present a plan for disposal of the lead contaminated soil that is shipped off-island since it may indeed be hazardous".

As noted above, the Removal Action Implementation Work Plan will define the requirements for additional analytical testing of the horizontal and lateral extent of contaminated soil and for waste disposal profiling purposes. Based on knowledge of the historical operations at Midway, the most likely contaminant in soils surrounding structures is lead due to the previous use of lead based paint. Based on limited analytical testing near structures in 2009, shallow soils may also include other heavy metals (barium and chromium), polychlorinated biphenyl's (PCBs) and pesticides (DDD, DDE, and DDT). Due to the low concentrations of

the these contaminants, it does not appear that toxicity Resource Conservation and Recovery Act (RCRA) codes would be applicable and due to the lack of generator or process specific requirements, RCRA P and U codes do not appear to be applicable. A copy of the 2009 analytical report is included in Attachment C.

The concentrations of the detected contaminants were below all applicable RCRA waste classifications. The excavation of lead contaminated soil will also remove soils that have potentially been impacted by other COI.

Prior to any on-site or off-site disposal, the FWS will complete analytical testing to satisfy waste characterization and identification requirements. These requirements will be detailed in the Removal Action Implementation Work Plan. Testing may include additional toxicity characteristic leaching procedures (TCLP) testing for RCRA 8 metals to evaluate RCRA D listing requirements, additional PCB testing to verify land disposal restrictions (LDRs) are met, and additional TCLP pesticide testing to verify the RCRA waste codes (specifically U codes) for DDE and DDD.

Soil Testing Within Fuel Farm Containment Berms

One respondent asked why testing was not conducted within the containment berms that surround the JP-5 tanks. Due to the presence of a spill containment liner and limited funding available during the EE/CA an assumption was made that all soil within the berms contains lead at concentrations above 75 mg/kg. During the implementation of the removal action in Decision Unit 8, confirmation soil sampling will be conducted to verify that the proposed cleanup goal is met.

USE OF ENCAPSULATION PAINT

Four comments were received over the use of encapsulation paint as part of the recommended alternatives. The following is a portion of the responses that expressed concern over the use of encapsulation paint.

> ".....The best solution is to remove all lead paint from the exterior of all structures. If it is not possible to take down buildings or where it is not feasible to remove all the lead, funds must be set aside and strict guidelines promulgated to assure that these buildings with lead paint remaining will have proper maintenance/encapsulation on a regular schedule."

> ".....Allowing such a large number of abandoned buildings to remain standing after remediation presents long-term problems and uncertainties that could jeopardize Midway's wildlife and personnel.... The EE/CA does not provide any evaluation of the structural integrity of the buildings, nor cost estimates of renovating, repairing, and maintaining the buildings...."

> "...If it is not plausible to remove all lead-based paint from specific buildings on Sand Island and encapsulation is needed to prevent lead contamination, funds should be set aside and strict guidelines set forth to assure that these buildings will have proper maintenance and encapsulation on a regular schedule. Without proper maintenance, the buildings with lead-based paint will become a future hazard for wildlife and human health on Sand Island...."

> "We are concerned with the encapsulation painting that has been used and that is proposed within the EE/CA. Encapsulation painting is a temporary fix for the problems of lead poisoning, and anywhere it has been employed or will be employed, there must be a long-term strategy in place to ensure that this problem is addressed over the long term. "

The FWS recognizes the use of lead encapsulation paint requires long-term inspection and maintenance. Due to presence of historical structures and other older buildings, full abatement of lead based paint is not practical. The FWS anticipates that lead based paint will be removed to the extent practical, using appropriate abatement techniques, but it is highly unlikely that all lead based paint can be removed from all structures or substrates. Full removal would likely include the replacement of numerous building features (fascia, siding, windows, eaves, etc.) In addition, it is likely that aggressive removal would damage existing structures at Midway. Additionally, some buildings at Midway siding or substrate contain asbestos. As such, mechanical removal is not an option.

The contractor chosen to implement the lead based paint abatement and subsequent painting of the structures with approved encapsulation paint will be required to follow industry standards. The Removal Action Implementation Work Plan will detail these requirements. One standard that may be referenced is the Housing and Urban Development (HUD) guidance for Lead Paint Safety, *A Field Guide for Painting, Home Maintenance and Renovation Work* or Chapter 12 and 13 of HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*, a copy of which can be found at http://www.hud.gov/offices/lead/lbp/hudguidelines/

These documents discuss the need to clean, scrape, sand and remove paint; the need to feather sanded edges, primer requirements and painting requirements. The Removal Action Implementation Work Plan will detail the paint requirements, which may include ASTM E1797-04, Standard Specification for Non-Reinforced Liquid Coating Encapsulation Products for Leaded Paint in Buildings and ASTM E1797-03, Standard Guide for Selection and Use of Liquid Coating Encapsulation Products for Leaded Paint in Buildings.

The long term maintenance of the encapsulation paint will require the preparation and implementation of a long term O&M plan. This plan will detail inspection procedures and frequency, maintenance requirements and schedules. If additional funding is available or other means of abatement are identified, additional lead abatement may be undertaken.

ADDRESSING LEAD ON INTERIOR STRUCTURES

One respondent expressed a concern over the presence of lead based paint on the interior of structures.

> ".....many of these buildings have lead-based paint on their interiors which is not addressed by the EE/CA. The EE/CA does not provide guidance on how this toxic interior paint will be maintained and prevented from spreading to the outside environment. Due to the unique circumstances on Sand Island, where buildings are crumbling such that the inside/outside distinction may be meaningless with respect to lead-based paint and no person other than the USFWS can respond in a timely way to this environmental emergency, the EE/CA should assume that the lead agency has authority to address this interior lead-based paint as well. In short, the EE/CA should provide a plan for the long-term maintenance of the buildings, including maintaining their structural integrity, the exterior lead encapsulation paint, and the interior lead-based paint."

At this time, structures at Midway other than those proposed for demolition are not in such crumbling condition that inside/outside distinction applies. For other structures, the management of interior lead based paint will be addressed as required under existing federal guidance's (such as HUD) for abatement of interior paint. The FWS recently renovated the interior of the officer quarters and these activities were completed in

accordance with HUD requirements. At this time, the threat of interior lead based paint contaminating surrounding soils is considered low.

DEMOLITION OF ADDITIONAL STRUCTURES

Four respondents commented on the fact that demolition and disposal of additional structures were not included. The following is a portion of the responses that commented on additional building demolition.

> "....The EE/CA proposes to remove only six buildings, which leaves ~65 buildings standing that are contaminated with lead-based paint—1 in Unit 1, 2 in Unit 3, 3 in Unit 4, 2 in Unit 5, 8 in Unit 6, 5 in Unit 7, and 44 in Unit 9—in addition to a number of ancillary structures (memorials, lift stations, electrical substations, flag poles, hydrants) that are covered with lead based paint. As explained in detail below, the best alternative for protecting Midway's resources is to remove all structures contaminated with lead-based paint that are not scheduled for use. However, the EE/CA fails to provide alternatives for removing these non-needed, contaminated structures....."

> "....We strongly encourage USFWS to take this opportunity to completely remove the crumbling structures on Midway, which pose risks to the safety of humans and wildlife. ..."

> "....Again, the ideal would be to remove all 59 of the structures that are not and will not be used by the U.S. FWS. This would be the preferred alternative....."

> "....The most protective solution would be to remove all of the structures that are not and will not be used by the U.S. FWS. This would be the preferred alternative....."

The FWS attempted to identify structures for demolition that had the highest potential for causing contamination of surrounding soils. As noted, only six buildings were evaluated for demolition. The primary reason for limiting the demolition option is implementation limitations and costs. In 2003, the FWS completed an Infrastructure Condition Assessment and Modification Report (referred to as the Right-Sizing Report). Appendix G of this Right-Sizing Report provided preliminary budgets for demolition of structures. The Right-Sizing Report concluded that total disposal costs would be approximately $21,220,000 over 5 years. This dollar estimate also included costs for pavement removal and above ground storage tank (AST) removal. Pavement removals are not part of this EE/CA and the costs associated with demolition of the ASTs were budgeted for in the EE/CA. If these numbers are backed out, the estimated cost for demolition is approximately $19,000,000. This estimate was based on 2003 dollars. Using the Consumer Price Index (CPI) conversion (0.858) for 2003 to 2010 dollars, the estimate in 2010 dollars is approximately $22,150,000. This value alone is nearly 2.4 times higher than the estimated cost for implementing the entire removal action proposed in the EE/CA. While full removal may provide additional environmental protection, it would require additional soil disturbance, a longer implementation schedule and a greater strain on Midway's current infrastructure.

The other reason that full demolition was not evaluated at this time is the, logistical challenges and timeframe requirements to handle the volume of debris that would be generated. Based on the 2003 Right-Sizing Report, approximately 675,000 square feet (ft^2) of buildings would be removed. Using the EPA's estimate on weight of construction and demolition (C&D) debris per square foot (158 lb/ft^2) full demolition would generate more than 53,325 tons of debris. Full demolition will generate more than 213,300 yd^3 of material using a conversion of 500 pounds per yd^3 of C&D debris. This material would need to be managed via encapsulation. For

reference purposes, this volume of material would fill a containment cell that was 800 feet long by 500 feet wide to a depth of 12 feet.

In addition, the Right-Sizing Report did not account for the stabilization of the C&D debris. The EE/CA recommends the use of a stabilization agent (Portland Cement or similar) to minimize future releases of excavated material or C&D debris. The solidification of a large volume of C&D debris (more than 213,000 cubic yards), would add costs and extend the project timeline.

The FWS may consider the removal of additional structures as the implementation of the chosen alternative is undertaken if additional funds become available, and methods are identified to minimize C&D debris and storage areas are identified and accepted. It is possible that after the removal of the proposed structures in Decision Units 1 and 2 (under the recommended alternatives), the selected contractor and the FWS may identify cost savings that allow for the demolition of additional structures.

DEMOLITION OF STRUCTURES IN UNITS 1 AND 2

The FWS received both comments in support and against the demolition of a number of the Cable Buildings and the Marine Barracks. Comments ranged from approval of the proposed demolition, to concerns over achieving approval for demolition, to opposition of demolition. In total, two respondents felt that demolition of the structures was potentially unacceptable due the historical status of the buildings, while four felt that demolition was of the upmost importance. The following is a portion of the responses that commented on demolition of historical structures.

Comments in Opposition

> "... it is highly unlikely you will obtain an approval from the Hawaii State Historic Preservation Division or the Advisory Council on Historic Preservation to demolish the historical Commercial Pacific Company building in Decision Unit 1 in time to address those structures during the summer/fall of 2011..... Alternative 7 for Decision Unit (1) was not seriously considered in your analysis..."

> "We believe the proposed demolition of buildings in Decision Areas 1 and 2 (except Building 643) would constitute and adverse effect to historic properties. As such your agency is required to consult under 35CRF800 (Section 106 consultation). Consultation will lead to a Memorandum of Agreement or a Programmatic Agreement stipulating the conditions under which the effect of your project can be avoided, minimized or mitigated. We suggest you consult with the Advisory Council on Historic Preservation on how to proceed with your 106 obligations...."

Comments in Support

> "....Leaving even the foundations create another problem for future management, as the foundations fall with time. We would applaud a decision to remove the cable company buildings in the first wave of effort, since they clearly pose the most severe problems...."

> "....Again, the ideal would be to remove all 59 of the structures that are not and will not be used by the U.S. FWS. This would be the preferred alternative. Absent that, DOI should act to immediately take down and remove the crumbling lead-contaminated buildings in Units 1 and 2. The old cable buildings are wooden structures more than 100 years old and have deteriorated badly. They should be the first to come down and the soil remediated around them as many albatrosses have been poisoned around them. These buildings currently are not of historic merit in their very poor deteriorated condition....."

"Unit 2 consist of the 70-year old Marine barrack buildings and these also have deteriorated badly and should be immediately taken down and removed....."

...."While I live in the historic city of Annapolis and am sensitive to historical concerns, the buildings in Units 1 and 2 are so badly deteriorated to have little historic merit and would cost many millions of dollars to rebuild. TEAR THEM DOWN NOW! ...."

"...The proposed removal of four historic buildings from Units 1 and 2 is necessary to protect wildlife and people. The four Cable Company buildings and two Marine barracks are in an irreparable state of decay (beyond renovation and repair) and pose ongoing, significant risks due to their toxic components (including lead and asbestos) and structural unsoundness. The lead soil concentrations surrounding these buildings were among the highest detected on Sand Island, including concentrations of 1,695 ppm near Cable Company Building 643 and 1,091 ppm near Marine Barrack Building 578—well above the recommended cleanup level of 75 ppm. Units 1 and 2 were identified as two of the three most hazardous units to wildlife, and these buildings should be prioritized for removal in 2011....."

"....The most protective solution would be to remove all of the structures that are not and will not be used by the U.S. FWS. This would be the preferred alternative. Absent that, DOI should act immediately to remove the crumbling lead-contaminated buildings in Units 1 and 2. In Unit 1 the abandoned cable company buildings are significantly deteriorated and it is my personal observation that they host the highest numbers of lead poisoned (droopwing) Laysan albatross chicks on Sand Island. Thus, I strongly agree with the EE/CA's recommendation to demolish the cable company buildings (with the exception of building 643) and that this demolition should be considered a high priority and completed as soon as possible. "

"It is also my personal observation that Unit 2 (the abandoned Marine barrack buildings) hosts very high numbers of lead poisoned (droopwing) Laysan albatross chicks. Additionally, I have observed an endangered Laysan duck foraging between the Marine barrack buildings during my visit to the island in 2006. Thus, I strongly agree with the EE/CA's recommendation to demolish the Marine barrack buildings and that this demolition should be considered a high priority and completed as soon as possible...."

The FWS understands that the demolition of site structures (particularly the Cable Buildings) will remove a piece of Midway History, but the structural conditions of the Cable Buildings (except Building 643) are beyond repair and pose a substantial risk to human and ecological receptors. The FWS will work with the Hawaii State Historic Preservation Division or the Advisory Council on Historic Preservation to address historic structures. The timeframe to complete this consultation and to complete a new, or modify the existing MOA, is undetermined and not entirely in FWS control. The FWS's goal is to complete the MOA in a timeframe that allows for Decision Unit 1 to be one of the first areas addressed during the implementation of the chosen alternative. If necessary, the FWS will delay or modify the proposed work in Decision Unit 1 as appropriate after consulting with the appropriate party.

LAYSAN DUCK STUDIES

The FWS received two comments suggesting that additional testing be conducted on the Laysan Duck. The following is a portion of the responses that commented on testing for the Laysan Duck.

> "The EE/CA notes that there are elevated lead blood levels for some Bonin Petrels and that no checks have been made on Laysan Ducks (ESA-Endangered) even though they have been seen around highly lead contaminated structures and soils. These studies need to be done."

> "Lead contamination has been tested in only two species on Midway: the Laysan albatross and the Bonin petrel to a lesser degree. Given that the Laysan duck is a federally endangered species that has been observed foraging near the contaminated buildings, the Laysan duck should also be tested to ensure that it is not being harmed by lead contamination. Certainly the USFWS and NOAA should measure baseline contamination levels for the Laysan duck before the lead remediation to compare with levels after remediation. In addition, the USFWS should conduct a contaminants analysis of the insect samples that were collected as part of the Ecological Risk Assessment but never analyzed. As acknowledged by the Ecological Risk Assessment, the Laysan duck is a potential receptor group because it consumes terrestrial insects and vegetation that may have accumulated high levels of soil-borne contaminants in their tissues..... The EE/CA itself acknowledges in Figure C-1 that Laysan duck is a receptor through exposure by contaminated soil ingestion."

The FWS understands that future testing of the Laysan Duck may be needed to determine if the Laysan Duck has been adversely affected by lead. The streamline risk evaluation (SRE) presented in the EE/CA correlated lead exposure in various avian species. The SRE determined that the use of a lead concentration protective of Albatross and the Bonin Petrel would be protective of the Laysan Duck. The Albatross and the Bonin Petrel act as an indicator species for the Laysan Duck.

The FWS will evaluate the need to conduct lead testing on the Laysan Duck, but we do not want to delay the removal action in order to complete testing or take actions that are unnecessarily intrusive to the Laysan Duck. It may be possible for the FWS to conduct lead in blood tests during future Laysan Duck studies.

SIZE OF THE CONSTRUCTION CREW

One comment was received regarding the potential waiver on the number of staff necessary to complete the proposed alternatives.

> "After participating in intense negotiations with our partner agencies over the number of personnel allowed on Midway at any one time "obtaining a waiver on the Papahanaumokuakea Marine National Monument existing management plan for Midway to allow for additional personnel" may be more difficult than presented in this analysis."

The FWS understands that obtaining a waiver for certain aspects of the recommended alternatives will require close consultation with a number of regulatory agencies and personnel. The FWS is committed to obtaining the necessary waivers to complete the proposed removal actions.

USE OF ONSITE INCINERATOR FOR TREATMENT OF CONTAMINATED SOIL

One respondent asked if the FWS thought to utilize the on-site incinerator for treatment of the contaminated soil. The on-site incinerator was designed to burn used oil and manage limited solid waste or ecological waste (bird carcasses). The chamber capacity on the incinerator is less than 0.5 yd^3 and was not designed for handling bulk debris, such as soil. Due to size constraint and burner temperatures, the use of the small incinerator is not practical or feasible.

REFERENCES

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Environmental Protection Agency (EPA), Estimating 2003, Building-Related, Construction and Demolition Materials Amounts.

Housing and Urban Development (HUD), A Field Guide for Painting, Home Maintenance and Renovation Work or Chapter 12 and 13 of HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing. March 2001.

ASTM, ASTM E1797-04, Standard Specification for Non-Reinforced Liquid Coating Encapsulation Products for Leaded Paint in Buildings.

ASTM, ASTM E1797-03, Standard Guide for Selection and Use of Liquid Coating Encapsulation Products for Leaded Paint in Buildings.

Oregon State University. The 2010 conversion factor revision.
http://oregonstate.edu/cla/polisci/sahr/sahr

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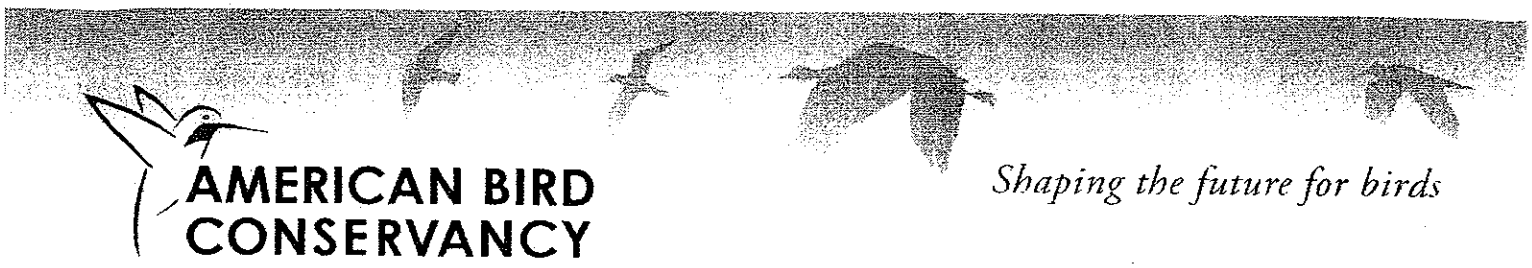
ATTACHMENT A
Comments Received



AMERICAN BIRD CONSERVANCY

Shaping the future for birds

February 15, 2011

Mr. Carlton Morris, FWS Project Manager
U.S. Fish and Wildlife Service, Division of Engineering
911 NE 11th Avenue
Portland, Oregon 97232

Re: Engineering Evaluation/Cost Analysis (EE/CA) for Removal of Lead-based Paint from Structures and Lead-contaminated Soil from Midway Atoll National Wildlife Refuge

Dear Mr. Morris:

The American Bird Conservancy (ABC) wishes to commend Midway Atoll National Wildlife Refuge on its progress in removing lead-based paint from the aging buildings there, and particularly for completing the EE/CA, which lays out options for ridding the refuge of this problem once and for all.

ABC has been encouraging the Refuge to take swift action on this issue for a decade, and we are eager to see its resolution. In our reviewing of the EE/CA, we wished to highlight three things as particularly important.

1) First, we would like to express our satisfaction with the proposed cleanup level of 75 mg/kg for lead in soil (Appendix C, Streamlined Risk Evaluation in Midway EE/CA Report). This level should provide a safe environment for the humans and wildlife on the island. However, it is important that all soils be removed around the Units until these levels are met and that geomembranes not be used. The geomembranes have a limited life-time, and using them will simply push the problem into the future, and waste the opportunity at-hand to solve the problem in a permanent way.
2) We are concerned with the encapsulation painting that has been used and that is proposed within the EE/CA. Encapsulation painting is a temporary fix for the problems of lead poisoning, and anywhere it has been employed or will be employed, there must be a long-term strategy in place to ensure that this problem is addressed over the long term.
3) We strongly encourage USFWS to take this opportunity to completely remove the crumbling structures on Midway, which pose risks to the safety of humans and wildlife. Leaving even the foundations creates another problem for future management, as the foundations fall with time. We would applaud a decision to remove the cable company buildings in the first wave of effort, since they clearly pose the most severe problems. ABC would like to express our willingness to assist with outreach to stakeholders and the Historic Preservation Office in any way possible.

