FINAL REPORT

Panama Canal Authority

Verification of the Implementation and Effectiveness of the Mitigation Measures for the Panama Canal Expansion Program – Third Set of Locks Project:

Bi-Annual Report ERM 002

June 2009

ERM Project: 0091551

Environmental Resources Management
World Trade Center, Piso 1 Área Comercial
Marbella, Calle 53

TABLE OF CONTENTS

ACRONYSMS 1

1 PROGRAM PROMOTER 5

2 INTRODUCTION 6

3 PROGRESS OF THE CANAL EXPANSION PROGRAM 8

3.1 PACIFIC ACCESS CHANNEL EXCAVATION 8

3.2 IMPROVEMENTS TO THE NAVIGATION CHANNELS 9

3.3 IMPROVEMENTS TO WATER SUPPLY 10

3.4 DESIGN AND CONSTRUCTION OF POSTPANAMAX LOCKS 10

4 PURPOSE, SCOPE OF WORK AND METHODOLOGY 11

4.1 PURPOSE 11

4.2 SCOPE OF WORK 11

4.3 METHODOLOGY 14

5 VERIFICATION OF THE PROGRAM'S ENVIRONMENTAL AND SOCIAL REQUIREMENTS 16

5.1 EXCAVATION OF THE PACIFIC ACCESS CHANNEL 16
5.1.1 Mitigation Measures Compliance Observations 17

5.2 GATUN LAKE DEEPENING AND WIDENING, AND DEEPENING OF THE CULEBRA CUT NAVIGATION CHANNEL 79
5.2.1 Mitigation Measures Compliance Observations 79
5.2.1.1 Mitigation Plan Measures 80
5.2.1.1.1 Air Quality, Noise and Vibration Control Programs 80
5.2.1.1.2 Soil Protection Program 81
5.2.1.1.3 Water Resources Protection Program 81
5.2.1.1.4 Flora and Fauna Protection Program 82
5.2.1.1.5 Solid and Hazardous Waste Management Program 83
5.2.1.1.6 Material Management Program 83
5.2.1.1.7 Socioeconomic and Cultural Resources Program 84
5.2.1.2 Monitoring Plans 85
5.2.1.2.1 Air Quality Monitoring 85
5.2.1.2.2 Noise Monitoring 85
5.2.1.2.3 Vibration Monitoring 86

5.2.1.2.4 Water and Sediment Quality Monitoring 86

5.3 WIDENING AND DEEPENING OF THE PACIFIC ENTRANCE CHANNEL 107
5.3.1 Compliance Observations 107
5.3.1.1 Mitigation Measures Plan 107
5.3.1.1.1 Air Quality, Noise and Vibration Control Program 107
5.3.1.1.2 Water Resources Protection Program 108
5.3.1.1.3 Flora and Fauna Protection Program 109
5.3.1.1.4 Solid and Hazardous Waste Management Program 110
5.3.1.1.5 Materials Management Program 110
5.3.1.2 Socioeconomic and Cultural Resources Program 111
5.3.1.3 Monitoring Plans 111
5.3.1.4 Air Quality Monitoring 111
5.3.1.5 Noise Monitoring 111
5.3.1.6 Vibration Monitoring 112
5.3.1.7 Water and Sediment Quality Monitoring 112

5.4 WIDENING AND DEEPENING OF THE ATLANTIC ENTRANCE CHANNEL 127

5.5 ELEVATION OF MAXIMUM LEVEL OF GATUN LAKE 127

5.6 DESIGN AND CONSTRUCTION OF POSTPANAMAX LOCKS 127

5.7 REQUIREMENTS REVIEW OF ANAM RESOLUTION DIEORA IA-632-2007 128
5.7.1 Bi-Annual Report 128
5.7.2 Program Modifications 129
5.7.3 Health and Occupational Safety Program 129
5.7.4 Ecological Compensation Plan 129
5.7.5 Reforestation Plan 130

6 CONCLUSIONS 132

7 APPENDICES 133

Appendix A List of reviewed Documents
Appendix B List of Interviwed Personnel
Appendix C DIEORA IA 632-2007 Resolution of November 9, 2007
Appendix D Requirements Log
Appendix E Telephone Calls Log
Appendix F Photo Log of ERM Visits
Appendix G Blasting Operations Report

TABLE OF CONTENTS

Appendix H	*Report of the Stabilization of Sur 1 Disposal Site*
Appendix I	*PAC 3 Wildlife Rescue Plan and Implementation Report*
Appendix J	*Air Quality Monitoring, Panama Canal Area*
Appendix K	*PAC 1 Water Quality Analytical Report*
Appendix L	*Ecological Compensation Payment Log for De Lessps Island in Lake Gatun*
Appendix M	*Water and Sediment Analytical Results for Gatun Lake*
Appendix N	*Blasting Operations Plan for the Pacific Entrance Channel Project*
Appendix O	*Blasting Test for the Pacific Entrance Channel Project*
Appendix P	*Structural Study of Properties near the Pacific Entrance Channel Project Area*
Appendix Q	*Water and Marine Sediment Analytical Results for the Pacific Entrance Channel Project Area*
Appendix R	*Resolution AG-0250-2009 Authorizing Change in Schedule of Blasting Activities*
Appendix S	*Closure of Tucan Case*

LIST OF TABLES

Table 1	*Inspection Program*	*13*
Tabla 2	*Pacific Entrance Excavation*	*35*
Table 3	*Widening and Deepening of Lake Gatun and Deepening of the Culebra Cut*	*88*
Table 4	*Widening and Deepening of the Pacific Entrance Channel*	*115*

ACRONYSMS

ACP	**Panama Canal Authority**
ANAM	**National Environmental Authority**
APPC	**Pan American Association for Conservation**
PAC 1	**Pacific Access Channel Phase 1**
PAC 2	**Pacific Access Channel Phase 2**
PAC 3	**Pacific Access Channel Phase 3**
CILSA	**CILSA Minera María**
CUSA	**Constructora Urbana, S.A.**
D.E.	**Decreto Ejecutivo (Executive Order)**
DECASA	**Desarrollo Ecológicos y Ambientales, S.A.**
DGNTI	**Dirección General de Normas y Tecnología Industrial (General Bureau of Industrial Standards and Technology)**
DI	**Dredging International**
DIEORA	**Dirección de Evaluación y Ordenamiento Ambiental (Environmental Evaluation and Organization Bureau)**
DIMAUD	**Dirección Municipal de Aseo Urbano y Domiciliario (Municipal Bureau of City and Residential Sanitation)**
ERM	**Environmental Resources Management**
EsIA	**Estudios de Impacto Ambiental (Environmental Impact Studies - EIA)**
ETESA	**Empresa de Transmisión Eléctrica, S.A.**
IARM	**Sección de Manejo y Seguimiento Ambiental (Environmental Management and Follow-up Branch)**
IDAAN	**Instituto de Acueductos y Alcantarillados Nacionales (National Institute of Aqueducts and Sewage Systems)**
MEC	**Munitions and Explosives of Concern**
MPN	**Most Probable Number**
NTU	**Nephelometric Turbidiy Units**
PMA	**Programa de Manejo Ambiental (Environmental Management Plan)**

PNCC	**Parque Nacional Camino de Cruces (Las Cruces National Park)**
USDA	**United States Department of Agriculture**
USEPA	**United States Environmental