Respectfully,

Dr. Jessica Hardesty Norris
Seabird Program Director
jhardesty@abcbirds.org

1098 Hoa Street
Honolulu, Hawaii 96825-3511

February 14, 2011

Carlton Morris, FWS Project Manager
U.S. Fish and Wildlife Service
Division of Engineering
911 N.E. 11th Avenue
Portland, Oregon 97232

Dear Carlton Mr. Morris:

Thank you for the opportunity to review and comment upon the Engineering Evaluation/Cost Analysis for the cleanup of lead-based paint at Midway Atoll National Wildlife Refuge. I do not submit these comments as an expert in either engineering or contaminants; however, they do come from my long-term and deeply felt concern for the protection of the unique historic resources found at Midway Atoll. I share the Fish and Wildlife Service's passion for the atoll's significant wildlife resources as well and commend FWS for its efforts to deal with this issue over the past many years. Finding a new source of project funding through the Comprehensive Environmental Restoration, Compensation, and Liability Act is also highly commendable. However, from the first page of the Executive Summary throughout the entire report, it is clear that your objectives only considered the ecological health of the atoll and that protection of historical resources as required by law and numerous legal agreements and plans was considered only after the fact.

The FWS news release regarding this report seeks comments on three areas of the analysis. I do not have the expertise to comment on the proposed clean-up level of 75 ppm for lead in the soil and will support your findings.

Regarding the schedule and cleanup priorities, it is highly unlikely you will obtain any approval from the Hawaii State Historic Preservation Division or the Advisory Council on Historic Preservation to demolish the historic Commercial Pacific Cable Company buildings in Decision Unit 1 in time to address those structures during the summer/fall of 2011. If indeed these buildings must be addressed first, Alternative 7 is most likely the only implementable course of action.

That comment leads to my primary concern: Alternative 7 for Decision Unit 1 was not seriously considered in your analysis. I find it difficult to believe that it would be any less safe for workers to dismantle hazardous portions of the Cable Company buildings and leave the concrete cores and foundations than it would be to bulldoze the structures. If that were the case, why would FWS have proposed, and the State Historic Preservation Division approved, the current plan outlined in the 2009 Memorandum of Agreement? If hand scraping and chemical strippers are acceptable treatments on Building 643, why would they not also be acceptable for the other structures, especially if all that remains are the concrete cores and foundations?

The analysis also cites the possibility of "entrainment of lead in soil under the foundations of the Cable Buildings due to burrowing birds." I suggest this possibility exists under many other buildings scheduled to be treated but not demolished in the report. Surely some method of preventing further access under these foundations can be devised, as must be proposed for Building 643.

The final paragraph under Alternative 7 on page 38 acknowledges that "Mechanized removal of soils from around the Cable Buildings may have an adverse effect on the National Register Cable Station property which may contain buried archeological deposits." That statement applies to all identified alternatives (except Alternative 1) for the Decision Unit. Archaeological testing should be employed under any of these alternatives and is a further reason it is unlikely Decision Unit 1 can be treated later this year.

I also note no cost estimate was developed for Decision Unit 1, Alternative 7 (page 62), though you managed to rate it in Table 9. Although more person-hours would undoubtedly be needed to hand scrape and strip the concrete cores and foundations, you may find volunteers willing to take on the task, or find alternative sources of funding to preserve at least part of these historically significant structures. FWS consistently finds volunteers to count albatrosses (including in this part of Sand Island) every year, and Oceanic Society has brought volunteers to Midway for historic preservation projects in the past. It would be worth at least a try to find a group to help.

A few other miscellaneous comments regarding this analysis:

- Page 18: why were no soil samples taken around the aboveground storage tanks? I assume the tanks must have been painted with lead-based paint, but it would be appropriate to explain the rationale for the assumption.
- Page 29 and elsewhere: will the geotextile membrane prevent birds from burrowing beneath the top 12 inches of clean soil? Will it deteriorate over time?
- Page 36: if 1 foot of contaminated soil is to be removed around the Cable Buildings and 3 feet of clean soil is to be placed on top of the excavation, how will the structures be protected from runoff during major rainstorms? Will they become the new low points in the compound?
- Page 61: after participating in intense negotiations with our partner agencies over the number of personnel allowed on Midway at any one time, "obtain[ing] a waiver on the FWS [should be Papahanaumokuakea Marine National Monument] existing management plan for Midway to allow for additional personnel" may be more difficult than presented in this analysis.

Again, I appreciate the opportunity to submit these comments. I realize the limitations FWS faces in managing its cultural and historic resources with no appropriated funding, but I am deeply saddened when I see how the Commercial Pacific Cable Company buildings have deteriorated in the 16 years since the agency assumed responsibility for Midway Atoll. The buildings managed to survive for more than 100 years; the least we should do is make every effort to preserve what little remains.

Sincerely,

Barbara A. Maxfield

Barbara A. Maxfield

cc: Tom Edgerton, FWS Superintendent, Papahanaumokuakea Marine National Monument

Audubon CALIFORNIA

February 22, 2011

Mr. Carlton Morris, FWS Project Manager

U.S. Fish and Wildlife Service, Division of Engineering

911 NE 11th Avenue

Portland, Oregon 97232

Re: Engineering Evaluation/Cost Analysis (EE/CA) for Removal of Lead-based Paint from Structures and Lead-contaminated Soil from Midway Atoll National Wildlife Refuge

Dear Mr. Morris:

We apologize for the tardy submission and respectfully request that you accept this brief comment past the deadline.

Audubon California congratulates Midway Atoll National Wildlife Refuge on its progress in removing lead-based paint from buildings, which are limiting the recovery of Black-footed albatrosses and possibly other wildlife, and creating an unacceptable human health hazard.

We concur that 75 mg/kg for lead in soil would provide a safe environment for the humans and wildlife on the island. Furthermore, we urge the Service to actually remove the soils around these buildings and not use geomembranes or encapsulation painting, which are temporary fixes and will not address the problem over the long term.

Finally, we strongly encourage USFWS to completely remove the crumbling structures on Midway, which pose risks to the safety of humans and wildlife. We suggest first removing the cable company buildings, as their condition is most unstable.

In sum, Audubon California looks forward to continuing to track FWS progress on remediating lead toxicity and other outstanding issues related to old buildings on the Refuge.

Respectfully,

Anna Weinstein

Seabird Program Manager

CENTER *for* BIOLOGICAL DIVERSITY

February 18, 2011

Comments sent via email to carlton_morris@fws.gov

Mr. Carlton Morris, FWS Project Manager
U.S. Fish and Wildlife Service, Division of Engineering
911 NE 11th Avenue
Portland, Oregon 97232
Email: carlton_morris@fws.gov

Re: Engineering Evaluation/Cost Analysis (EE/CA) for Removal of Lead-based Paint from Structures and Lead-contaminated Soil from Midway Atoll National Wildlife Refuge

Dear Mr. Morris,

These comments on the Engineering Evaluation/Cost Analysis (EE/CA) for Removal of Lead-based Paint from Structures and Lead-contaminated Soil from Midway Atoll National Wildlife Refuge are submitted on behalf of the Center for Biological Diversity ("Center"). The Center is a non-profit, public interest environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. The Center has over 320,000 members and online activists throughout the United States and internationally who are vitally concerned about and actively involved in the protection of Hawaiian species and their habitats.

The Center is deeply concerned with the ongoing harm to wildlife on Midway Atoll National Wildlife Refuge from lead-based paint contamination, including the lethal poisoning of up to 10,000 Laysan albatross chicks each year from ingestion of lead-based paint and the exposure of other protected species to lead contamination, including the Bonin petrel and endangered Laysan duck. The immediate removal of lead-based paint from all contaminated structures and the removal of lead-contaminated soil from Midway Atoll, beginning in 2011, are necessary to reduce unneeded harm to Midway's wildlife and prevent continuing violations of the Migratory Bird Treaty Act and Endangered Species Act.

We support several of the cleanup goals outlined in the EE/CA including (1) the proposed cleanup level of 75 mg/kg for lead in soil; (2) the start date for the cleanup of 2011; and (3) removal of historic buildings in Decision Units 1 and 2. However, we have several concerns about the proposed alternatives, including the (1) unacceptably long timeline for cleanup; (2) the failure to evaluate the removal of ~65 lead-contaminated buildings, many of which are not scheduled for use; (3) the failure to remove lead-contaminated soil at the appropriate distance

and depth in each Decision Unit; and (4) the use of geomembranes in place of more comprehensive removal of lead-contaminated soil.

We would support an alternative for each Decision Unit that includes the removal of lead-contaminated buildings and structures not scheduled for use, the removal of lead-contaminated soil at the appropriate distances and depths, and which completes the cleanup in two years.

These comments provide a brief background on the Center's concerns regarding the ongoing harm to Midway's wildlife from lead-based paint contamination, and detailed comments on the EE/CA alternatives beginning with the three issues of particular interest to the USFWS (i.e. proposed cleanup level, schedule, and removal of historic buildings).

I. Background on the Center's concerns regarding ongoing harm to Midway's wildlife from lead-based paint contamination

In February 2010, the Center sent a notice of intent to sue the Secretary of Commerce and the National Oceanic and Atmospheric Administration (collectively "NOAA"), the Secretary of Interior and the Fish and Wildlife Service (collectively "USFWS"), and the State of Hawai'i Department of Land and Natural Resources ("State of Hawai'i") for violations of the Migratory Bird Treaty Act ("MBTA"), the Endangered Species Act ("ESA"), and the Resource Conservation and Recovery Act ("RCRA") relating to lead-based paint and other waste on Midway Atoll. In January 2011, the Center sent a notice of intent to sue the Navy for the same violations.

As detailed in the Center's notice letter, USFWS, NOAA, the State of Hawai'i, and the Navy are violating the MBTA by allowing the lethal and sub-lethal lead poisoning of Laysan albatross, a species which is included in the list of migratory birds protected by the MBTA. The lead-caused mortality of Laysan albatross chicks on Sand Island has been documented since at least 1982 (Sileo and Fefer 1987) when Midway was under the custody of the Navy. The lead-poisoning of chicks continued after Midway was transferred to the Department of the Interior in 1996 and after Midway became part of the Papahānaumokuākea Marine National Monument in 2006 under management of the USFWS and NOAA in coordination with the State of Hawai'i.

Laysan albatross chicks within five meters of buildings on Sand Island had average blood lead values of 440 µg/dL, compared to an average blood lead of 6 µg/dL in chicks nesting greater than 100 meters from buildings (Finkelstein et al. 2003). Lead-poisoned chicks on Sand Island have 440 times the background blood lead level and 44 times the Centers for Disease Control's blood lead level of concern for children (10 µg/dL) (CDC 1991). Blood lead values greater than 100 µg/dL have been shown to cause encephalopathy and death in both humans and animals (National Research Council 1993). A substantial proportion of Laysan albatross chicks nesting in proximity of buildings/structures exhibit clinical signs of lead poisoning—peripheral neuropathy referred to as "droopwing." Droopwing manifests in the chicks' inability to raise their wings, which commonly drag on the ground resulting in broken bones and open sores. Chicks with droopwing will never be able to fly, and will die either directly as a result of lead poisoning, or,

if they manage to survive to fledging age, from starvation at the end of the breeding season when their parents stop feeding them.

Recent research indicates that lead poisoning is having negative population-level effects on the Laysan albatross. Finkelstein et al. (2009) estimated that up to 7% of Laysan albatross chicks on Sand Island, equal to ~10,000 chicks in 2007, fail to fledge as a result of lead poisoning from ingestion of lead-based paint. The lead-poisoning deaths of 7% of chicks on Sand Island each year was projected to create a 16% reduction in the Laysan albatross population size at 50 years into the future. Furthermore, models found that at the current rate of lead-induced chick mortality, lead poisoning would be responsible for a decrease in the Laysan albatross population size by ~100,000 to 360,000 birds in 50 years (Finkelstein et al. 2009).

As detailed in the Center's notice letter, the failure by USFWS, NOAA, the State of Hawai'i and the Navy to remediate lead-based paint from all buildings and contaminated soil on Sand Island also jeopardizes the survival and recovery of the Laysan duck and may constitute take under the Endangered Species Act. NOAA has provided examples of habitat-modifying activities that may harm a listed species and thereby constitute a take under the ESA. 64 Fed. Reg. 60727, 60730 (Nov. 8, 1999). These examples include contaminating a listed species' habitat with pollutants and "poisoning, or contaminating plants, fish, wildlife, or other biota required by the listed species for feeding, sheltering, or other essential behavioral patterns." Id. Based on studies of the effects of lead on Sand Island bird species and the presence of the federally endangered Laysan duck on Sand Island, it can be inferred that the failure to remediate lead-based paint contamination on Sand Island is causing the take of the Laysan duck, and that the probability of take will increase as the Laysan duck population on Sand Island grows. As detailed above, the Laysan duck is susceptible to lethal and sub-lethal lead poisoning on Sand Island because: (a) the Laysan duck uses areas surrounding lead-contaminated buildings; (b) the Laysan duck's behaviors involve probing soil that has a high likelihood of lead contamination and foraging for plants and insects which place it at risk of inadvertently ingesting paint chips; and (c) ducks can be poisoned by the ingestion of a small paint chip (~0.1 grams). Thus it is likely that unauthorized take of Laysan ducks is occurring on Sand Island in violation of the ESA. Of added concern, this year a short-tailed albatross pair successfully nested on Midway, and a future breeding population of this federally endangered species could be exposed to lead poisoning and deaths of chicks similar to the Laysan albatross

II. Comments on the EE/CA

We support the proposed cleanup level of 75 mg/kg for lead in soil, the start date for the cleanup of 2011, and the removal of historic buildings in Units 1 and 2. However, we do not support the long timeline for cleanup, the failure to propose removal of contaminated buildings not planned for use, the failure to excavate the lead-contaminated soil to the appropriate depths and distances, and the use of geomembranes in place of comprehensive soil removal. An alternative that completes cleanup in two years, removes non-needed contaminated buildings, and removes lead-contaminated soil to the appropriate distances and depths would provide the best and most cost-effective solution to protecting Midway's wildlife.

A. The proposed cleanup level for lead in soil appears to be appropriate.

The proposed cleanup level of 75 mg/kg (75 ppm) for lead in soil appears to be appropriate based on the analyses described in the EE/CA Appendix C, the clean-up level for lead in soil recommended in the USFWS's *Ecological Risk Assessment for Lead in Soil and Laysan Albatross Chicks on Sand Island*, and conversations with toxicologists. This preliminary cleanup goal was developed to be protective of the Bonin petrel, but the agencies must ensure that this level will be protective of other wildlife species on Midway, including the Laysan albatross and Laysan duck.

B. The proposed timeline for cleanup is unacceptably long.

The proposed timeline for completion of the cleanup of six years or more is unacceptably long and will result in unneeded harm to Midway's wildlife. This timeline will result in the increased spread of lead-contaminated paint across the island, cause unneeded deaths of Laysan albatross chicks and potentially other species, and continue violations of the Migratory Bird Treaty Act and Endangered Species Act. Structures on Midway Atoll are subject to extreme weathering processes, and the deterioration of non-remediated structures with lead-based paint is increasing over time. Each year that the cleanup is delayed, more lead-based paint peels from the non-remediated structures and spreads across the island, increasing the potential for poisoning wildlife and increasing the difficulty and cost of the cleanup. Given the time-sensitive nature of the cleanup, the removal of lead-based paint from structures and lead-contaminated soil should be expedited. The EE/CA provides no substantive rationale for why a shorter timeline is not possible.

A timeline of two years would provide a more reasonable alternative that is appropriately protective of Midway's wildlife, with work beginning in the fall of 2011 and completed in fall of 2012. The cleanup of the units that are most hazardous to wildlife, identified as Units 1, 2, and 6, should be prioritized for 2011. The remaining cleanup should be accomplished in 2012.

C. The removal of historic buildings in Decision Units 1 and 2 is necessary.

The proposed removal of four historic buildings from Units 1 and 2 is necessary to protect wildlife and people. The four Cable Company buildings and two Marine barracks are in an irreparable state of decay (beyond renovation and repair) and pose ongoing, significant risks due to their toxic components (including lead and asbestos) and structural unsoundness. The lead soil concentrations surrounding these buildings were among the highest detected on Sand Island, including concentrations of 1,695 ppm near Cable Company Building 643 and 1,091 ppm near Marine Barrack Building 578—well above the recommended cleanup level of 75 ppm. Units 1 and 2 were identified as two of the three most hazardous units to wildlife, and these buildings should be prioritized for removal in 2011.

D. The proposed alternatives do not provide options for removing buildings from most of the units, which is the best alternative for protecting Midway's resources and personnel.

The EE/CA proposes to remove only six buildings, which leaves ~65 buildings standing that are contaminated with lead-based paint—1 in Unit 1, 2 in Unit 3, 3 in Unit 4, 2 in Unit 5, 8

in Unit 6, 5 in Unit 7, and 44 in Unit 9—in addition to a number of ancillary structures (memorials, lift stations, electrical substations, flag poles, hydrants) that are covered with lead-based paint. As explained in detail below, the best alternative for protecting Midway's resources is to remove all structures contaminated with lead-based paint that are not scheduled for use. However, the EE/CA fails to provide alternatives for removing these non-needed, contaminated structures. The EE/CA dismisses its failure to provide alternatives for the demolition of the lead-based structures with a single statement on page 33 that cites the impracticality of costs: "While demolition may be practical for a number of additional structures, previous cost estimates (GeoEngineers, 2003 and FWS, 2004) have indicated that large scale demolition is currently impractical due to costs." This cursory dismissal is inadequate. An examination of the cited FWS (2004) references, which were not included in the administrative record and not available for public inspection, reveals that these USFWS reports do not provide cost estimates for removing additional buildings. The GeoEngineers (2003) report, which was not included in the EE/CA bibliography or administrative record, highlights the decaying and unsafe state of the infrastructure on the Refuge which will only worsen over time given the harsh marine environment, and gives a cost estimate for demolition of a subset of inhabited structures and equipment storage structures. According to this report, demolition of 19 inhabited structures totaling 515,700 ft^2, including removal and disposal of asbestos, was estimated at $11,345,400, while demolition of 54 equipment storage structures totaling 41,075 ft^2 was estimated at $492,900. Neither of these estimates demonstrates that the cost of removing non-needed buildings is impractical, especially when weighed against the ongoing costs of maintenance and repair for these abandoned structures. The failure to provide alternatives including removing more buildings, or even all buildings, is a fundamental flaw in the EE/CA.

E. The EE/CA must provide a plan for the long-term maintenance for all buildings left standing, including the maintenance of their structural integrity, the exterior lead encapsulation coatings, and the interior lead-based paint.

The EE/CA proposed alternatives allow a minimum of ~65 lead-coated buildings to remain standing after remediation, most of which have no planned use. An additional 25 buildings that have already been remediated will also remain. Allowing such a large number of abandoned buildings to remain standing after remediation presents long-term problems and uncertainties that could jeopardize Midway's wildlife and personnel. First, the lead encapsulation paint applied to each building during remediation must be regularly and rigorously maintained since all of the lead-based paint will not be removed during the remediation process. Because Midway's structures are exposed to harsh weathering processes, this maintenance will require re-painting, and perhaps re-scraping, of exteriors on a regular schedule. However, the EE/CA does not provide any plan for or acknowledge the need for long-term maintenance of the lead encapsulation coating. Second, Midway's buildings are decaying over time and will need to be structurally maintained and re-enforced to prevent their collapse. The EE/CA does not provide any evaluation of the structural integrity of the buildings, nor cost estimates of renovating, repairing, and maintaining the buildings. Third, many of these buildings have lead-based paint on their interiors which is not addressed by the EE/CA.[1] The EE/CA does not provide guidance on

[1] The EE/CA states that "CERCLA generally limits the lead agencies [sic] authority to respond to LBP inside a structure." EE/CA at 32. The cited law provides an exception to this limitation, however, in that "the President may respond to any release or threat of release if in the President's discretion, it constitutes a public health or

how this toxic interior paint will be maintained and prevented from spreading to the outside environment. Due to the unique circumstances on Sand Island, where buildings are crumbling such that the inside/outside distinction may be meaningless with respect to lead-based paint and no person other than the USFWS can respond in a timely way to this environmental emergency, the EE/CA should assume that the lead agency has authority to address this interior lead-based paint as well.[2] In short, the EE/CA should provide a plan for the long-term maintenance of the buildings, including maintaining their structural integrity, the exterior lead encapsulation paint, and the interior lead-based paint.

F. Lead-contaminated soil must be removed to the appropriate distance and depth in each unit.

The EE/CA does not provide a clear explanation for how the areas (distances from buildings and depths) proposed for soil removal were determined for each unit. For all units, it appears that the proposed cleanup distances and depths are not sufficient to remove the lead-contaminated soil based on the findings of the soil samples. The soil samples indicate that lead contamination is patchy in distribution, and that high lead levels exceeding the cleanup limit are found both near and far from buildings and at shallow to deep depths. For example, soil sampling from Units 1, 3, 4, 5, 6, and 7 indicates that lead at concentrations above the clean-up level were found at distances up to 30 to 45 feet (the maximum sampling distance) from the building perimeters in all of these units and at depths of 24-28 inches or 30-36 inches (the maximum sampling depth) at these 30-45 foot distances. Because highly contaminated soil was found at the maximum distances and depths sampled, it is quite possible that high lead levels extend beyond these distances and depths, and that soil should be removed beyond them. At a minimum, the soil sampling data indicate that excavation of contaminated soil should occur to at least 45 feet from the building perimeters and at least to 3 feet deep in all units.

We are concerned that the recommended areas (distance and depth) for soil removal in the nine units are significantly smaller than what is indicated by the soil sampling. As outlined below, the removal distances for the preferred alternative 3 range from 15 to 50 feet and from 1 to 3 feet deep instead of the minimum of 45 feet from building perimeters and 3 feet deep indicated by the soil sample analyses:

Preferred Alternative Recommendations:
Unit 1: up to 50 feet from the sides of buildings to 1 foot deep
Unit 2: 30 feet from the sides of buildings to 2 feet deep
Unit 3: 15 feet from the sides of buildings to 1 foot deep
Unit 4: 20 feet from the sides of buildings to 3 feet deep
Unit 5: 15 feet from the sides of most buildings to 1 foot deep
Unit 6: up to 50 feet from the sides of buildings to 1 foot deep
Unit 7: does not specify distance and depth of soil excavation
Unit 8: does not specify distance and depth of soil excavation

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environmental emergency and no other person with the authority and capability to respond to the emergency will do so in a timely manner." 42 U.S.C. 9604(a)(4); *see also* U.S. Environmental Protection Agency, *Response Actions at Sites with Contamination Inside Buildings* (1993), *available at* http://www.epa.gov/fedfac/documents/epa893.htm.

[2] *Id.*

Unit 9: does not specify distance and depth of soil excavation

G. Geomembranes should not be used.

We are concerned that the use of geomembranes will result in significant hazards to Midway's wildlife that do not outweigh the potential benefits. Geomembranes are proposed for use in Units 1, 6, and 9 as part of preferred alternative 3 and in all units as part of alternative 4. For Units 1, 6, and 9, the EE/CA preferred alternative recommends laying down a geomembrane after excavating one foot of soil, rather than removing lead-contaminated soil to the appropriate depth (i.e. at least 3 feet). For all units, alternative 4 recommends placing a geomembrane on the surface instead of removing any lead-contaminated soil. The use of geomembranes poses several substantial hazards that will likely undermine the long-term integrity of the lead cleanup: (1) geomembranes must be replaced after several decades and thus do not provide a long-term solution to containing lead-contaminated soil; (2) geomembranes may not last as long as anticipated based on harsh island weathering processes; (3) geomembranes may create water drainage problems in the island's sandy soils leading to runoff and erosion hazards; and (4) geomembranes will exclude burrowing seabirds like the Bonin petrel from nesting in these areas given that the birds will not be able to penetrate the membranes and the proposed soil depths above the geomembrane (i.e. 1 to 3 feet) are too shallow for the birds to construct stable burrows. The lead-contaminated soil should be excavated to the appropriate depth (i.e. at least 3 feet) around each building instead of using the geomembranes.

H. The Laysan duck should be tested for lead contamination.

Lead contamination has been tested in only two species on Midway: the Laysan albatross and the Bonin petrel to a lesser degree. Given that the Laysan duck is a federally endangered species that has been observed foraging near the contaminated buildings, the Laysan duck should also be tested to ensure that it is not being harmed by lead contamination. Certainly the USFWS and NOAA should measure baseline contamination levels for the Laysan duck before the lead remediation to compare with levels after remediation. In addition, the USFWS should conduct a contaminants analysis of the insect samples that were collected as part of the *Ecological Risk Assessment* but never analyzed. As acknowledged by the *Ecological Risk Assessment*, the Laysan duck is a potential receptor group because it consumes terrestrial insects and vegetation that may have accumulated high levels of soil-borne contaminants in their tissues:

> Three potential receptor groups that occur on the island include: (1) piscivorous species that obtain food form offshore sources, but whose chicks exhibit oral nest building behaviors that lead to incidentally ingestion of lead contaminated paint chips and possibly soil particles through preening; (2) piscivorous species that nest in burrows which can lead to high levels of contact with and incidental ingestion of contaminated soil; and, (3) omnivorous ground-feeding species (e.g., Laysan duck) that consume terrestrial insects and vegetation that may have accumulated high levels of soil-borne contaminants in their tissues. (p.11)

The EE/CA itself acknowledges in Figure C-1 that Laysan duck is a receptor through exposure by contaminated soil ingestion.

I. Clean sand should be used in the backfill of excavated areas.

The EE/CA does not ensure that the sand to be used to backfill excavated sites is free of harmful levels of contaminants. The EE/CA states that areas where contaminated sand is removed will be backfilled with "clean" sand taken from an area between the fuel pier and the cargo pier. Sand from this site should be tested for lead and other contaminants of concern to ensure that this is truly "clean" sand that will not introduce harmful contaminants into the remediated areas.

J. The EE/CA must present a plan for disposal of the lead-contaminated soil that is shipped off-island.

The EE/CA determined that the lead-contaminated soil on Sand Island is "non-hazardous" based on leachable lead levels. However, the soil samples were not tested for other contaminants of concern that might make it meet a "hazardous" designation. Indeed, the EE/CA raises cause for concern that Midway's soil may contain hazardous levels of other contaminants. Of 14 soil locations analyzed for arsenic, chromium, lead and mercury and 5 analyzed for seven analytes of PCBs, one soil sample location had significant contamination with elevated levels of lead, mercury, and PCBs. Accordingly, the EE/CA should present a plan for disposal of the lead-contaminated soil that is shipped off-island since it may indeed be hazardous.

III. Conclusion

Thank you for the opportunity to submit these comments. The Center is pleased that the USFWS is finally addressing these issues and hopes that the final alternative selected is the best possible for Midway Atoll's wildlife. A major hurdle in implementing the selected alternative will be funding the removal action. The Center urges USFWS to aggressively pursue funds to complete the removal action through a variety of means, including but not limited to the Central Hazardous Materials Fund, specific congressional budget requests, and contributions from other responsible agencies such as those listed in the Center's notice letter. The legal and environmental risks grow significantly as the USFWS delays the lead-based paint removal action.

Please contact me with any questions regarding these comments.

Sincerely,

Shaye Wolf

Shaye Wolf, Ph.D.
Center for Biological Diversity
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GERALD W. WINEGRAD
1328 Washington Drive
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February 15, 2011

Mr. Carlton Morris, FWS Project Manager
U.S. Fish and Wildlife Service, Division of Engineering
911 NE 11th Avenue
Portland, Oregon 97232

Re: Engineering Evaluation/Cost Analysis (EE/CA) for Removal of Lead-based Paint from Structures and Lead-contaminated Soil from Midway Atoll National Wildlife Refuge

Dear Mr. Morris:

These comments are submitted on the above captioned matter in hopes that they will help expedite the long-overdue removal of lead paint from Sand Island at Midway Atoll National Wildlife Refuge, part of Papahānaumokuākea Marine National Monument. I commend DOI on finally mapping out a robust game plan to resolve this threat to albatrosses and petrels and potentially to the endangered Laysan Duck, but would urge a much prompter completion of the remediation.

INTRODUCTION.

By way of introduction, I am an attorney and a Professor of Public Policy at the University of Maryland where I teach graduate courses in wildlife management and Chesapeake Bay restoration that I have authored. I have 40 years of experience in wildlife conservation at the state, national and international levels. I have worked for conservation NGOs since 1969 (National Wildlife Federation) and was Vice President of Policy for American Bird Conservancy from 1995-2008 and worked with Dr. Finkelstein as her supervisor in a post-doc fellowship at ABC in 2004-2005. Beginning in 2004, Myra and I met numerous times with Interior officials, including the Deputy Secretary of Interior, the Chief of Refuges for the FWS, and the General Counsel for the President's CEQ to urge expedited action on Midway lead paint remediation.

I also have spent a week on Midway and observed firsthand the issues at Sand Island. Midway is a remarkable place with a spectacular array of wildlife and I still have wonderful memories of this near paradise for birds and other critters. My wife and I volunteered to pull *verbesina* and do nest counts of Red-tailed Tropicbirds. We were constantly surrounded by Laysan and Black-footed Albatrosses as Midway hosts the world's largest nesting colonies of these birds, a large percentage of their global population. It saddens us greatly to know of the long-term poisoning of these Laysan Albatrosses in a paradise despoiled by humans.

TIME FOR REMEDIATION LONG OVERDUE.

The Department of Interior has known since at least 1987 that Laysan Albatross chicks were being poisoned by lead paint on Sand Island. See Sileo, L. and S.I. Fefer, *Paint Chip Poisoning of Laysan Albatross at Midway Atoll*, Journal of Wildlife Disease, 23(3):432-437 (1987). This is before Midway was designated a NWR and six years before the Navy announced plans to close Midway and nine years before Interior accepted the transfer of Midway from the Navy.

Laysan Albatross chicks eat peeling lead paint chips directly from 90 aging U.S. Navy structures and 5 old trans-Pacific cable buildings. They also eat the paint chips in the sand immediately surrounding the buildings.

Dr. Myra Finkelstein's research on Sand Island documented that Laysan chicks raised in nests close (< 5 meters) to these old buildings have extremely high elevated levels of blood lead concentrations, averaging 440 µg/dL, compared to an average blood lead of 6 µg/dL in chicks nesting greater than 100 meters from buildings. Laysan Albatross adults on Sand Island had an average blood lead level of 1 µg/dL, which could be considered the background (or normal) blood lead levels for this species. The Center for Disease Control's blood lead level of concern for children is 10 µg/dL and children with blood lead levels greater than 35 µg/dL receive clinical treatment for lead poisoning. Blood lead values greater than 100 µg/dL have been shown to cause encephalopathy and death in both humans and animals. Dr. Finkelstein estimated that the lead poisoning of Laysan Albatross chicks on Sand Island is affecting as many as 10,000 chicks a year with acute levels of lead levels in their blood (average = 85 µg/dL) enough to cause immunological, neurological and renal impairment, thus decreasing their chances of survival. See Finkelstein, M. E.; Gwiazda, R. H.; Smith, D. R. *Environ Sci Technol* (2003), *37*, 3256-3260 and Finkelstein, M.; Nakagawa, M.; Sievert, P.; Klavitter, J.; Doak D.F. *Animal Conservation* (2010), *13*, 148-156

An estimated one thousand Laysan Albatross chicks a year that nest within five meters of building structures exhibit a condition of peripheral neuropathy referred to as "droopwing". Droopwing manifests itself in the chicks' inability to raise their wings, which commonly drag on the ground resulting in broken bones and open sores. Chicks with droopwing will never be able to fly; hence all will die of starvation or dehydration. This is in addition to the Laysan Albatross chicks that suffer significant other detrimental effects from lead exposure (immunological, neurological and renal impairment).

More recently, U.S. FWS biologists concluded in the December 2009 Midway Ecological Risk Assessment that "Lead paint that is peeling from the buildings and the lead contaminated soil is affecting approximately 6,674 Laysan Albatross chicks each year. This number indicates approximately 1.5% of Midway's chicks are affected annually (Klavitter 2004)."

Dr. Myra Finkelstein and her co-authors, including John Klavitter the Midway Atoll NWR Manager, in late 2009 published *Assessment of demographic risk factors and management priorities: impacts on juveniles substantially affect population viability of a long-lived seabird* in a peer-reviewed journal and found that "for Laysan albatross that breed on Sand Island up to 7% of chicks on Sand Island fail to fledge as a result of lead poisoning, which will create a 16% reduction in the Laysan albatross population size (190,000 less birds) at 50 years into the future. We demonstrate how straightforward

management actions that increase juvenile survivorship (e.g. removal of lead-based paint) can help slow population declines..."

In releasing the EE/CA Tom Edgerton, Superintendent of the Papahānaumokuākea Marine National Monument, was quoted as saying: "Unfortunately, lead-based paint was used on most of the buildings, and high levels of lead-based paint are still found on buildings and in soil surrounding them. This poses an unnecessary risk to the refuges Laysan albatross colony, with as many as 10,000 chicks, or up to 3 percent of the hatchlings, dying from lead poisoning each year."

And yet Interior proposes to take six years or more to accomplish the necessary remediation.

The principal Refuge management objective on Midway's land "is to enhance the quality of habitat for the full diversity of nesting seabird species." This objective is being violated by the failure to remediate the lead paint in a timely fashion.

Interior officials, including attorneys and biologists, were offered the opportunity by the Navy to have any and all buildings torn down and removed from Midway before the turnover of Midway to Interior but Interior inexplicably decided to allow 95 structures with lead paint issues to remain when there were plans to use only some of these structures, 36 at present. All people concerned with this issue acknowledge that the preferred solution is to completely tear down and remove the 59 structures that Interior has no intent to use and that they present continuing threats to human and wildlife health and safety. After their removal, all lead paint would be removed from the 36 other structures, the structures would be encapsulated, and the soil around these 95 building would be removed to a depth that assures a safe level to a level no more than the proposed cleanup level of 75 mg/kg for lead in the soil. The only justification given for not doing this is cost, with an earlier DOI estimate at $55 million.

Given the egregious error DOI made in accepting all 95 lead-based paint contaminated buildings from the Navy, and given the clear documentation of significant Laysan Albatross lead poisoning from the buildings and surrounding soils, DOI should have corrected these errors long ago by remediating the lead paint problem. Bonin Petrels also are affected by lead poisoning and ESA-listed Laysan Ducks could be as well.

The Midway Ecological Risk Assessment published in December 2009 by the U.S. FWS found that: "Based on the findings of this PA/SI, the FWS concludes that hazardous substances have been released, as defined in Section 101 (22) of CERCLA, and there is a substantial threat of ongoing and future releases into the environment at Midway Atoll that pose an imminent and substantial threat to the public health or welfare or the environment and a removal action is appropriate to address the lead contamination."

Despite this substantial threat of ongoing and future releases into the environment at Midway Atoll that poses an imminent and substantial threat to the public health and welfare, the DOI preferred alternative and other alternatives propose to take six years to end this imminent and substantial threat to the public health and welfare. Indicative of the delay is how Interior has delayed the publication of the draft EE/CA for months, potentially setting back remediation efforts even further. That Interior would continue to allow the poisoning of trust resources for at least six more years in a National Wildlife Refuge in a Marine National Monument is not acceptable and is contrary to our nation's most

important wildlife conservation laws, including the Migratory Bird Treaty Act (MBTA) and the Endangered Species Act (ESA). Taking so long also violates a core Refuge management objective to enhance the quality of habitat for the full diversity of nesting seabird species.

SPECIFIC COMMENTS ON EE/CA QUERIES.

DOI seeks comments on the entire EE/CA and specifically asks for comments on these three items:

1. The proposed cleanup level of 75 mg/kg for lead in soil (Appendix C, Streamlined Risk Evaluation in Midway EE/CA Report).

2. Schedule and cleanup priorities as the FWS will not be able to address the entire site in the first year of cleanup.

3. The removal of historic buildings in Decision Unit 1 and Decision Unit 2 (Sections 8.1 and 8.2 in Midway EE/CA Report).

I will attempt to address each of these starting in reverse order:

**The removal of historic buildings in Decision Unit 1 and Decision Unit 2.*

Again, the ideal would be to remove all 59 of the structures that are not and will not be used by the U.S. FWS. This would be the preferred alternative. Absent that, DOI should act to immediately take down and remove the crumbling lead-contaminated buildings in Units 1 and 2. The old cable buildings are wooden structures more than 100 years old and have deteriorated badly. They should be the first to come down and the soil remediated around them as many albatrosses have been poisoned around them. These buildings currently are not of historic merit in their very poor deteriorated condition.

Unit 2 consist of the 70-year old Marine barrack buildings and these also have deteriorated badly and should be immediately taken down and removed. There are high levels of lead-contamination on and around these buildings, too. Adding to this urgency is that the EE/CA rates Units 1, 2, and 6 as having the greatest adverse impact to wildlife of all the 9 units.

While I live in the historic city of Annapolis and am sensitive to historical concerns, the buildings in Units 1 and 2 are so badly deteriorated to have little historic merit and would cost many millions of dollars to rebuild. TEAR THEM DOWN NOW! I say this as a veteran of the U.S. Navy having served from 1970-1974 on active duty and having reached the rank of Commander in the Reserves as a JAG. My father was an enlisted man in the U.S. Navy serving on destroyers in WWII.

**Schedule and cleanup priorities as the FWS will not be able to address the entire site in the first year of cleanup.*

The six year phase of remediation is the ***major flaw*** in the EE/CA. After many years in delaying comprehensive remediation, DOI needs to act much more quickly to prevent the imminent and substantial threat to the public health and welfare these buildings and their surrounding soils present to wildlife and potentially human resources.

As noted above, DOI has known for decades about the lead paint poisoning of trust resources and Dr. Finkelstein's research documented without equivocation the source of the lead contamination from the extant buildings. Dr. Finkelstein and I, along with other conservation group NGOs, have pressed

ranking DOI officials since 2004 to act expeditiously to remediate the lead paint problem and even had contact with then First Lady Laura Bush who visited Midway and was aware of the problem. She promised action on the problem back in 2007, nearly four years ago.

In a Washington Post story dated December 18, 2006 (attached) on Lead Poisoning of Midway Albatrosses, the Post story reported this: "The Interior Department estimates it will cost $5.6 million to clean up the atoll....'Incrementally, over the next several years, we believe we can take care of the problem' said Marshall Jones, deputy director of the U.S. Fish and Wildlife Service."

More than four years have passed since Deputy Director's comments and the problem is still severe and presenting an imminent and substantial threat to the public health and welfare. I suggest that the total removal of the buildings suggested in Units 1 and 2 under Alternative 3 be accomplished this year along with the buildings in Unit 6 under the preferred alternative as well having all lead contaminated soil removed that is above the 75 mg/kg level.

I fully realize that there is a small window to do the work when the albatrosses are off Sand Island in the late July or early August to October period, but these remediation actions need to be expedited.

I further suggest that the remainder of the buildings' surrounding soil be removed down to the 75 mg/kg level and that the soil be removed to such a depth so as not to have to use a membrane in Units 1, 6, and 9. These membranes will deteriorate over time and will lead to eventual contamination of trust resources again. Previous efforts to place polyethylene matting/tarps and snow fencing around 15 buildings has not prevented lead poisoning in the chicks, and chicks have been observed with droopwing on the matting. Some seabirds have been snagged on the tarps and fences and have been injured or died as a result. All soils around all units that exceed the 75 mg/kg should be removed at the radius where the chicks have access.

The continued allowance by Interior of lead paint "takes" of Laysan Albatrosses and contamination of Bonin Petrels is a direct violation of the MBTA and the ESA involving the Laysan Duck as this latter species has been observed around the contaminated buildings in several of the highest priority Units. I again urge that all Units be remediated in two years under alternative three.

**The proposed cleanup level of 75 mg/kg for lead in soil (Appendix C, Streamlined Risk Evaluation in Midway EE/CA Report).*

This level appears to be satisfactory based on studies, standards for lead contamination, and my discussions with toxicologists. However, it is important that all soils be removed around all nine Units until these levels are met and no membranes be used. The clean-up level should be accomplished wherever the albatross chicks may have access to the soils during their nesting. The EE/CA reports that studies have shown that lead levels in the soil around affected buildings can be as high as 9,300 ppm.

SPECIFIC COMMENTS ON OTHER ISSUES.

**IDEAL WOULD BE TO REMOVE ALL 59 LEAD CONTAMINATED BUILDINGS NOT IN USE OR THAT WILL NOT BE USED.*

As mentioned above, this should be the preferred alternative and should be done if possible. Unfortunately only the structures in Units 1, 6, and 8 are proposed to be removed but others should be as well.

**REMOVE ALL LEAD CONTAMINATED SOIL AROUND ALL STRUCTURES IN THE NINE UNITS TO A LEVEL OF NO MORE THAN 75 mg/kg.*

As mentioned above, membranes should not be used in lieu of contaminated soil removal and the removal should be at both sufficient depth and sufficient radius from the structures to achieve the 75 mg/kg level.

**ALL LEAD PAINT SHOULD BE REMOVED FROM ALL 95 STRUCTURES AND ALL STRUCTURES IN THE 9 UNITS.*

The EE/CA mentions that 25 structures have been encapsulated with lead paint abated. Unfortunately, many have not had all the lead paint removed. For example, nine officers' quarters buildings did not have all lead paint removed and do to the warm, tropical marine environment will be peeling again unless constantly maintained. The best solution is to remove all lead paint from the exterior of all structures. If it is not possible to take down buildings or where it is not feasible to remove all the lead, funds must be set aside and strict guidelines promulgated to assure that these buildings with lead paint remaining will have proper maintenance/encapsulation on a regular schedule.

** SUPPORT THE ON-SITE DISPOSAL OF THE DEMOLITION DEBRIS AND SOIL USING EX-SITU SOIL STABILIZATION METHODS (USE OF PORTLAND CEMENT-TYPE MIXTURE TO SOLIDIFY SOILS IN A CONCRETE MONOLITH) IN THE CONSOLIDATION UNIT.*

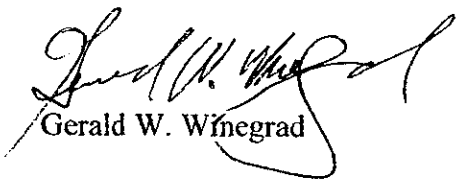
I fully support the planned on site disposal of debris and soil with lead paint in the R2 concrete lined consolidation unit and the stabilization with Portland cement. I have observed the old concrete lined water reservoir (R2) and think it is a sound disposal practice to place the materials there.

*MORE STUDIES ON BONIN PETRELS AND NEW BLOOD STUDY NEED TO BE DONE ON LAYSAN DUCK.

The EE/CA notes that there are elevated lead blood levels for some Bonin Petrels and that no checks have been made on Laysan Ducks (ESA-Endangered) even though they have been seen around highly lead contaminated structures and soils. These studies need to be done.

Thank you for this opportunity to comment and for the EE/CA that finally sets a course—albeit over too long a period—for remediating this problem that is leading to the deaths of as many as 10,000 Laysan Albatrosses, the lead poisoning of an unknown number of Bonin Petrels, and the possible lead poisoning of Laysan Ducks. By expediting the remediation, DOI could help fulfill the principal refuge management objective on Midway's land "to enhance the quality of habitat for the full diversity of nesting seabird species."

Respectfully Submitted,



Gerald W. Winegrad

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAHUHIHEWA BUILDING
601 KAMOKILA BLVD, KAPOLEI HI 96706

DATE: February 8, 2011

LOG: 2011.0207
DOC: 1101RS51

TO: Carlton Morris
FWS Project Manager
Division of Engineering
US Fish and Wildlife Service
911 NE 11th Avenue
Portland, Oregon 97232

SUBJECT: **National Historic Preservation Act (NHPA) Section 106 Review / Removal of Lead Based Paint**
Permit # (None)
Building Owner: United States National Park Service
Location: Midway Atoll
Tax Map Key: N/A

This letter is in response to an undated communication, received by our office on January 25, 2011, re removal or encapsulation of lead based paint at Midway Atoll. This project has been undertaken after discovery of the negative impact of lead based paint on Laysan Albatross nestlings. Your office has since compiled a Preliminary Assessment/Site Inspection report on the lead levels in nine areas and examined six alternatives (including "No Action"). A cleanup goal of 75 milligrams per kilogram for lead in the soil was determined and a remedial program over six years decided upon. Lead based paint and/or asbestos siding is to be removed from specified structures and Buildings 578, 579,619, 623, 626, 628, 643 (which had the highest toxicity) be demolished. Contaminated soils are to be excavated and a soil barrier (geomembrane) be added over the disposal sites. The areas of potential effect would be building footprints and sites adjacent with contaminated soils.

Midway Island was the site of a pivotal World War II battle in 1942 that stopped a potential invasion of the Hawaiian Islands by the Empire of Japan. The island is a National Memorial Site due to its importance in World War II, it is also a National Wildlife Refuge and a part of the Papahanaumokuakea National Marine Sanctuary.

Our office is only qualified to comment on the historic preservation issues, particularly with relation to the World War II Structures. As such, we have the following comments:

1. We consider the 6 year clean-up timeline reasonable.
2. We believe the proposed demolition of buildings in "Decision" Areas 1 and 2 (except Building 643) would constitute an adverse effect to historic properties. As such your agency is required to consult under 36CFR800 (Section 106 consultation). Consultation will lead to a Memorandum of Agreement or a Programmatic Agreement stipulating the conditions under which the effect of your project can be avoided, minimized or mitigated. We suggest you consult with the Advisory Council on Historic Preservation on how to proceed with your 106 obligations. You are also welcome to come and talk to our staff.

Any questions should be addressed to Ross W. Stephenson, SHPD Historian, at (808) 692-8028 (office), (808) 497-2233 (cell) or ross.w.stephenson@hawaii.gov.

Mahalo for the opportunity to comment.

Pua Aiu
Administrator

UNIVERSITY OF CALIFORNIA, SANTA CRUZ

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SANTA BARBARA · SANTA CRUZ

DEPARTMENT OF MICROBIOLOGY AND ENVIRONMENTAL TOXICLOGY
DIVISION OF NATURAL SCIENCE
1156 HIGH ST
SANTA CRUZ, CALIFORNIA 95064

February 17, 2011

Mr. Carlton Morris, FWS Project Manager
U.S. Fish and Wildlife Service, Division of Engineering
911 NE 11th Avenue
Portland, Oregon 97232
email carlton_morris@fws.gov

Re: Engineering Evaluation/Cost Analysis (EE/CA) for Removal of Lead-based Paint from Structures and Lead-contaminated Soil from Midway Atoll National Wildlife Refuge

Dear Mr. Morris:

These comments are submitted with the hope they will aid in the prompt initiation of the removal of lead-based paint from Sand Island at Midway Atoll National Wildlife Refuge, part of Papahānaumokuākea Marine National Monument. I have been examining the lead poisoning of Laysan albatross on Midway Atoll for the last decade and am incredibly thrilled to see a comprehensive plan to clean up lead-based paint from Sand Island. The prompt removal of lead-based paint from structures and lead-contaminated soil from Midway Atoll will prevent the lead poisoning deaths of thousands of albatrosses each year as well as protect other species such as the endangered Laysan duck from being lead poisoned in the future.

Comments with respect to specific items designated by DOI:

1. The proposed cleanup level of 75 mg/kg for lead in soil (Appendix C, Streamlined Risk Evaluation in Midway EE/CA Report).

I support the proposed cleanup level of 75mg/kg for lead in soil and agree with the EE/CA that this level will be protective of wildlife health on Midway Atoll with respect to lead poisoning.

2. Schedule and cleanup priorities as the FWS will not be able to address the entire site in the first year of cleanup.

The six year phase of remediation is one of my major concerns with the EE/CA. I understand the logistical constraints with respect to working on Midway Atoll as well as the short annual window during the non-breeding season make the prompt removal of lead-based paint and lead contaminated soil challenging, but all efforts should be made to expedite the removal process to prevent further lead-induced mortalities on Midway.

I suggest that the total removal of the buildings in Units 1 (with the exception of building 643) and 2 be accomplished this year along with remediation of lead-based paint from the buildings in Unit 6 as well removing all lead contaminated soil that is above the 75 mg/kg level in Units 1, 2 and 6.

I agree with the EE/CA's prioritization of Units, 1, 2 and 6 for lead-based paint removal.

3. The removal of historic buildings in Decision Unit 1 and Decision Unit 2 (Sections 8.1 and 8.2 in Midway EE/CA Report).

The most protective solution would be to remove all of the structures that are not and will not be used by the U.S. FWS. This would be the preferred alternative. Absent that, DOI should act immediately to remove the crumbling lead-contaminated buildings in Units 1 and 2.

In Unit 1 the abandoned cable company buildings are significantly deteriorated and it is my personal observation that they host the highest numbers of lead poisoned (droopwing) Laysan albatross chicks on Sand Island. Thus, I strongly agree with the EE/CA's recommendation to demolish the cable company buildings (with the exception of building 643) and that this demolition should be considered a high priority and completed as soon as possible.

It is also my personal observation that Unit 2 (the abandoned Marine barrack buildings) hosts very high numbers of lead poisoned (droopwing) Laysan albatross chicks. Additionally, I have observed an endangered Laysan duck foraging between the Marine barrack buildings during my visit to the island in 2006. Thus, I strongly agree with the EE/CA's recommendation to demolish the Marine barrack buildings and that this demolition should be considered a high priority and completed as soon as possible.

Comments on other aspects of the EE/CA

1) The ideal solution to ensure no further action is needed to prevent lead poisoning from unused buildings on Sand Island would be to remove all the buildings with lead-based paint that are not in current use or that will not be used in the future.
2) The use of geomembranes on Sand Island is concerning with respect to their structural integrity in a harsh environment and that any deterioration of the membrane could pose a risk to wildlife through entanglement as well as other unforeseen issues.
3) If it is not plausible to remove all lead-based paint from specific buildings on Sand Island and encapsulation is needed to prevent lead contamination, funds should be set aside and strict guidelines set forth to assure that these buildings will have proper maintenance and encapsulation on a regular schedule. Without proper maintenance, the buildings with lead-based paint will become a future hazard for wildlife and human health on Sand Island.
4) I support the planned on site disposal of debris and soil with lead paint in the R2 concrete lined consolidation unit and the stabilization with Portland cement. If the volume of contaminated soil exceeds the capacity of the R2 unit, then off-site removal should be considered in order to avoid the use of geomembranes on Midway Atoll. Before geomembranes are used on Midway Atoll, their use and degradation should be evaluated in terms of risk to wildlife (e.g., burrowing seabirds).

Thank you for this opportunity to comment, I am very excited about the proposed plan to clean-up the lead-based paint from buildings and soil on Midway Atoll and hope that the clean-up process can begin in 2011 and be expedited as much as possible.

Sincerely,

Myra Finkelstein

Myra Finkelstein, PhD
Assistant Researcher

ATTACHMENT B
Durability of Geotextiles

CETCO® REMEDIATION TECHNOLOGIES Technical Reference

THE DURABILITY OF POLYPROPYLENE GEOTEXTILES FOR ENVIRONMENTAL APPLICATIONS

Reactive Core Mat is constructed with polypropylene geotextiles and fibers. Polypropylene is a durable polymer used in many aggressive environments because of its excellent resistance to degradation. Currently, polypropylene geotextiles are used in many environmental applications.

Potential mechanisms for degradation of polypropylene fibers include oxidation, hydrolysis and environmental stress cracking. In soil, oxygen concentration can vary from 21% in gravels to 1% in fine grained soils.

In the attached study of the durability of polypropylene in environmental applications, a number of parameters were analyzed. They include: Moisture Resistance, Chemical Resistance, Leachate Compatibility, Biological Resistance, Temperature stability, Ultraviolet Resistance, Installation Survivability and Lifetime Prediction.

The results of the study indicate that the durability of polypropylene is not significantly adversely affected by any of the parameters listed above. Furthermore, it has been concluded that polypropylene can be exposed to sunlight for up to 14 days between installation and cover and will have an expected lifetime of up to 200 years. In summary, it is evident that polypropylene geotextiles are not susceptible to biological or physical degradation under normal conditions of soil burial or contact with contaminated groundwater or sediment.

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Smart Solutions®

Technical Note *SM-404*

The Durability of Polypropylene Nonwoven Geotextiles for Waste Containment Applications

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FAX (423) 485-9068
www.fixsoil.com

GPD-SM-404
Revised March 1997

SUMMARY OF BENEFITS

Polypropylene is a very durable polymer commonly used in aggressive environments including automotive battery casings, fuel containers and the like. Because of its excellent resistance to harmful chemical environments, the use of polypropylene to manufacture nonwoven geotextiles for waste containment systems is a beneficial use of this versatile polyolefin. Presently, nonwoven polypropylene geotextiles are used in more than 80% of all waste containment applications.

Moisture Resistance	Unlike nonwoven polyester geotextiles, polypropylene does not absorb water nor does the presence of water have any effect whatsoever on tensile strength or other mechanical properties.
Chemical Resistance (pH)	Extensive research has shown polypropylene is very resistant to certain concentrations of aggressive chemicals such as nitric acid, hydrochloric acid, sulfuric acid, sodium hydroxide and potassium hydroxide. Therefore, polypropylene geotextiles have been found acceptable in most solid and hazardous waste landfills.
Leachate Compatibility	Many independent leachate immersion tests conducted in accordance with EPA Method 9090 have shown no significant reduction in mechanical properties of our nonwoven polypropylene geotextiles.
Biological Resistance	Since polypropylene does not support, attract or deteriorate from fungal growths, SI Geosolutions nonwoven geotextiles are rot and mildew resistant.
Temperature Stability	Polypropylene can withstand temperatures of at least 150 degrees Celsius (300° F)without melting.
Ultraviolet Resistance (Sunlight)	Because polypropylene degrades during extended exposure to sunlight, SI Geosolutions nonwoven polypropylene geotextiles are produced with carbon black and other UV inhibitors. These additives allow our nonwoven polypropylene geotextiles to be exposed for up to 14 days between laydown and cover.
Installation Survivability	Nonwoven polypropylene geotextiles have superior puncture and mullen burst strength, which increase their installation survivability.
Lifetime Prediction	When properly stabilized and buried, nonwoven polypropylene geotextiles have been expected to last for up to 200 years.

INTRODUCTION

By virtue of its chemical composition, molecular structure, and thermodynamic properties, polypropylene is one of the most resistant organic raw materials known today. This is one of the reasons that over 80 percent of all geosynthetics are made from the polypropylene (Schneider 1989).

METHODS OF DEGRADATION

Chemical degradation of geotextiles is a result of environmental and polymer compositional factors. Regarding environmental factors, one can expect the greatest amount of degradation to occur, in general; (1) at relatively high temperatures (i.e. >100° C), (2) in soils which are chemically active; (3) and when the geosynthetic is under stress. Key chemical degradation mechanisms that can be found in some soil and waste environments include oxidation, hydrolysis, and environmental stress cracking.

An oxidation reaction can either be initiated by ultraviolet radiation or thermal energy, but must have sufficient oxygen present. Since the geosynthetic will be buried in most applications, thermally activated oxidation is of most interest. Polypropylene oxidation is the reaction of free radicals within polymer with oxygen, resulting in breakdown and/or degradation of the molecular chains and embrittlement of the polymer.

Antioxidants are typically added to the polymer to prevent oxidation during processing and use. Broad classes of antioxidants often used in geosynthetic include phenolic and hindered amine light stabilizers (HALS). As the antioxidants are consumed, resistance of the polymer to oxidation will decrease. The rate of polymer oxidation is dependent on how much and what type of antioxidant is present initially, at what rate it is used, how well it is distributed within the polymer, and how fast it can be leached out by the flow of fluids, such as water, into and around the polymer. Environmental factors which affect the rate of oxidation include temperature and oxygen concentration. In soil, oxygen concentrations can vary from 21% in gravels at shallow depth to 1% in fine-grained soils at deeper depths. The presence of transition metal ions such as iron or copper may act as catalysts to accelerate the oxidation reaction. Thermal oxidation at typical in-soil temperatures appear to be quite slow. (Allen and Elias, 1996.)

TOXICOLOGY

Polypropylene is biologically inert and used for packaging food intended for human consumption (i.e., yogurt containers, Tupperware®, etc.) To ensure that the

TOXICOLOGY (Cont.)

processing performed does not alter these characteristics, skin and mucous laboratory tests have shown that polypropylene does not cause irritating affects. An extensive series of repeat insult patch testing in humans and many years of extensive use in diverse products such as infant diapers, feminine hygiene products, and surgical fabrics have confirmed that adverse affects on the skin should not be expected. Furthermore, polypropylene is considered to be without significant oral toxicity. When tested by the Food and Drug Administration's specific methods, polypropylene is well below the specified limits of extractables. In addition, the United States Pharmacopoeia (U.S.P.) specifies oral toxicity testing on plastics intended for medical uses. Polypropylene materials have never caused toxicity when tested according to the U.S.P. method (MATAFAXX, 1992).

MOISTURE

Polypropylene is a paraffinic hydrocarbon and does not adsorb water like the polyamides polyester (PET) or nylon. The moisture gain of polypropylene fibers is insignificant and water has no affect on tensile strength and other mechanical properties. Therefore, water alone does not cause any noticeable degradation in polypropylene fibers. Fibers subjected to boiling water or steam for long periods show no loss of strength (Cook, 1984).

ULTRAVIOLET RESISTANCE (Sunlight)

Like polyethylene, polypropylene is attacked by atmospheric oxygen and the reaction is stimulated by sunlight. Polypropylene fibers will deteriorate on exposure to light, but may be effectively protected by stabilizers (Cook, 1984). Without site-specific environmental conditions, SI Geosolutions recommends a maximum exposure period of 14 days between laydown and cover of all of our nonwoven geotextiles. This is in compliance with guidelines issued by the US Environmental Protection Agency (EPA 1993). If the maximum exposure period will exceed these guidelines, we recommend that the installer either (1) utilize an economical, lightweight woven geotextile, such as SI Geosolutions 994GC as a temporary cover; or (2) install a test roll on the most northward facing slope and remove samples after 30 days of actual exposure to evaluate possible strength loss. Site personnel should carefully cut a representative roll-width by 5-foot sample (1.5m); label with contact name, address and telephone number; add a roll number, style and project name; place in a strong black wrap and send to a laboratory. It is the responsibility of the Construction Quality Assurance (CQA) engineer to identify the actual index tests required to determine the actual strength retention.

Three different nonwoven geotextiles were exposed in accordance with ASTM D5970-96, Deterioration of Geotextiles From Outdoor Exposure, starting June 15, through July 15, 1996 in Northwest Georgia, USA. Machine direction (MD) and cross-machine direction (CMD) coupons for each style were attached to a test frame oriented to 45° from horizontal and facing due south. Unexposed coupons were retained for control testing. After 30 days exposure, five specimens from each coupon were tested for tensile strength and elongation in accordance with ASTM D5035. The exposed results were then compared to the unexposed test results and the percent strength retained was calculated. The results are shown in Table 1 below:

Table 1. Results of 30-day Outdoor Exposure Tests

Product Style	Percent Strength Retained MD	CMD	Average
801	96	85	91
1601	90	89	90
1751	94	91	93

TEMPERATURE STABILITY

High Temperatures

The mechanical properties of the fibers deteriorate as temperature increases, but polypropylene performs better that polyethylene in this respect. The softening point of polypropylene fibers is approximately 150° C (300° F), and the fibers "melt" at 165° C (330° F). The softening and melting points of polypropylene is determined in the way which crystallinity has been influenced during and after spinning. Shrinkage of polypropylene fibers depends greatly upon the treatment the fiber receives during processing. In boiling water, monofilament yarns may shrink as much as 15 percent after 20 minutes; multifilament and staple fibers only shrink between 0 and 10 percent (Cook, 1984). However, polypropylene exhibits a moisture regain of only 0.01 to 0.1 weight percent (Cox, 1994).

Flammability

Polypropylene is a hydrocarbon and will burn. On being exposed to a flame, however, the fiber melts and draws away from the flame, extinguishing itself. When tested in accordance with BS2963, polypropylene fabrics are self-extinguishing and therefore of low flammability, (as defined in BS3121). Construction, additives, finishes, and

Flammability (Cont.)

the presence of other fibers have a considerable influence on the burning characteristics of any particular fabric or structure. For the purpose of fire insurance, polypropylene fabric is included in the same class as wool (Cook, 1984).

Low Temperature

The low temperature flexibility of polypropylene is excellent for most applications. SI's polypropylene geotextiles retain normal flexibility from –40C to 150C (-40F to 302F). Below –40F, polypropylene can become inflexible and not suitable for all applications.

BIOLOGICAL RESISTANCE

Insects

Polypropylene cannot be digested by insect and related pests, such as white ants, dermestid beetles, silverfish, and moth larvae. Polypropylene fiber is not liable to attack unless it becomes a barrier beyond which the insect much pass to reach an objective. In this case, the insect may cut through the fiber without ingesting it. Furthermore, polypropylene does not attract nor is it a food source for insects or rodents. As stated earlier, much like humans, it is believed that rodents would not be adversely affected by ingesting small quantities of polypropylene.

Micro-Organisms

Polypropylene fibers will not support the growth of mildew or fungi. Some micro-organisms, however, may even grow on the very small amount of contaminants which may develop on the surface of fibers or yarns in use. Such growth has no effect on the strength of any materials made from polypropylene fiber. Similarly, polypropylene is an inert resin which does not support or attract fungal growths and does not deteriorate due to fungal presence (Cox, 1994).

CHEMICAL RESISTANCE

Polypropylene is inert to a wide range of chemicals. Its resistance and susceptibilities are similar to those of polyethylene, but its higher crystallinity tends to make it more resistant
that polyethylene to those chemicals which degrade polyolefin fibers. There is no known solvent for polypropylene at room temperature (Cook, 1994). Extensive information on the chemical resistance of polypropylene shows that it is very resistant to acids and alkalies at room temperatures (Ahmed, 1994). For example, polypropylene is acceptable at room temperature for use with:

Table 2. Chemical Resistance of Polypropylene at Various pH Levels

Chemical (Concentration)	pH Level
Nitric Acid—up to 39%	1
Hydrochloric Acid—up to 37%	1
Sulfuric Acid—up to 96%	1
Sodium Hydroxide—up to 70%	14
Potassium Hydroxide—10%, 25%	14

This covers the entire measurable pH range (Cox, 1994).

However, polypropylene is vulnerable to the following substances: highly oxidizing substances (peroxide), concentrated nitric acid (>40%), concentrated sulphuric acid, chlorosulphonate acid, pure halogen, certain chlorinated hydrocarbons (halogenated hydrocarbons), and certain aromatic hydrocarbons (Schneider, 1989).

Polypropylene does not show any tendency to develop surface cracks when subjected to stresses in the presence of detergents or other substances (Cook, 1994). Polypropylene is extremely stable chemically due to its structural properties as a hydrocarbon construction. Extensive studies testing the chemical stability of polypropylene when exposed to hundreds of organic and inorganic chemicals have shown it to be highly stable against: acids, alkalies, aqueous solutions of inorganic salts, detergents, oils and greases, and gasoline and lubricants.

CHEMICAL RESISTANCE (Cont.)
Actual test results are shown below:

Table 3. Physical Effects of Chemicals on Polypropylene (Schneider)

	% Change in Mass Per Unit Area*	
CHEMICAL	**23° C**	**60° C**
Sulfuric Acid (98%)	-0.2	-0.2
Nitric Acid, fuming	-0.1	--
Sodium hypochlorite (20%)	0.1	-2.1
Gasoline	4.8	6.6
Benzene	3.4	0.6
Xylene	7.0	0.3
Menthylene chloride	5.5	1.6
Carbon tetrachloride	13.5	0.9
Turpentine	9.5	10.5
Transformer oil	0.4	14.9

**The weight change as listed is due to the sum of the effects of swelling and dissolution.*

SI Geosolutions, in accordance with ASTM D543, has evaluated the chemical compatibility of our nonwoven geotextiles with JP4 jet fuel. A sample of our 451 (4.5 oz/yd^2 or 150 gr/m^2) nonwoven geotextile was exposed to the fuel for 7 days at room temperature. It was then evaluated for retention of grab tensile properties in accordance with ASTM D4632. The results are as follows:

Table 4. Results of JP4 Jet Fuel Tests

Product Style	Percent Strength Retained MD	CMD	Average
451	91.5	87%	89

LANDFILL LEACHATE
SI Geosolutions has performed several studies on the compatibility of our polypropylene nonwoven geotextiles with leachates and in various pH solutions commonly encountered in soil or solid waste applications. Since the evaluation of long-term chemical aging of nonwoven geotextiles is nearly impossible due to the inherent stability of the polymer, laboratory immersion tests were conducted at elevated temperatures (50° C) to accelerate behavior. Variables such as temperature, moisture, and oxygen content were controlled in the lab and samples were removed at 30-, 60-, 90-, and 120-day intervals. The results of these tests are shown in Table 5 (Boschuk, 1993 and Narejo, 1995).

LANDFILL LEACHATE (Cont.)

Table 5. Results of Chemical Compatibility Testing Conducted by SI Geosolutions, Inc.

Property	Test Method	% Change After 120 Days @ 50° C 451*	1601*
Grab Tensile	ASTM D4632	0.88	-1.14
Trapeziodal Tear	ASTM D4533	-23.79	54.82
		-16.28	-7.48
Puncture	ASTM D3786	-8.42	-6.6
Permittivity	ASTM D4491	-15.61	-7.46

*/Typical 4.5 (150 gr/m^2) and 16 oz/yd^2 (540 gr/m^2) nonwoven needlepunched geotextiles, respectively.

LIFETIME PREDICTION

Using the assumption that kinetics double with every 10° C rise in temperature, polypropylene embrittlement would not take place for 45 years in a 30° C landfill under anaerobic conditions (Wheat, 1992). Since the first geotextile installation occurred in North America in 1958, it is not possible to demonstrate 100-year durability with "real-time" success stories. As a result, the Geosynthetic Research Institute (GRI) designed a series of four accelerated laboratory incubation protocols to demonstrate aging progression in polyethylene geomembranes. The "durability" (e.g. the prevention of aging) of polyethylene and polypropylene is typically extended by manufactures by adding antioxidants to the resin during processing. This prevents oxygen from attacking the polymer itself. Since it is well established that the engineering properties are not reduced until the antioxidants are completely depleted, tests were conducted at GRI to measure the amount of time to initiate polymer degradation.

Series III samples were exposed to water on top and air below with a compressive stress of 260 kPa (37.7 psi). This test series is intended to model leachate or surface water collection systems in a waste containment facility. Since polyethylene and polypropylene geotextiles behave similarly to the materials in this study, the predicted antioxidant lifetime at 25°C for the specimens evaluated is approximately 120 years, (Hsuan and Koerner, 1985).

In a separate study, properly stabilized polypropylene geotextiles have been estimated to have a functional longevity of nearly 200 years in an oceanic or marine application (Wisse & Birkenfeld, 1982).

INSTALLATION SURVIVABILITY

Nonwoven polypropylene geotextiles have higher puncture and mullen burst strength than polyester nonwoven geotextiles which make them very resistant to installation stresses and enhance their construction/installation survivability success.

Table 6. Selected Strengths of Typical Nonwoven Geotextiles

		MARV	
Properties	**Test Method**	**PET**	**PP**
Mass/Unit Area	ASTM D5261	8.0	8.0
Puncture Strength	ASTM D4833	100 lbs	140 lbs
Mullen Burst	ASTM D3786	380 psi	440 psi

CONCLUSIONS

As previously stated, polypropylene is a very durable polymer commonly used in aggressive environments including automotive battery casings, fuel containers and the like. Because of its excellent resistance to harmful chemical environments, the use of polypropylene to manufacture nonwoven geotextiles for waste containment systems is a beneficial use of this versatile polyolefin. Presently, nonwoven polypropylene geotextiles are used in more than 80% of all waste containment applications.

Moisture Resistance	Unlike nonwoven polyester geotextiles, polypropylene does not absorb water nor does the presence of water have any effect whatsoever on tensile strength or other mechanical properties.
Chemical Resistance (pH)	Extensive research has shown polypropylene is very resistant to certain concentrations of aggressive chemicals such as nitric acid, hydrochloric acid, sulfuric acid, sodium hydroxide and potassium hydroxide. Therefore, polypropylene geotextiles have been found acceptable in most solid and hazardous waste landfills.
Leachate Compatibility	Many independent leachate immersion tests conducted in accordance with EPA Method 9090 have shown no significant reduction in mechanical properties of our nonwoven polypropylene geotextiles.
Biological Resistance	Since polypropylene does not support, attract or deteriorate from fungal growths, SI Geosolutions nonwoven geotextiles are rot and mildew resistant.
Temperature Stability	Polypropylene can withstand temperatures of at least 150 degrees Celsius (300° F)without melting.
Ultraviolet Resistance (Sunlight)	Because polypropylene degrades during extended exposure to sunlight, SI Geosolutions nonwoven polypropylene geotextiles are produced with carbon black and other UV inhibitors. These additives allow our nonwoven polypropylene geotextiles to be exposed for up to 14 days between laydown and cover.
Installation Survivability	Nonwoven polypropylene geotextiles have superior puncture and mullen burst strength, which increase their installation survivability.
Lifetime Prediction	When properly stabilized and buried, nonwoven polypropylene geotextiles have been expected to last for up to 200 years.

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ATTACHMENT C
2009 Analytical Results

TestAmerica
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ORELAP#: OR100021

December 07, 2009

Joey Hickey
GeoEngineers, Inc.
15055 SW Sequoia Parkway, Suite 140
Portland, OR 97224

RE: Midway Atoll National Wildlife Refuge

Enclosed are the results of analyses for samples received by the laboratory on 10/26/09 16:50. The following list is a summary of the Work Orders contained in this report, generated on 12/07/09 14:54.

If you have any questions concerning this report, please feel free to contact me.

Work Order	Project	ProjectNumber
PSJ0951	Midway Atoll National Wildli	0758-145-00

TestAmerica Portland

Estella K Rieben

Estella Rieben, Project Manager

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GeoEngineers, Inc.	Project Name:	**Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2	PSJ0951-01	Soil	04/01/08 00:00	10/26/09 16:50
5	PSJ0951-02	Soil	04/01/08 00:00	10/26/09 16:50
31	PSJ0951-03	Soil	04/01/08 00:00	10/26/09 16:50
188	PSJ0951-04	Soil	04/01/08 00:00	10/26/09 16:50
209	PSJ0951-05	Soil	04/01/08 00:00	10/26/09 16:50
307	PSJ0951-06	Soil	04/01/08 00:00	10/26/09 16:50
1311	PSJ0951-07	Soil	04/01/08 00:00	10/26/09 16:50
1921	PSJ0951-08	Soil	04/01/08 00:00	10/26/09 16:50
2501	PSJ0951-09	Soil	04/01/08 00:00	10/26/09 16:50
3181	PSJ0951-10	Soil	04/01/08 00:00	10/26/09 16:50
9	PSJ0951-11	Soil	04/01/08 00:00	10/26/09 16:50
13	PSJ0951-12	Soil	04/01/08 00:00	10/26/09 16:50
17	PSJ0951-13	Soil	04/01/08 00:00	10/26/09 16:50
17	PSJ0951-14	Soil	04/01/08 00:00	10/26/09 16:50
22	PSJ0951-15	Soil	04/01/08 00:00	10/26/09 16:50
188	PSJ0951-16	Soil	04/01/08 00:00	10/26/09 16:50
204	PSJ0951-17	Soil	04/01/08 00:00	10/26/09 16:50
208	PSJ0951-18	Soil	04/01/08 00:00	10/26/09 16:50
306	PSJ0951-19	Soil	04/01/08 00:00	10/26/09 16:50
B424 7	PSJ0951-20	Soil	04/01/08 00:00	10/26/09 16:50
9	PSJ0951-21	Soil	04/01/08 00:00	10/26/09 16:50
22	PSJ0951-22	Soil	04/01/08 00:00	10/26/09 16:50
190	PSJ0951-23	Soil	04/01/08 00:00	10/26/09 16:50
203	PSJ0951-24	Soil	04/01/08 00:00	10/26/09 16:50
205	PSJ0951-25	Soil	04/01/08 00:00	10/26/09 16:50
209	PSJ0951-26	Soil	04/01/08 00:00	10/26/09 16:50
305	PSJ0951-27	Soil	04/01/08 00:00	10/26/09 16:50
2501	PSJ0951-28	Soil	04/01/08 00:00	10/26/09 16:50
B424 3	PSJ0951-29	Soil	04/01/08 00:00	10/26/09 16:50
B414 1	PSJ0951-30	Soil	04/01/08 00:00	10/26/09 16:50
16	PSJ0951-31	Soil	04/01/08 00:00	10/26/09 16:50
196	PSJ0951-32	Soil	04/01/08 00:00	10/26/09 16:50
202	PSJ0951-33	Soil	04/01/08 00:00	10/26/09 16:50
300	PSJ0951-34	Soil	04/01/08 00:00	10/26/09 16:50
310	PSJ0951-35	Soil	04/01/08 00:00	10/26/09 16:50

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Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
314	PSJ0951-36	Soil	04/01/08 00:00	10/26/09 16:50
317	PSJ0951-37	Soil	04/01/08 00:00	10/26/09 16:50
328	PSJ0951-38	Soil	04/01/08 00:00	10/26/09 16:50
B414 6	PSJ0951-39	Soil	04/01/08 00:00	10/26/09 16:50
B416 6	PSJ0951-40	Soil	04/01/08 00:00	10/26/09 16:50
18	PSJ0951-41	Soil	04/01/08 00:00	10/26/09 16:50
18	PSJ0951-42	Soil	04/01/08 00:00	10/26/09 16:50
200	PSJ0951-43	Soil	04/01/08 00:00	10/26/09 16:50
202	PSJ0951-44	Soil	04/01/08 00:00	10/26/09 16:50
301	PSJ0951-45	Soil	04/01/08 00:00	10/26/09 16:50
303	PSJ0951-46	Soil	04/01/08 00:00	10/26/09 16:50
310	PSJ0951-47	Soil	04/01/08 00:00	10/26/09 16:50
317	PSJ0951-48	Soil	04/01/08 00:00	10/26/09 16:50
323	PSJ0951-49	Soil	04/01/08 00:00	10/26/09 16:50
B414 4	PSJ0951-50	Soil	04/01/08 00:00	10/26/09 16:50
16	PSJ0951-51	Soil	04/01/08 00:00	10/26/09 16:50
318	PSJ0951-52	Soil	04/01/08 00:00	10/26/09 16:50
329	PSJ0951-53	Soil	04/01/08 00:00	10/26/09 16:50
1311	PSJ0951-54	Soil	04/01/08 00:00	10/26/09 16:50
1331	PSJ0951-55	Soil	04/01/08 00:00	10/26/09 16:50
3118	PSJ0951-56	Soil	04/01/08 00:00	10/26/09 16:50

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15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Analytical Case Narrative

TestAmerica - Portland, OR

PSJ0951

Samples were originally extracted for PCB analysis. Pesticides were noted during PCB analysis and added by the client. The pesticide analysis was run on the PCB extract, therefore there was not a Pesticide Blank Spike for the extracts. Only surrogate recovery and batch method black are available to validate extraction.

TestAmerica Portland

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GeoEngineers, Inc.	Project Name: **Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number: 0758-145-00	Report Created:
Portland, OR 97224	Project Manager: Joey Hickey	12/07/09 14:54

Total Metals per EPA 6000/7000 Series Methods

TestAmerica Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-01 (2)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	ND	----	10.1	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 19:36	H3
PSJ0951-02 (5)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	22.4	----	10.1	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 19:55	H3
PSJ0951-03 (31)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	27.1	----	10.5	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 20:01	H3
PSJ0951-04 (188)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	36.2	----	10.7	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 20:08	H3
PSJ0951-05 (209)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	56.2	----	10.2	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 20:14	H3
PSJ0951-06 (307)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	13.1	----	9.80	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 20:20	H3
PSJ0951-07 (1311)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	67.5	----	10.1	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 20:26	H3
PSJ0951-08 (1921)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	68.0	----	10.4	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 20:33	H3
PSJ0951-09 (2501)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	20.8	----	10.2	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 20:51	H3
PSJ0951-10 (3181)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	ND	----	10.2	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 20:58	H3
PSJ0951-11 (9)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	55.6	----	10.0	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 21:04	H3

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Portland, OR 97224	Project Manager: Joey Hickey	12/07/09 14:54

Total Metals per EPA 6000/7000 Series Methods

TestAmerica Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-12 (13)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	87.5	----	10.8	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 21:10	H3
PSJ0951-13 (17)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	58.5	----	10.3	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 21:16	H3
PSJ0951-14 (17)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	49.3	----	10.2	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 21:23	H3
PSJ0951-15 (22)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	77.7	----	9.80	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 21:29	H3
PSJ0951-16 (188)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	63.7	----	10.1	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 21:35	H3
PSJ0951-17 (204)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	84.8	----	9.85	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 21:41	H3
PSJ0951-18 (208)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	94.3	----	10.1	mg/kg dry	1x	9100990	10/27/09 18:26	10/29/09 21:48	H3
PSJ0951-19 (306)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	50.8	----	9.68	mg/kg dry	1x	9100990	10/27/09 18:26	10/30/09 21:01	H3
PSJ0951-20 (B424 7)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	76.9	----	10.3	mg/kg dry	1x	9100990	10/27/09 18:26	10/30/09 21:07	H3
PSJ0951-21 (9)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	67.2	----	10.5	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 15:47	H3
PSJ0951-22 (22)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	94.6	----	10.0	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 16:06	H3

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PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
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GeoEngineers, Inc.	Project Name: **Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number: 0758-145-00	Report Created:
Portland, OR 97224	Project Manager: Joey Hickey	12/07/09 14:54

Total Metals per EPA 6000/7000 Series Methods

TestAmerica Portland

Analyte	Method	Result	MDL^	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-23 (190)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	76.9	-----	10.2	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 16:12	H3
PSJ0951-24 (203)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	95.0	-----	9.84	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 16:19	H3
PSJ0951-25 (205)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	73.1	-----	10.2	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 16:37	H3
PSJ0951-26 (209)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	81.2	-----	10.9	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 16:44	H3
PSJ0951-27 (305)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	92.0	-----	11.1	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 16:50	H3
PSJ0951-28 (2501)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	84.4	-----	10.4	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 16:56	H3
PSJ0951-29 (B424 3)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	117	-----	9.98	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 17:02	H3
PSJ0951-30 (B414 1)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	165	-----	10.1	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 17:09	H3
PSJ0951-31 (16)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	107	-----	10.2	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 17:15	H3
PSJ0951-32 (196)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	116	-----	10.4	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 17:21	H3
PSJ0951-33 (202)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	98.8	-----	10.1	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 17:27	H3

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Portland, OR 97224	Project Manager: Joey Hickey	12/07/09 14:54

Total Metals per EPA 6000/7000 Series Methods

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Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-34 (300)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	112	-----	10.8	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 17:34	H3
PSJ0951-35 (310)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	164	-----	9.93	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 17:53	H3
PSJ0951-36 (314)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	105	-----	9.88	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 17:59	H3
PSJ0951-37 (317)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	89.5	-----	9.89	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 18:05	H3
PSJ0951-38 (328)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	158	-----	9.76	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 18:11	H3
PSJ0951-39 (B414 6)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	162	-----	10.2	mg/kg dry	1x	9100991	10/27/09 18:30	10/30/09 18:18	H3
PSJ0951-40 (B416 6)			**Soil**			**Sampled: 04/01/08 00:00**				
Arsenic	EPA 6010B	ND	-----	24.5	mg/kg dry	1x	9110249	11/09/09 08:57	11/10/09 02:40	H3
Barium	"	18.1	-----	0.489	"	"	"	"	"	H3
Cadmium	"	ND	-----	2.94	"	"	"	"	"	H3
Chromium	"	15.4	-----	1.47	"	"	"	"	"	H3
Lead	"	253	-----	96.0	"	10x	9100991	10/27/09 18:30	11/03/09 13:54	H3
Selenium	"	ND	-----	24.5	"	1x	9110249	11/09/09 08:57	11/10/09 02:40	H3
Silver	"	ND	-----	2.94	"	"	"	"	"	H3
PSJ0951-41 (18)			**Soil**			**Sampled: 04/01/08 00:00**				
Arsenic	EPA 6010B	ND	-----	25.4	mg/kg dry	1x	9110249	11/09/09 08:57	11/10/09 02:47	H3
Barium	"	19.5	-----	0.509	"	"	"	"	"	H3
Cadmium	"	ND	-----	3.05	"	"	"	"	"	H3
Chromium	"	11.8	-----	1.53	"	"	"	"	"	H3
Lead	"	219	-----	104	"	10x	9100992	10/27/09 18:31	11/03/09 14:00	H3
Selenium	"	ND	-----	25.4	"	1x	9110249	11/09/09 08:57	11/10/09 02:47	H3
Silver	"	ND	-----	3.05	"	"	"	"	"	H3

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GeoEngineers, Inc.	Project Name: **Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number: 0758-145-00	Report Created:
Portland, OR 97224	Project Manager: Joey Hickey	12/07/09 14:54

Total Metals per EPA 6000/7000 Series Methods
TestAmerica Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-42 (18)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	74.2	----	10.2	mg/kg dry	1x	9100992	10/27/09 18:31	10/30/09 19:14	H3
PSJ0951-43 (200)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	180	----	10.3	mg/kg dry	1x	9100992	10/27/09 18:31	10/30/09 19:20	H3
PSJ0951-44 (202)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	149	----	10.2	mg/kg dry	1x	9100992	10/27/09 18:31	10/30/09 19:27	H3
PSJ0951-45 (301)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	189	----	10.1	mg/kg dry	1x	9100992	10/27/09 18:31	10/30/09 19:33	H3
PSJ0951-46 (303)			**Soil**			**Sampled: 04/01/08 00:00**				
Arsenic	EPA 6010B	ND	----	25.1	mg/kg dry	1x	9110249	11/09/09 08:57	11/10/09 02:53	H3
Barium	"	20.4	----	0.501	"	"	"	"	"	H3
Cadmium	"	ND	----	3.01	"	"	"	"	"	H3
Chromium	"	7.57	----	1.50	"	"	"	"	"	H3
Lead	"	286	----	100	"	10x	9100992	10/27/09 18:31	11/03/09 14:07	H3
Selenium	"	ND	----	25.1	"	1x	9110249	11/09/09 08:57	11/10/09 02:53	H3
Silver	"	ND	----	3.01	"	"	"	"	"	H3
PSJ0951-47 (310)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	180	----	9.82	mg/kg dry	1x	9100992	10/27/09 18:31	10/30/09 19:45	H3
PSJ0951-48 (317)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	208	----	10.0	mg/kg dry	1x	9100992	10/27/09 18:31	10/30/09 19:52	H3
PSJ0951-49 (323)			**Soil**			**Sampled: 04/01/08 00:00**				
Arsenic	EPA 6010B	ND	----	24.6	mg/kg dry	1x	9110249	11/09/09 08:57	11/10/09 02:59	H3
Barium	"	21.9	----	0.492	"	"	"	"	"	H3
Cadmium	"	ND	----	2.95	"	"	"	"	"	H3
Chromium	"	5.61	----	1.48	"	"	"	"	"	H3
Lead	"	221	----	9.65	"	"	9100992	10/27/09 18:31	10/30/09 19:58	H3
Selenium	"	ND	----	24.6	"	"	9110249	11/09/09 08:57	11/10/09 02:59	H3
Silver	"	ND	----	2.95	"	"	"	"	"	H3

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GeoEngineers, Inc.	Project Name: **Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number: 0758-145-00	Report Created:
Portland, OR 97224	Project Manager: Joey Hickey	12/07/09 14:54

Total Metals per EPA 6000/7000 Series Methods

TestAmerica Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-50 (B414 4)			**Soil**			**Sampled: 04/01/08 00:00**				
Lead	EPA 6010B	152	-----	10.4	mg/kg dry	1x	9100992	10/27/09 18:31	10/30/09 20:04	H3
PSJ0951-51 (16)			**Soil**			**Sampled: 04/01/08 00:00**				
Arsenic	EPA 6010B	ND	-----	24.1	mg/kg dry	1x	9110249	11/09/09 08:57	11/10/09 03:06	H3
Barium	"	5.94	-----	0.482	"	"	"	"	"	H3
Cadmium	"	ND	-----	2.89	"	"	"	"	"	H3
Chromium	"	3.67	-----	1.45	"	"	"	"	"	H3
Lead	"	1090	-----	97.3	"	10x	9100992	10/27/09 18:31	11/03/09 14:13	H3
Selenium	"	ND	-----	24.1	"	1x	9110249	11/09/09 08:57	11/10/09 03:06	H3
Silver	"	ND	-----	2.89	"	"	"	"	"	H3
PSJ0951-52 (318)			**Soil**			**Sampled: 04/01/08 00:00**				
Arsenic	EPA 6010B	ND	-----	25.1	mg/kg dry	1x	9110249	11/09/09 08:57	11/10/09 03:12	H3
Barium	"	53.1	-----	0.501	"	"	"	"	"	H3
Cadmium	"	ND	-----	3.01	"	"	"	"	"	H3
Chromium	"	20.6	-----	1.50	"	"	"	"	"	H3
Lead	"	1500	-----	103	"	10x	9100992	10/27/09 18:31	11/03/09 14:19	H3
Selenium	"	ND	-----	25.1	"	1x	9110249	11/09/09 08:57	11/10/09 03:12	H3
Silver	"	ND	-----	3.01	"	"	"	"	"	H3
PSJ0951-53 (329)			**Soil**			**Sampled: 04/01/08 00:00**				
Arsenic	EPA 6010B	ND	-----	25.6	mg/kg dry	1x	9110249	11/09/09 08:57	11/10/09 03:43	H3
Barium	"	36.1	-----	0.511	"	"	"	"	"	H3
Cadmium	"	ND	-----	3.07	"	"	"	"	"	H3
Chromium	"	23.0	-----	1.53	"	"	"	"	"	H3
Lead	"	868	-----	102	"	10x	9100992	10/27/09 18:31	11/03/09 14:25	H3
Selenium	"	ND	-----	25.6	"	1x	9110249	11/09/09 08:57	11/10/09 03:43	H3
Silver	"	ND	-----	3.07	"	"	"	"	"	H3
PSJ0951-54 (1311)			**Soil**			**Sampled: 04/01/08 00:00**				
Arsenic	EPA 6010B	ND	-----	25.6	mg/kg dry	1x	9110249	11/09/09 08:57	11/10/09 03:50	H3
Barium	"	66.2	-----	0.511	"	"	"	"	"	H3
Cadmium	"	ND	-----	3.07	"	"	"	"	"	H3
Chromium	"	12.9	-----	1.53	"	"	"	"	"	H3
Lead	"	1900	-----	102	"	10x	9100992	10/27/09 18:31	11/03/09 14:32	H3
Selenium	"	ND	-----	25.6	"	1x	9110249	11/09/09 08:57	11/10/09 03:50	H3

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GeoEngineers, Inc.	Project Name:	**Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Total Metals per EPA 6000/7000 Series Methods

TestAmerica Portland

Analyte	Method	Result	MDL[A]	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-54 (1311)			**Soil**			**Sampled: 04/01/08 00:00**				
Silver	EPA 6010B	ND	-----	3.07	mg/kg dry	1x	9110249	11/09/09 08:57	11/10/09 03:50	H3
PSJ0951-55 (1331)			**Soil**			**Sampled: 04/01/08 00:00**				
Arsenic	EPA 6010B	ND	-----	25.1	mg/kg dry	1x	9110249	11/09/09 08:57	11/10/09 03:56	H3
Barium	"	17.9	-----	0.501	"	"	"	"	"	H3
Cadmium	"	ND	-----	3.01	"	"	"	"	"	H3
Chromium	"	6.68	-----	1.50	"	"	"	"	"	H3
Lead	"	613	-----	98.3	"	10x	9100992	10/27/09 18:31	11/03/09 14:38	H3
Selenium	"	ND	-----	25.1	"	1x	9110249	11/09/09 08:57	11/10/09 03:56	H3
Silver	"	ND	-----	3.01	"	"	"	"	"	H3
PSJ0951-56 (3118)			**Soil**			**Sampled: 04/01/08 00:00**				
Arsenic	EPA 6010B	ND	-----	24.9	mg/kg dry	1x	9110249	11/09/09 08:57	11/10/09 04:02	H3
Barium	"	61.5	-----	0.498	"	"	"	"	"	H3
Cadmium	"	ND	-----	2.99	"	"	"	"	"	H3
Chromium	"	15.8	-----	1.49	"	"	"	"	"	H3
Lead	"	948	-----	102	"	10x	9100992	10/27/09 18:31	11/03/09 14:44	H3
Selenium	"	ND	-----	24.9	"	1x	9110249	11/09/09 08:57	11/10/09 04:02	H3
Silver	"	ND	-----	2.99	"	"	"	"	"	H3

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The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report shall not be reproduced except in full, without the written approval of the laboratory.

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15055 SW Sequoia Parkway, Suite 140	Project Number: 0758-145-00	Report Created:
Portland, OR 97224	Project Manager: Joey Hickey	12/07/09 14:54

Total Mercury per EPA Method 7471A

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Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-40 (B416 6)			**Soil**			**Sampled: 04/01/08 00:00**				
Mercury	EPA 7471A	ND	-----	0.0942	mg/kg dry	1x	9110474	11/13/09 14:01	11/16/09 09:06	H, N1
PSJ0951-41 (18)			**Soil**			**Sampled: 04/01/08 00:00**				
Mercury	EPA 7471A	ND	-----	0.0975	mg/kg dry	1x	9110474	11/13/09 14:01	11/16/09 09:09	H, N1
PSJ0951-46 (303)			**Soil**			**Sampled: 04/01/08 00:00**				
Mercury	EPA 7471A	ND	-----	0.0963	mg/kg dry	1x	9110474	11/13/09 14:01	11/16/09 09:11	H, N1
PSJ0951-49 (323)			**Soil**			**Sampled: 04/01/08 00:00**				
Mercury	EPA 7471A	ND	-----	0.0960	mg/kg dry	1x	9110474	11/13/09 14:01	11/16/09 09:14	H, N1
PSJ0951-51 (16)			**Soil**			**Sampled: 04/01/08 00:00**				
Mercury	EPA 7471A	ND	-----	0.0950	mg/kg dry	1x	9110474	11/13/09 14:01	11/16/09 09:22	H, N1
PSJ0951-52 (318)			**Soil**			**Sampled: 04/01/08 00:00**				
Mercury	EPA 7471A	ND	-----	0.0927	mg/kg dry	1x	9110474	11/13/09 14:01	11/16/09 09:25	H, N1
PSJ0951-53 (329)			**Soil**			**Sampled: 04/01/08 00:00**				
Mercury	EPA 7471A	ND	-----	0.0915	mg/kg dry	1x	9110474	11/13/09 14:01	11/16/09 09:28	H, N1
PSJ0951-54 (1311)			**Soil**			**Sampled: 04/01/08 00:00**				
Mercury	EPA 7471A	0.367	-----	0.0969	mg/kg dry	1x	9110474	11/13/09 14:01	11/16/09 09:30	H, N1
PSJ0951-55 (1331)			**Soil**			**Sampled: 04/01/08 00:00**				
Mercury	EPA 7471A	0.202	-----	0.0946	mg/kg dry	1x	9110474	11/13/09 14:01	11/16/09 09:33	H, N1
PSJ0951-56 (3118)			**Soil**			**Sampled: 04/01/08 00:00**				
Mercury	EPA 7471A	ND	-----	0.0713	mg/kg dry	1x	9110474	11/13/09 14:01	11/16/09 09:37	H, N1

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15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Organochlorine Pesticides per EPA Method 8081A

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Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-40 (B416 6)			**Soil**			**Sampled: 04/01/08 00:00**				**HI, N1**
Aldrin	EPA 8081A	ND	-----	0.00674	mg/kg dry	1x	9110709	11/20/09 11:13	11/25/09 12:12	
alpha-BHC	"	ND	-----	0.00674	"	"	"	"	"	
beta-BHC	"	ND	-----	0.00674	"	"	"	"	"	
delta-BHC	"	ND	-----	0.00674	"	"	"	"	"	
gamma-BHC (Lindane)	"	ND	-----	0.00674	"	"	"	"	"	
gamma-Chlordane	"	ND	-----	0.00674	"	"	"	"	"	
alpha-Chlordane	"	ND	-----	0.00674	"	"	"	"	"	
Chlordane (tech)	"	ND	-----	0.151	"	"	"	"	"	
4,4'-DDD	"	ND	-----	0.00674	"	"	"	"	"	
4,4'-DDE	"	0.133	-----	0.0337	"	5x	"	"	11/24/09 19:48	
4,4'-DDT	"	0.0482	-----	0.00674	"	1x	"	"	11/25/09 12:12	
Dieldrin	"	ND	-----	0.00674	"	"	"	"	"	
Endosulfan I	"	ND	-----	0.00674	"	"	"	"	"	
Endosulfan II	"	ND	-----	0.00674	"	"	"	"	"	
Endosulfan sulfate	"	ND	-----	0.00674	"	"	"	"	"	
Endrin	"	ND	-----	0.00674	"	"	"	"	"	
Endrin aldehyde	"	ND	-----	0.00674	"	"	"	"	"	
Endrin ketone	"	ND	-----	0.00674	"	"	"	"	"	
Heptachlor	"	ND	-----	0.00674	"	"	"	"	"	
Heptachlor epoxide	"	ND	-----	0.00674	"	"	"	"	"	
Methoxychlor	"	ND	-----	0.00674	"	"	"	"	"	
Toxaphene	"	ND	-----	0.201	"	"	"	"	"	
Surrogate(s): 2,4,5,6-Tetrachloro-m-xylene				*73.5%*		*36 - 140 %*				
PSJ0951-41 (18)			**Soil**			**Sampled: 04/01/08 00:00**				**HI, N1, RL3**
Aldrin	EPA 8081A	ND	-----	0.0140	mg/kg dry	2x	9110709	11/20/09 11:13	11/25/09 14:25	
alpha-BHC	"	ND	-----	0.0140	"	"	"	"	"	
beta-BHC	"	ND	-----	0.0140	"	"	"	"	"	
delta-BHC	"	ND	-----	0.0140	"	"	"	"	"	
gamma-BHC (Lindane)	"	ND	-----	0.0140	"	"	"	"	"	
gamma-Chlordane	"	ND	-----	0.0140	"	"	"	"	"	
alpha-Chlordane	"	ND	-----	0.0140	"	"	"	"	"	
Chlordane (tech)	"	ND	-----	0.313	"	"	"	"	"	
4,4'-DDD	"	ND	-----	0.0140	"	"	"	"	"	
4,4'-DDE	"	0.0798	-----	0.0140	"	"	"	"	"	
4,4'-DDT	"	0.126	-----	0.0140	"	"	"	"	"	

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GeoEngineers, Inc.	Project Name:	**Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Organochlorine Pesticides per EPA Method 8081A

TestAmerica Portland

Analyte	Method	Result	MDL[A]	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-41 (18)			**Soil**			**Sampled: 04/01/08 00:00**				**HI, NI, RL3**
Dieldrin	EPA 8081A	ND	-----	0.0140	mg/kg dry	2x	9110709	11/20/09 11:13	11/25/09 14:25	
Endosulfan I	"	ND	-----	0.0140	"	"	"	"	"	
Endosulfan II	"	ND	-----	0.0140	"	"	"	"	"	
Endosulfan sulfate	"	ND	-----	0.0140	"	"	"	"	"	
Endrin	"	ND	-----	0.0140	"	"	"	"	"	
Endrin aldehyde	"	ND	-----	0.0140	"	"	"	"	"	
Endrin ketone	"	ND	-----	0.0140	"	"	"	"	"	
Heptachlor	"	ND	-----	0.0140	"	"	"	"	"	
Heptachlor epoxide	"	ND	-----	0.0140	"	"	"	"	"	
Methoxychlor	"	ND	-----	0.0140	"	"	"	"	"	
Toxaphene	"	ND	-----	0.417	"	"	"	"	"	
Surrogate(s):	*2,4,5,6-Tetrachloro-m-xylene*			*75.2%*		*36 - 140 %*				
PSJ0951-46 (303)			**Soil**			**Sampled: 04/01/08 00:00**				**HI, NI, RL3**
Aldrin	EPA 8081A	ND	-----	0.0140	mg/kg dry	2x	9110709	11/20/09 11:13	11/25/09 14:51	
alpha-BHC	"	ND	-----	0.0140	"	"	"	"	"	
beta-BHC	"	ND	-----	0.0140	"	"	"	"	"	
delta-BHC	"	ND	-----	0.0140	"	"	"	"	"	
gamma-BHC (Lindane)	"	ND	-----	0.0140	"	"	"	"	"	
gamma-Chlordane	"	ND	-----	0.0140	"	"	"	"	"	
alpha-Chlordane	"	ND	-----	0.0140	"	"	"	"	"	
Chlordane (tech)	"	ND	-----	0.313	"	"	"	"	"	
4,4'-DDD	"	ND	-----	0.0140	"	"	"	"	"	
4,4'-DDE	"	ND	-----	0.0140	"	"	"	"	"	
4,4'-DDT	"	ND	-----	0.112	"	"	"	"	"	RL1
Dieldrin	"	ND	-----	0.0209	"	"	"	"	"	RL1
Endosulfan I	"	ND	-----	0.0140	"	"	"	"	"	
Endosulfan II	"	ND	-----	0.0140	"	"	"	"	"	
Endosulfan sulfate	"	ND	-----	0.0140	"	"	"	"	"	
Endrin	"	ND	-----	0.0979	"	"	"	"	"	RL1
Endrin aldehyde	"	ND	-----	0.0140	"	"	"	"	"	
Endrin ketone	"	ND	-----	0.0209	"	"	"	"	"	RL1
Heptachlor	"	ND	-----	0.0140	"	"	"	"	"	
Heptachlor epoxide	"	ND	-----	0.0140	"	"	"	"	"	
Methoxychlor	"	ND	-----	0.0559	"	"	"	"	"	RL1
Toxaphene	"	ND	-----	0.417	"	"	"	"	"	

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GeoEngineers, Inc.	Project Name:	**Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Organochlorine Pesticides per EPA Method 8081A

TestAmerica Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-46 (303)			**Soil**			**Sampled: 04/01/08 00:00**				**H1, N1, RL3**
Surrogate(s): 2,4,5,6-Tetrachloro-m-xylene				*71.9%*		*36 - 140 %*			*11/25/09 14:51*	
PSJ0951-S1 (16)			**Soil**			**Sampled: 04/01/08 00:00**				**H1, N1, RL3**
Aldrin	EPA 8081A	ND	-----	0.0135	mg/kg dry	2x	9110709	11/20/09 11:13	11/25/09 15:46	
alpha-BHC	"	ND	-----	0.0135	"	"	"	"	"	
beta-BHC	"	ND	-----	0.0135	"	"	"	"	"	
delta-BHC	"	ND	-----	0.0135	"	"	"	"	"	
gamma-BHC (Lindane)	"	ND	-----	0.0135	"	"	"	"	"	
gamma-Chlordane	"	ND	-----	0.0135	"	"	"	"	"	
alpha-Chlordane	"	ND	-----	0.0135	"	"	"	"	"	
Chlordane (tech)	"	ND	-----	0.302	"	"	"	"	"	
4,4'-DDD	"	ND	-----	0.0135	"	"	"	"	"	
4,4'-DDE	"	ND	-----	0.0135	"	"	"	"	"	
4,4'-DDT	"	ND	-----	0.0135	"	"	"	"	"	
Dieldrin	"	ND	-----	0.0135	"	"	"	"	"	
Endosulfan I	"	ND	-----	0.0135	"	"	"	"	"	
Endosulfan II	"	ND	-----	0.0135	"	"	"	"	"	
Endosulfan sulfate	"	ND	-----	0.0135	"	"	"	"	"	
Endrin	"	ND	-----	0.0135	"	"	"	"	"	
Endrin aldehyde	"	ND	-----	0.0135	"	"	"	"	"	
Endrin ketone	"	ND	-----	0.0135	"	"	"	"	"	
Heptachlor	"	ND	-----	0.0135	"	"	"	"	"	
Heptachlor epoxide	"	ND	-----	0.0135	"	"	"	"	"	
Methoxychlor	"	ND	-----	0.0135	"	"	"	"	"	
Toxaphene	"	ND	-----	0.403	"	"	"	"	"	
Surrogate(s): 2,4,5,6-Tetrachloro-m-xylene				*80.4%*		*36 - 140 %*				
PSJ0951-52 (318)			**Soil**			**Sampled: 04/01/08 00:00**				**H1, N1, RL3**
Aldrin	EPA 8081A	ND	-----	0.0211	mg/kg dry	3x	9110709	11/20/09 11:13	11/25/09 16:11	
alpha-BHC	"	ND	-----	0.0211	"	"	"	"	"	
beta-BHC	"	ND	-----	0.0211	"	"	"	"	"	
delta-BHC	"	ND	-----	0.0211	"	"	"	"	"	
gamma-BHC (Lindane)	"	ND	-----	0.0211	"	"	"	"	"	
gamma-Chlordane	"	ND	-----	0.0211	"	"	"	"	"	
alpha-Chlordane	"	ND	-----	0.0211	"	"	"	"	"	
Chlordane (tech)	"	ND	-----	0.473	"	"	"	"	"	

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GeoEngineers, Inc.	Project Name:	**Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Organochlorine Pesticides per EPA Method 8081A

TestAmerica Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-52 (318)			Soil			Sampled: 04/01/08 00:00				H1, N1, RL3
4,4'-DDD	EPA 8081A	ND	-----	0.0211	mg/kg dry	3x	9110709	11/20/09 11:13	11/25/09 16:11	
4,4'-DDE	"	**1.21**	-----	0.176	"	25x	"	"	11/24/09 18:04	
4,4'-DDT	"	**0.945**	-----	0.176	"	"	"	"	"	
Dieldrin	"	ND	-----	0.0211	"	3x	"	"	11/25/09 16:11	
Endosulfan I	"	ND	-----	0.0211	"	"	"	"	"	
Endosulfan II	"	ND	-----	0.0211	"	"	"	"	"	
Endosulfan sulfate	"	ND	-----	0.0211	"	"	"	"	"	
Endrin	"	ND	-----	0.0211	"	"	"	"	"	
Endrin aldehyde	"	ND	-----	0.0211	"	"	"	"	"	
Endrin ketone	"	ND	-----	0.0211	"	"	"	"	"	
Heptachlor	"	ND	-----	0.0211	"	"	"	"	"	
Heptachlor epoxide	"	ND	-----	0.0211	"	"	"	"	"	
Methoxychlor	"	ND	-----	0.0211	"	"	"	"	"	
Toxaphene	"	ND	-----	0.631	"	"	"	"	"	
Surrogate(s):	*2,4,5,6-Tetrachloro-m-xylene*			*76.8%*		*30 - 140 %*				
PSJ0951-54 (1311)			Soil			Sampled: 04/01/08 00:00				H1, N1, RL3
Aldrin	EPA 8081A	ND	-----	0.0203	mg/kg dry	3x	9110709	11/20/09 11:13	11/25/09 16:37	
alpha-BHC	"	ND	-----	0.0203	"	"	"	"	"	
beta-BHC	"	ND	-----	0.0203	"	"	"	"	"	
delta-BHC	"	ND	-----	0.0203	"	"	"	"	"	
gamma-BHC (Lindane)	"	ND	-----	0.0203	"	"	"	"	"	
gamma-Chlordane	"	ND	-----	0.0203	"	"	"	"	"	
alpha-Chlordane	"	ND	-----	0.0203	"	"	"	"	"	
Chlordane (tech)	"	ND	-----	0.454	"	"	"	"	"	
4,4'-DDD	"	ND	-----	0.0203	"	"	"	"	"	
4,4'-DDE	"	**0.686**	-----	0.169	"	25x	"	"	11/24/09 17:38	
4,4'-DDT	"	**0.148**	-----	0.0203	"	3x	"	"	11/25/09 16:37	
Dieldrin	"	ND	-----	0.0203	"	"	"	"	"	
Endosulfan I	"	ND	-----	0.0203	"	"	"	"	"	
Endosulfan II	"	ND	-----	0.0203	"	"	"	"	"	
Endosulfan sulfate	"	ND	-----	0.0203	"	"	"	"	"	
Endrin	"	ND	-----	0.0203	"	"	"	"	"	
Endrin aldehyde	"	ND	-----	0.0303	"	"	"	"	"	RL1
Endrin ketone	"	ND	-----	0.0203	"	"	"	"	"	
Heptachlor	"	ND	-----	0.0203	"	"	"	"	"	

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GeoEngineers, Inc.	Project Name:	**Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Organochlorine Pesticides per EPA Method 8081A

TestAmerica Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-54 (1311)		**Soil**				**Sampled: 04/01/08 00:00**				**H1, N1, RL3**
Heptachlor epoxide	EPA 8081A	ND	-----	0.0203	mg/kg dry	3x	9110709	11/20/09 11:13	11/25/09 16:37	
Methoxychlor	"	ND	-----	0.0203	"	"	"	"	"	
Toxaphene	"	ND	-----	0.606	"	"	"	"	"	
Surrogate(s):	*2,4,5,6-Tetrachloro-m-xylene*			*76.2%*		*36 - 140 %*				

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GeoEngineers, Inc.	Project Name: **Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number: 0758-145-00	Report Created:
Portland, OR 97224	Project Manager: Joey Hickey	12/07/09 14:54

Polychlorinated Biphenyls per EPA Method 8082

TestAmerica Portland

Analyte	Method	Result	MDL[A]	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-40 (B416 6)			**Soil**			**Sampled: 04/01/08 00:00**				**H3**
Aroclor 1016	EPA 8082	ND	-----	0.0335	mg/kg dry	1x	9110268	11/09/09 17:15	11/16/09 18:44	
Aroclor 1221	"	ND	-----	0.0674	"	"	"	"	"	
Aroclor 1232	"	ND	-----	0.0335	"	"	"	"	"	
Aroclor 1242	"	ND	-----	0.0335	"	"	"	"	"	
Aroclor 1248	"	ND	-----	0.0335	"	"	"	"	"	
Aroclor 1254	"	ND	-----	0.0335	"	"	"	"	"	
Aroclor 1260	"	0.0364	-----	0.0335	"	"	"	"	"	
Surrogate(s): Decachlorobiphenyl				*90.5%*		*16 - 149 %*				
PSJ0951-41 (18)			**Soil**			**Sampled: 04/01/08 00:00**				**H3**
Aroclor 1016	EPA 8082	ND	-----	0.0347	mg/kg dry	1x	9110268	11/09/09 17:15	11/16/09 19:50	
Aroclor 1221	"	ND	-----	0.0699	"	"	"	"	"	
Aroclor 1232	"	ND	-----	0.0347	"	"	"	"	"	
Aroclor 1242	"	ND	-----	0.0347	"	"	"	"	"	
Aroclor 1248	"	ND	-----	0.0347	"	"	"	"	"	
Aroclor 1254	"	ND	-----	0.0347	"	"	"	"	"	
Aroclor 1260	"	0.0467	-----	0.0347	"	"	"	"	"	
Surrogate(s): Decachlorobiphenyl				*95.9%*		*16 - 149 %*				
PSJ0951-46 (303)			**Soil**			**Sampled: 04/01/08 00:00**				**H3, RL7**
Aroclor 1016	EPA 8082	ND	-----	0.174	mg/kg dry	5x	9110268	11/09/09 17:15	11/16/09 20:12	
Aroclor 1221	"	ND	-----	0.350	"	"	"	"	"	
Aroclor 1232	"	ND	-----	0.174	"	"	"	"	"	
Aroclor 1242	"	ND	-----	0.174	"	"	"	"	"	
Aroclor 1248	"	ND	-----	0.174	"	"	"	"	"	
Aroclor 1254	"	ND	-----	0.174	"	"	"	"	"	
Aroclor 1260	"	1.37	-----	0.174	"	"	"	"	"	
Surrogate(s): Decachlorobiphenyl				*94.1%*		*16 - 149 %*				
PSJ0951-49 (323)			**Soil**			**Sampled: 04/01/08 00:00**				**H3**
Aroclor 1016	EPA 8082	ND	-----	0.0337	mg/kg dry	1x	9110268	11/09/09 17:15	11/16/09 20:34	
Aroclor 1221	"	ND	-----	0.0678	"	"	"	"	"	
Aroclor 1232	"	ND	-----	0.0337	"	"	"	"	"	
Aroclor 1242	"	ND	-----	0.0337	"	"	"	"	"	
Aroclor 1248	"	ND	-----	0.0337	"	"	"	"	"	

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GeoEngineers, Inc.	Project Name: **Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number: 0758-145-00	Report Created:
Portland, OR 97224	Project Manager: Joey Hickey	12/07/09 14:54

Polychlorinated Biphenyls per EPA Method 8082

TestAmerica Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-49 (323)			**Soil**			**Sampled: 04/01/08 00:00**				H3
Aroclor 1254	EPA 8082	ND	-----	0.0337	mg/kg dry	1x	9110268	11/09/09 17:15	11/16/09 20:34	
Aroclor 1260	"	ND	-----	0.0337	"	"	"	"	"	
Surrogate(s): *Decachlorobiphenyl*				*88.1%*		*16 - 149 %*				
PSJ0951-51 (16)			**Soil**			**Sampled: 04/01/08 00:00**				H3
Aroclor 1016	EPA 8082	ND	-----	0.0336	mg/kg dry	1x	9110268	11/09/09 17:15	11/17/09 12:01	
Aroclor 1221	"	ND	-----	0.0675	"	"	"	"	"	
Aroclor 1232	"	ND	-----	0.0336	"	"	"	"	"	
Aroclor 1242	"	ND	-----	0.0336	"	"	"	"	"	
Aroclor 1248	"	ND	-----	0.0336	"	"	"	"	"	
Aroclor 1254	"	0.0722	-----	0.0336	"	"	"	"	"	
Aroclor 1260	"	ND	-----	0.0336	"	"	"	"	"	
Surrogate(s): *Decachlorobiphenyl*				*103%*		*16 - 149 %*				
PSJ0951-52 (318)			**Soil**			**Sampled: 04/01/08 00:00**				H3
Aroclor 1016	EPA 8082	ND	-----	0.0350	mg/kg dry	1x	9110268	11/09/09 17:15	11/17/09 12:23	
Aroclor 1221	"	ND	-----	0.0705	"	"	"	"	"	
Aroclor 1232	"	ND	-----	0.0350	"	"	"	"	"	
Aroclor 1242	"	ND	-----	0.0350	"	"	"	"	"	
Aroclor 1248	"	ND	-----	0.0350	"	"	"	"	"	
Aroclor 1254	"	ND	-----	0.0350	"	"	"	"	"	
Aroclor 1260	"	0.135	-----	0.0350	"	"	"	"	"	
Surrogate(s): *Decachlorobiphenyl*				*93.3%*		*16 - 149 %*				
PSJ0951-53 (329)			**Soil**			**Sampled: 04/01/08 00:00**				H3
Aroclor 1016	EPA 8082	ND	-----	0.0345	mg/kg dry	1x	9110268	11/09/09 17:15	11/17/09 12:45	
Aroclor 1221	"	ND	-----	0.0694	"	"	"	"	"	
Aroclor 1232	"	ND	-----	0.0345	"	"	"	"	"	
Aroclor 1242	"	ND	-----	0.0345	"	"	"	"	"	
Aroclor 1248	"	ND	-----	0.0345	"	"	"	"	"	
Aroclor 1254	"	ND	-----	0.0345	"	"	"	"	"	
Aroclor 1260	"	0.0879	-----	0.0345	"	"	"	"	"	
Surrogate(s): *Decachlorobiphenyl*				*92.7%*		*16 - 149 %*				

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GeoEngineers, Inc.	Project Name:	**Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Polychlorinated Biphenyls per EPA Method 8082

TestAmerica Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-54 (1311)			**Soil**			**Sampled: 04/01/08 00:00**				H3
Aroclor 1016	EPA 8082	ND	----	0.0336	mg/kg dry	1x	9110268	11/09/09 17:15	11/17/09 13:07	
Aroclor 1221	"	ND	----	0.0677	"	"	"	"	"	
Aroclor 1232	"	ND	----	0.0336	"	"	"	"	"	
Aroclor 1242	"	ND	----	0.0336	"	"	"	"	"	
Aroclor 1248	"	ND	----	0.0336	"	"	"	"	"	
Aroclor 1254	"	ND	----	0.0336	"	"	"	"	"	
Aroclor 1260	"	ND	----	0.0336	"	"	"	"	"	
Surrogate(s): *Decachlorobiphenyl*				*95.6%*		*16 - 149 %*				
PSJ0951-55 (1331)			**Soil**			**Sampled: 04/01/08 00:00**				H3
Aroclor 1016	EPA 8082	ND	----	0.0336	mg/kg dry	1x	9110268	11/09/09 17:15	11/17/09 13:29	
Aroclor 1221	"	ND	----	0.0677	"	"	"	"	"	
Aroclor 1232	"	ND	----	0.0336	"	"	"	"	"	
Aroclor 1242	"	ND	----	0.0336	"	"	"	"	"	
Aroclor 1248	"	ND	----	0.0336	"	"	"	"	"	
Aroclor 1254	"	0.132	----	0.0336	"	"	"	"	"	
Aroclor 1260	"	ND	----	0.0336	"	"	"	"	"	
Surrogate(s): *Decachlorobiphenyl*				*94.6%*		*16 - 149 %*				
PSJ0951-56 (3118)			**Soil**			**Sampled: 04/01/08 00:00**				H3
Aroclor 1016	EPA 8082	ND	----	0.0348	mg/kg dry	1x	9110268	11/09/09 17:15	11/17/09 13:51	
Aroclor 1221	"	ND	----	0.0700	"	"	"	"	"	
Aroclor 1232	"	ND	----	0.0348	"	"	"	"	"	
Aroclor 1242	"	ND	----	0.0348	"	"	"	"	"	
Aroclor 1248	"	ND	----	0.0348	"	"	"	"	"	
Aroclor 1254	"	ND	----	0.0348	"	"	"	"	"	
Aroclor 1260	"	0.122	----	0.0348	"	"	"	"	"	
Surrogate(s): *Decachlorobiphenyl*				*92.9%*		*16 - 149 %*				

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GeoEngineers, Inc.	Project Name:	**Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Percent Dry Weight (Solids) per ASTM D2216-80

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Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-01 (2)			**Soil**			**Sampled: 04/01/08 00:00**				H3
% Solids	NCA SOP	98.0	-----	0.0100	% by Weight	1x	9101058	10/28/09 16:37	10/28/09 16:37	
PSJ0951-02 (5)			**Soil**			**Sampled: 04/01/08 00:00**				H3
% Solids	NCA SOP	97.7	-----	0.0100	% by Weight	1x	9101058	10/28/09 16:37	10/28/09 16:37	
PSJ0951-03 (31)			**Soil**			**Sampled: 04/01/08 00:00**				H3
% Solids	NCA SOP	94.4	-----	0.0100	% by Weight	1x	9101058	10/28/09 16:37	10/28/09 16:37	
PSJ0951-04 (188)			**Soil**			**Sampled: 04/01/08 00:00**				H3
% Solids	NCA SOP	91.0	-----	0.0100	% by Weight	1x	9101058	10/28/09 16:37	10/28/09 16:37	
PSJ0951-05 (209)			**Soil**			**Sampled: 04/01/08 00:00**				H3
% Solids	NCA SOP	95.8	-----	0.0100	% by Weight	1x	9101058	10/28/09 16:37	10/28/09 16:37	
PSJ0951-06 (307)			**Soil**			**Sampled: 04/01/08 00:00**				H3
% Solids	NCA SOP	99.1	-----	0.0100	% by Weight	1x	9101058	10/28/09 16:37	10/28/09 16:37	
PSJ0951-07 (1311)			**Soil**			**Sampled: 04/01/08 00:00**				H3
% Solids	NCA SOP	97.1	-----	0.0100	% by Weight	1x	9101058	10/28/09 16:37	10/28/09 16:37	
PSJ0951-08 (1921)			**Soil**			**Sampled: 04/01/08 00:00**				H3
% Solids	NCA SOP	94.6	-----	0.0100	% by Weight	1x	9101058	10/28/09 16:37	10/28/09 16:37	
PSJ0951-09 (2501)			**Soil**			**Sampled: 04/01/08 00:00**				H3
% Solids	NCA SOP	96.5	-----	0.0100	% by Weight	1x	9101058	10/28/09 16:37	10/28/09 16:37	
PSJ0951-10 (3181)			**Soil**			**Sampled: 04/01/08 00:00**				H3
% Solids	NCA SOP	96.3	-----	0.0100	% by Weight	1x	9101058	10/28/09 16:37	10/28/09 16:37	
PSJ0951-11 (9)			**Soil**			**Sampled: 04/01/08 00:00**				H3

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15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Percent Dry Weight (Solids) per ASTM D2216-80

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Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-11 (9)			Soil			Sampled: 04/01/08 00:00				H3
% Solids	NCA SOP	95.1	-----	0.0100	% by Weight	1x	9101058	10/28/09 16:37	10/28/09 16:37	
PSJ0951-12 (13)			Soil			Sampled: 04/01/08 00:00				H3
% Solids	NCA SOP	92.7	-----	0.0100	% by Weight	1x	9101058	10/28/09 16:37	10/28/09 16:37	
PSJ0951-13 (17)			Soil			Sampled: 04/01/08 00:00				
% Solids	NCA SOP	95.4	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-14 (17)			Soil			Sampled: 04/01/08 00:00				
% Solids	NCA SOP	96.9	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-15 (22)			Soil			Sampled: 04/01/08 00:00				
% Solids	NCA SOP	99.1	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-16 (188)			Soil			Sampled: 04/01/08 00:00				
% Solids	NCA SOP	96.4	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-17 (204)			Soil			Sampled: 04/01/08 00:00				
% Solids	NCA SOP	98.6	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-18 (208)			Soil			Sampled: 04/01/08 00:00				
% Solids	NCA SOP	98.2	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-19 (306)			Soil			Sampled: 04/01/08 00:00				
% Solids	NCA SOP	99.3	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-20 (B424 7)			Soil			Sampled: 04/01/08 00:00				
% Solids	NCA SOP	97.2	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-21 (9)			Soil			Sampled: 04/01/08 00:00				

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GeoEngineers, Inc.	Project Name: **Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number: 0758-145-00	Report Created:
Portland, OR 97224	Project Manager: Joey Hickey	12/07/09 14:54

Percent Dry Weight (Solids) per ASTM D2216-80

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Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-21 (9)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	94.8	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-22 (22)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	98.9	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-23 (190)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	95.7	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-24 (203)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	97.7	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-25 (205)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	95.7	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-26 (209)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	90.1	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-27 (305)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	85.6	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-28 (2501)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	96.1	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-29 (B424 3)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	96.3	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-30 (B414 1)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	98.1	-----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-31 (16)			**Soil**			**Sampled: 04/01/08 00:00**				

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Portland, OR 97224	Project Manager: Joey Hickey	12/07/09 14:54

Percent Dry Weight (Solids) per ASTM D2216-80

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Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-31 (16)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	97.2	----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-32 (196)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	95.9	----	0.0100	% by Weight	1x	9101056	10/28/09 16:36	10/29/09 10:31	H3
PSJ0951-33 (202)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	98.4	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-34 (300)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	92.3	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-35 (310)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	98.7	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-36 (314)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	97.3	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-37 (317)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	99.1	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-38 (328)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	98.5	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-39 (B414 6)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	96.9	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-40 (B416 6)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	99.2	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-41 (18)			**Soil**			**Sampled: 04/01/08 00:00**				

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15055 SW Sequoia Parkway, Suite 140	Project Number: 0758-145-00	Report Created:
Portland, OR 97224	Project Manager: Joey Hickey	12/07/09 14:54

Percent Dry Weight (Solids) per ASTM D2216-80

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Analyte	Method	Result	MDL^	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-41 (18)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	95.4	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-42 (18)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	97.0	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-43 (200)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	97.2	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-44 (202)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	94.3	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-45 (301)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	97.1	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-46 (303)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	95.9	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-47 (310)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	97.9	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-48 (317)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	98.6	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-49 (323)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	98.7	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-50 (B414 4)			**Soil**			**Sampled: 04/01/08 00:00**				
% Solids	NCA SOP	94.1	----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-51 (16)			**Soil**			**Sampled: 04/01/08 00:00**				

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Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Percent Dry Weight (Solids) per ASTM D2216-80

TestAmerica Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PSJ0951-51 (16)			**Soil**				**Sampled: 04/01/08 00:00**			
% Solids	NCA SOP	98.8	-----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-52 (318)			**Soil**				**Sampled: 04/01/08 00:00**			
% Solids	NCA SOP	95.0	-----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-53 (329)			**Soil**				**Sampled: 04/01/08 00:00**			
% Solids	NCA SOP	95.9	-----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-54 (1311)			**Soil**				**Sampled: 04/01/08 00:00**			
% Solids	NCA SOP	97.8	-----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-55 (1331)			**Soil**				**Sampled: 04/01/08 00:00**			
% Solids	NCA SOP	98.8	-----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3
PSJ0951-56 (3118)			**Soil**				**Sampled: 04/01/08 00:00**			
% Solids	NCA SOP	95.6	-----	0.0100	% by Weight	1x	9101055	10/28/09 16:36	10/29/09 10:07	H3

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Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

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QC Batch: 9100990 **Soil Preparation Method: EPA 3050**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (9100990-BLK1)							Extracted: 10/27/09 18:26							
Lead	EPA 6010B	ND	---	9.62	mg/kg wet	1x	--	--	--	--	--	--	10/29/09 19:11	
LCS (9100990-BS1)							Extracted: 10/27/09 18:26							
Lead	EPA 6010B	55.2	---	9.62	mg/kg wet	1x	--	48.1	115%	(80-120)	--	--	10/29/09 19:17	
Matrix Spike (9100990-MS1)					QC Source: PSJ0951-01			Extracted: 10/27/09 18:26						
Lead	EPA 6010B	54.9	---	9.72	mg/kg dry	1x	2.01	48.6	109%	(75-125)	--	--	10/29/09 19:42	
Matrix Spike Dup (9100990-MSD1)					QC Source: PSJ0951-01			Extracted: 10/27/09 18:26						
Lead	EPA 6010B	56.2	---	10.1	mg/kg dry	1x	2.01	50.5	107%	(75-125)	2.31%	(40)	10/29/09 19:49	

QC Batch: 9100991 **Soil Preparation Method: EPA 3050**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (9100991-BLK1)							Extracted: 10/27/09 18:30							
Lead	EPA 6010B	ND	---	9.90	mg/kg wet	1x	--	--	--	--	--	--	10/30/09 15:29	
LCS (9100991-BS1)							Extracted: 10/27/09 18:30							
Lead	EPA 6010B	51.7	---	9.71	mg/kg wet	1x	--	48.5	107%	(80-120)	--	--	10/30/09 15:36	
Matrix Spike (9100991-MS1)					QC Source: PSJ0951-21			Extracted: 10/27/09 18:30						
Lead	EPA 6010B	110	---	10.5	mg/kg dry	1x	67.2	52.7	80.2%	(75-125)	--	--	10/30/09 15:54	
Matrix Spike Dup (9100991-MSD1)					QC Source: PSJ0951-21			Extracted: 10/27/09 18:30						
Lead	EPA 6010B	122	---	10.5	mg/kg dry	1x	67.2	52.7	104%	(75-125)	10.7%	(40)	10/30/09 16:00	

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GeoEngineers, Inc.	Project Name:	**Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

TestAmerica Portland

QC Batch: 9100992 **Soil Preparation Method: EPA 3050**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (9100992-BLK1)							Extracted: 10/27/09 18:31							
Lead	EPA 6010B	ND	---	10.0	mg/kg wet	1x	--	--	--	--	--	--	10/30/09 18:30	
LCS (9100992-BS1)							Extracted: 10/27/09 18:31							
Lead	EPA 6010B	58.3	---	10.0	mg/kg wet	1x	--	50.0	117%	(80-120)	--	--	10/30/09 18:36	
Matrix Spike (9100992-MS1)					QC Source: PSJ0951-41		Extracted: 10/27/09 18:31							
Lead	EPA 6010B	307	---	104	mg/kg dry	10x	219	51.9	168%	(75-125)	--	--	11/02/09 14:51	MHA
Matrix Spike Dup (9100992-MSD1)					QC Source: PSJ0951-41		Extracted: 10/27/09 18:31							
Lead	EPA 6010B	349	---	103	mg/kg dry	10x	219	51.4	253%	(75-125)	13.1%	(40)	11/03/09 15:15	MHA

QC Batch: 9110249 **Soil Preparation Method: EPA 3050**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (9110249-BLK1)							Extracted: 11/09/09 08:57							
Arsenic	EPA 6010B	ND	---	24.5	mg/kg wet	1x	--	--	--	--	--	--	11/10/09 02:28	
Barium	"	ND	---	0.490	"	"	--	--	--	--	--	--	"	
Cadmium	"	ND	---	2.94	"	"	--	--	--	--	--	--	"	
Chromium	"	ND	---	1.47	"	"	--	--	--	--	--	--	"	
Selenium	"	ND	---	24.5	"	"	--	--	--	--	--	--	"	
Silver	"	ND	---	2.94	"	"	--	--	--	--	--	--	"	
LCS (9110249-BS1)							Extracted: 11/09/09 08:57							
Arsenic	EPA 6010B	44.2	---	24.3	mg/kg wet	1x	--	48.5	91.1%	(80-120)	--	--	11/10/09 02:34	
Barium	"	229	---	0.485	"	"	--	243	94.4%	"	--	--	"	
Cadmium	"	22.8	---	2.91	"	"	--	24.3	93.9%	"	--	--	"	
Chromium	"	45.6	---	1.46	"	"	--	48.5	94.0%	"	--	--	"	
Selenium	"	45.1	---	24.3	"	"	--	"	92.9%	"	--	--	"	
Silver	"	23.0	---	2.91	"	"	--	24.3	94.6%	"	--	--	"	
Matrix Spike (9110249-MS1)					QC Source: PSJ0951-52		Extracted: 11/09/09 08:57							
Arsenic	EPA 6010B	43.6	---	25.3	mg/kg dry	1x	5.35	50.6	75.5%	(75-125)	--	--	11/10/09 03:31	
Barium	"	212	---	0.506	"	"	53.1	253	62.8%	"	--	--	"	MS
Cadmium	"	17.8	---	3.04	"	"	1.22	25.3	65.7%	"	--	--	"	MS
Chromium	"	51.4	---	1.52	"	"	20.6	50.6	61.0%	"	--	--	"	MS
Selenium	"	43.6	---	25.3	"	"	1.33	"	83.5%	"	--	--	"	
Silver	"	18.5	---	3.04	"	"	0.0466	25.3	73.0%	"	--	--	"	MS

TestAmerica Portland

Estella K Rieben

Estella Rieben, Project Manager

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THE LEADER IN ENVIRONMENTAL TESTING

PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
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GeoEngineers, Inc.	Project Name:	**Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

TestAmerica Portland

QC Batch: 9110249 **Soil Preparation Method: EPA 3050**

Analyte	Method	Result	MDL^A	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike Dup (9110249-MSD1)					QC Source: PSJ0951-52				Extracted: 11/09/09 08:57					
Arsenic	EPA 6010B	44.2	---	25.1	mg/kg dry	1x	5.35	50.1	77.5%	(75-125)	1.41%	(40)	11/10/09 03:37	
Barium	"	261	---	0.501	"	"	53.1	251	82.9%	"	20.7%	"	"	
Cadmium	"	18.5	---	3.01	"	"	1.22	25.1	69.0%	"	3.74%	"	"	M8
Chromium	"	53.8	---	1.50	"	"	20.6	50.1	66.3%	"	4.47%	"	"	M8
Selenium	"	43.4	---	25.1	"	"	1.33	"	84.0%	"	0.380%	"	"	
Silver	"	19.0	---	3.01	"	"	0.0466	25.1	75.4%	"	2.30%	"	"	

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15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Total Mercury per EPA Method 7471A - Laboratory Quality Control Results

TestAmerica Portland

QC Batch: 9110474 **Soil Preparation Method: EPA 7471A**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (9110474-BLK1)							Extracted: 11/13/09 14:01							
Mercury	EPA 7471A	ND	---	0.0990	mg/kg wet	1x	--	--	--	--	--	--	11/16/09 08:49	
LCS (9110474-BS1)							Extracted: 11/13/09 14:01							
Mercury	EPA 7471A	0.588	---	0.0969	mg/kg wet	1x	--	0.605	97.2%	(80-120)	--	--	11/16/09 08:52	
LCS Dup (9110474-BSD1)							Extracted: 11/13/09 14:01							
Mercury	EPA 7471A	0.587	---	0.0959	mg/kg wet	1x	--	0.600	97.9%	(80-120)	0.210%	(20)	11/16/09 08:55	
Duplicate (9110474-DUP1)					QC Source: PSJ0951-40		Extracted: 11/13/09 14:01							
Mercury	EPA 7471A	ND	---	0.0916	mg/kg dry	1x	ND	--	--	--	77.0%	(40)	11/16/09 08:58	R4
Matrix Spike (9110474-MS1)					QC Source: PSJ0951-40		Extracted: 11/13/09 14:01							
Mercury	EPA 7471A	0.566	---	0.0938	mg/kg dry	1x	0.0156	0.586	93.9%	(75-125)	--	--	11/16/09 09:00	
Matrix Spike Dup (9110474-MSD1)					QC Source: PSJ0951-40		Extracted: 11/13/09 14:01							
Mercury	EPA 7471A	0.590	---	0.0965	mg/kg dry	1x	0.0156	0.603	95.2%	(75-125)	4.09%	(40)	11/16/09 09:03	

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15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Organochlorine Pesticides per EPA Method 8081A - Laboratory Quality Control Results

TestAmerica Portland

QC Batch: 9110709 **Soil Preparation Method: EPA 3550**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (9110709-BLK1)								Extracted: 11/20/09 11:13						NI
Aldrin	EPA 8081A	ND	---	0.00669	mg/kg wet	1x	--	--	--	--	--	--	11/24/09 12:51	
alpha-BHC	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
beta-BHC	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
delta-BHC	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
gamma-BHC (Lindane)	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
gamma-Chlordane	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
alpha-Chlordane	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
Chlordane (tech)	"	ND	---	0.150	"	"	--	--	--	--	--	--	"	
4,4'-DDD	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
4,4'-DDE	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
4,4'-DDT	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
Dieldrin	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
Endosulfan I	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
Endosulfan II	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
Endosulfan sulfate	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
Endrin	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	C
Endrin aldehyde	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
Endrin ketone	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
Heptachlor	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
Heptachlor epoxide	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
Methoxychlor	"	ND	---	0.00669	"	"	--	--	--	--	--	--	"	
Toxaphene	"	ND	---	0.200	"	"	--	--	--	--	--	--	"	
Surrogate(s): 2,4,5,6-Tetrachloro-m-xylene		*Recovery: 79.9%*			*Limits: 36-140%*								*11/24/09 12:51*	

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15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Polychlorinated Biphenyls per EPA Method 8082 - Laboratory Quality Control Results

TestAmerica Portland

QC Batch: 9110268 **Soil Preparation Method: EPA 3550**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (9110268-BLK1)								Extracted: 11/09/09 17:15						
Aroclor 1016	EPA 8082	ND	---	0.0333	mg/kg wet	1x	--	--	--	--	--	--	11/17/09 14:35	
Aroclor 1221	"	ND	---	0.0669	"	"	--	--	--	--	--	--	"	
Aroclor 1232	"	ND	---	0.0333	"	"	--	--	--	--	--	--	"	
Aroclor 1242	"	ND	---	0.0333	"	"	--	--	--	--	--	--	"	
Aroclor 1248	"	ND	---	0.0333	"	"	--	--	--	--	--	--	"	
Aroclor 1254	"	ND	---	0.0333	"	"	--	--	--	--	--	--	"	
Aroclor 1260	"	ND	---	0.0333	"	"	--	--	--	--	--	--	"	
Surrogate(s): Decachlorobiphenyl		*Recovery: 97.6%*			*Limits: 16-149%*								*11/17/09 14:35*	
LCS (9110268-BS1)								Extracted: 11/09/09 17:15						
Aroclor 1016	EPA 8082	0.332	---	0.0332	mg/kg wet	1x	--	0.333	99.9%	(57-135)	--	--	11/17/09 14:57	
Aroclor 1260	"	0.322	---	0.0332	"	"	--	"	96.9%	(60-135)	--	--	"	
Surrogate(s): Decachlorobiphenyl		*Recovery: 95.4%*			*Limits: 16-149%*								*11/17/09 14:57*	
Matrix Spike (9110268-MS1)					QC Source: PSJ0951-40			Extracted: 11/09/09 17:15						
Aroclor 1016	EPA 8082	0.319	---	0.0334	mg/kg dry	1x	ND	0.334	95.4%	(37-145)	--	--	11/16/09 19:06	
Aroclor 1260	"	0.332	---	0.0334	"	"	0.0364	"	88.4%	(25-144)	--	--	"	
Surrogate(s): Decachlorobiphenyl		*Recovery: 92.3%*			*Limits: 16-149%*								*11/16/09 19:06*	
Matrix Spike Dup (9110268-MSD1)					QC Source: PSJ0951-40			Extracted: 11/09/09 17:15						
Aroclor 1016	EPA 8082	0.329	---	0.0335	mg/kg dry	1x	ND	0.336	97.9%	(37-145)	3.08%	(26)	11/16/09 19:28	
Aroclor 1260	"	0.360	---	0.0335	"	"	0.0364	"	96.4%	(25-144)	8.17%	(30)	"	
Surrogate(s): Decachlorobiphenyl		*Recovery: 96.9%*			*Limits: 16-149%*								*11/16/09 19:28*	

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15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Percent Dry Weight (Solids) per ASTM D2216-80 - Laboratory Quality Control Results

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QC Batch: 9101055 **Soil Preparation Method: Dry Weight**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Duplicate (9101055-DUP1)					QC Source: PSJ0951-45			Extracted: 10/28/09 16:36						
% Solids	NCA SOP	96.7	---	0.0100	% by Weight	1x	97.1	--	--	--	0.413%	(20)	10/29/09 10:07	H3
Duplicate (9101055-DUP2)					QC Source: PSJ0951-46			Extracted: 10/28/09 16:36						
% Solids	NCA SOP	96.2	---	0.0100	% by Weight	1x	95.9	--	--	--	0.312%	(20)	10/29/09 10:07	H3

QC Batch: 9101056 **Soil Preparation Method: Dry Weight**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Duplicate (9101056-DUP1)					QC Source: PSJ0951-21			Extracted: 10/28/09 16:36						
% Solids	NCA SOP	94.9	---	0.0100	% by Weight	1x	94.8	--	--	--	0.105%	(20)	10/29/09 10:31	H3

QC Batch: 9101058 **Soil Preparation Method: Dry Weight**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Duplicate (9101058-DUP1)					QC Source: PSJ1007-01			Extracted: 10/28/09 16:37						
% Solids	NCA SOP	69.4	---	0.0100	% by Weight	1x	68.5	--	--	--	1.31%	(20)	10/28/09 16:37	
Duplicate (9101058-DUP2)					QC Source: PSJ1007-02			Extracted: 10/28/09 16:37						
% Solids	NCA SOP	62.9	---	0.0100	% by Weight	1x	62.5	--	--	--	0.638%	(20)	10/28/09 16:37	

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GeoEngineers, Inc.	Project Name:	**Midway Atoll National Wildlife Refuge**	
15055 SW Sequoia Parkway, Suite 140	Project Number:	0758-145-00	Report Created:
Portland, OR 97224	Project Manager:	Joey Hickey	12/07/09 14:54

Notes and Definitions

Report Specific Notes:

C	-	Calibration Verification recovery was above the method control limit for this analyte. Analyte not detected, data not impacted.
H	-	Sample analysis performed past method-specified holding time.
H1	-	Sample analysis performed past the method-specified holding time per client's approval.
H3	-	Sample was received and analyzed past holding time.
M8	-	The MS and/or MSD were below the acceptance limits. See Blank Spike (LCS).
MHA	-	Due to high levels of analyte in the sample, the MS/MSD calculation does not provide useful spike recovery information. See Blank Spike (LCS).
N1	-	See case narrative.
R4	-	Due to the low levels of analyte in the sample, the duplicate RPD calculation does not provide useful information.
RL1	-	Reporting limit raised due to sample matrix effects.
RL3	-	Reporting limit raised due to high concentrations of non-target analytes.
RL7	-	Sample required dilution due to high concentrations of target analyte.

Laboratory Reporting Conventions:

DET	-	Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only
ND	-	Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).
NR/NA	-	Not Reported / Not Available
dry	-	Sample results reported on a Dry Weight Basis. Results and Reporting Limits have been corrected for Percent Dry Weight.
wet	-	Sample results and reporting limits reported on a Wet Weight Basis (as received). Results with neither 'wet' nor 'dry' are reported on a Wet Weight Basis.
RPD	-	RELATIVE PERCENT DIFFERENCE (RPDs calculated using Results, not Percent Recoveries).
MRL	-	METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.
MDL*	-	METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated Results.
Dil	-	Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.
Reporting Limits	-	Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.
Electronic Signature	-	Electronic Signature added in accordance with TestAmerica's *Electronic Reporting and Electronic Signatures Policy*. Application of electronic signature indicates that the report has been reviewed and approved for release by the laboratory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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GeoEngineers

TestAmerica: 9405 SW Nimbus Avenue, Beaverton, OR, 97005

CHAIN OF CUSTODY REPORT

Work Order #: PSJ09951

CLIENT GeoEngineers, Inc
REPORT TO Joey Hickey
ADDRESS 15055 SW Sequoia Parkway, Suite 140, Portland, OR
PHONE 503-624-9274 FAX 503-620-5940

INVOICE TO Tom Smiley
US Fish and Wildlife Service
911 NE 11th Ave, Portland, OR
503-231-6145
P.O. NUMBER 0758-145-00

PROJECT NAME Midway Atoll National Wildlife Refuge
PROJECT NUMBER 0758-145-00
SAMPLED BY US FWS

TURNAROUND REQUEST in Business Days *
Organic and Inorganic Analyses
☑ 10 ☐ 7 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ < 1
Petroleum Hydrocarbon Analyses
☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ < 1

OTHER Specify
* Turnaround Requests less than standard may incur Rush Charges.

	CLIENT SAMPLE IDENTIFICATION	SAMPLE COLLECTION Date	Depth below ground surface (bgs) (inches)	REQUESTED ANALYSES: Total Lead	PCBs	TCLP Pb	RCRA 8 Metals Total	MATRIX (W, S, O)	# OF CONT	COMMENTS	LAB WO ID
1	2	--	3	X	1		3	S	1		
2	5	--	3	X	1		3	S	1		
3	31	--	3	X	1	2	3	S	1		
4	188	--	6	X	1		3	S	1		
5	209	--	6	X	1		3	S	1		
6	307	--	6	X	1		3	S	1		
7	1311	--	12	X	1	2	3	S	1		
8	1921	--	6	X	1		3	S	1		
9	2501	--	36	X	1		3	S	1		
10	3181	--	24	X	1		3	S	1		
11	9	--	0	X	1	2	3	S	1		
12	13	--	0	X	1		3	S	1		
13	17	--	0	X	1		3	S	1		
14	17	--	3	X	1		3	S	1		
15	22	--	12	X	1	2	3	S	1		
16	188	--	0	X	1		3	S	1		
17	204	--	0	X	1		3	S	1		
18	208	--	0	X	1		3	S	1		
19	308	--	6	X	1	2	3	S	1		
20	B424 7	--	3	X	1		3	S	1		
21	9	--	3	X	1		3	S	1		
22	22	--	9	X	1		3	S	1		
23	190	--	0	X	1	2	3	S	1		
24	203	--	9	X	1		3	S	1		
25	205	--	3	X	1		3	S	1		
26	209	--	3	X	1		3	S	1		
27	305	--	3	X	1	2	3	S	1		
28	2501	--	18	X	1		3	S	1		
29	B424 3	--	3	X	1		3	S	1		
30	B414 1	--	0	X	1		3	S	1		
31	16	--	9	X	1	2	3	S	1		

GeoEngineers

TestAmerica: 9405 SW Nimbus Avenue, Beaverton, OR, 97005

CHAIN OF CUSTODY REPORT

Work Order #: PSJ0951

CLIENT GeoEngineers, Inc
REPORT TO Joey Hickey
ADDRESS 15055 SW Sequoia Parkway, Suite 140, Portland, OR
PHONE 503-624-9274 FAX 503-620-5940

INVOICE TO Tom Smiley
US Fish and Wildlife Service
911 NE 11th Ave, Portland, OR
503-231-5145
P.O NUMBER 0758-145-00

TURNAROUND REQUEST In Business Days *
Organic and Inorganic Analyses
Petroleum Hydrocarbon Analyses
OTHER Specify:
* Turnaround Requests less than standard may incur Rush Charges.

PROJECT NAME: Midway Atoll National Wildlife Refuge
PROJECT NUMBER 0758-145-00
SAMPLED BY: US FWS

PRESERVATIVE

REQUESTED ANALYSES

	CLIENT SAMPLE IDENTIFICATION	SAMPLE COLLECTION Date	Depth below ground surface (bgs) (inches)	Total Lead	PCBs	TCLCP Pb	RCRA 8 Metals Total							MATRIX (W, S, O)	# OF CONT.	COMMENTS	LAB WO ID
32	196	--	0	X	1	2	3							S	1		
33	202	--	0	X	1		3							S	1		
34	300	--	0	X	1		3							S	1		
35	310	--	3	X	1	2	3							S	1		
36	314	--	3	X	1		3							S	1		
37	317	--	6	X	1		3							S	1		
38	328	--	0	X	1		3							S	1		
39	B414 6	--	0	X	1	2	3							S	1		
40	B416 6	--	0	X	1		3							S	1		
41	18	--	0	X	1		3							S	1		
42	18	--	12	X	1		3							S	1		
43	200	--	0	X	1		3							S	1		
44	202	--	3	X	1	2	3							S	1		
45	301	--	0	X	1		3							S	1		
46	303	--	0	X	1		3							S	1		
47	310	--	0	X	1		3							S	1		
48	317	--	12	X	1	2	3							S	1		
49	323	--	6	X	1		3							S	1		
50	B414 4	--	0	X	1		3							S	1		
51	18	--	6	X	1	2	3							S	1		
52	318	--	6	X	1		3							S	1		
53	329	--	0	X	1		3							S	1		
54	1311	--	6	X	1		3							S	1		
55	1331	--	0	X	1		3							S	1		
56	3118	--	6	X	1	2	3							S	1		

RELINQUISHED BY: [signature] DATE: 10/26/2009
PRINT NAME: Joey Hickey FIRM: GeoEngineers TIME: 16:30
RECEIVED BY: [signature] DATE: 10/26/09
PRINT NAME: Bob FIRM: TAP TIME: 16:30

RELINQUISHED BY: [signature] DATE: 10/26/09
PRINT NAME: Bob FIRM: TAP TIME: 16:56
RECEIVED BY: [signature] DATE: 10/26/09
PRINT NAME: [illegible] FIRM: TAP TIME: 1650

Notes:

1 - Run 10 highest Total Pb samples for PCBs.
2 - Composite - 15 samples (after all other testing is done) and run TCLCP Pb
3 - Run 10 highest total Pb samples for Total RCRA 8 metals

0-9

TestAmerica Portland

Sample Receiving Checklist

Work Order #: PSJ0951 Date/Time Received: 10/26/09 1650

Client Name and Project: Geoengineers

Time Zone:

☐EDT/EST ☐CDT/CST ☐MDT/MST ☑PDT/PST ☐AK ☐OTHER

Unpacking Checks:

Cooler #(s): 1 ____ ____ ____ ____

Temperatures: 0.9 ____ ____ ____ ____

Digi #1 ☐ Digi #2 ☐ IR Gun ☑ (☑Plastic ☐Glass)

Temperature out of Range:

__Not enough or No Ice

__Ice Melted

__W/in 4 Hrs of collection

__Other:_____

Initials: MA

N/A	Yes	No	
☑	☐	☐	1. If ESI client, were temp blanks received? If no, document on NOD.
☑	☐	☐	2. Cooler Seals intact? (N/A if hand delivered) if no, document on NOD.
	☑	☐	3. Chain of Custody present? If no, document on NOD.
	☑	☐	4. Bottles received intact? If no, document on NOD.
	☑	☐	5. Sample is not multiphasic? If no, document on NOD.
	☑	☐	6. Proper Container and preservatives used? If no, document on NOD.
☑	☐	☐	7. pH of all samples checked and meet requirements? If no, document on NOD.
☑	☐	☐	8. Cyanide samples checked for sulfides and meet requirements? If no, notify PM.
☑	☐	☐	9. HF Dilution required?
	☑	☐	10. Sufficient volume provided for all analysis? If no, document on NOD and consult PM before proceeding.
	☑	☐	11. Did chain of custody agree with samples received? If no, document on NOD.
	☑	☐	12. Is the "Sampled by" section of the COC completed?
☑	☐	☐	13. Were VOA/Oil Syringe samples without headspace?
☑	☐	☐	14. Were VOA vials preserved? ☐HCl ☐Sodium Thiosulfate ☐Ascorbic Acid
	☐	☑	15. Did samples require preservation with sodium thiosulfate?
☑	☐	☐	16. If yes to #14, was the residual chlorine test negative? If no, document on NOD.
☑	☐	☐	17. Are dissolved/field filtered metals bottles sediment-free? If no, document on NOD.
☑	☐	☐	18. Is sufficient volume provided for client requested MS/MSD or matrix duplicates? If no, document on NOD and contact PM before proceeding.
☑	☐	☐	19. Are analyses with short holding times received in hold?
	☑	☐	20. Was Standard Turn Around (TAT) requested?
	☐	☑	21. Receipt date(s) < 48 hours past the collection date(s)? If no, notify PM.

MA

TestAmerica Portland

Sample Receiving Checklist

Work Order #: PSJ0951

Login Checks:

Initials:

N/A	Yes	No	
	☑	☐	22. Sufficient volume provided for all analysis? If no, document on NOD & contact PM.
☑	☐	☐	23. Sufficient volume provided for client requested MS/MSD or matrix duplicates? If no, document on NOD and contact PM.
	☑	☐	24. Did the chain of custody include "received by" and "relinquished by" signatures, dates and times?
☐	☑	☐	25. Were special log in instructions read and followed?
	☑	☐	26. Were tests logged checked against the COC?
☑	☐	☐	27. Were rush notices printed and delivered?
☑	☐	☐	28. Were short hold notices printed and delivered?
☑	☐	☐	29. Were subcontract COCs printed?
☑	☐	☐	30. Was HF dilution logged?

Labeling and Storage Checks:

Initials:

N/A	Yes	No	
☑	☐	☐	31. Were the subcontracted samples/containers put in Sx fridge?
☑	☐	☐	32. Were sample bottles and COC double checked for dissolved/filtered metals?
	☑	☐	33. Did the sample ID, Date, and Time from label match what was logged?
☑	☐	☐	34. Were Foreign sample stickers affixed to each container and containers stored in foreign fridge?
☑	☐	☐	35. Were HF stickers affixed to each container, and containers stored in Sx fridge?
☐	☑	☐	36. Was an NOD for created for noted discrepancies and placed in folder?

Document any problems or discrepancies and the actions taken to resolve them on a Notice of Discrepancy form (NOD).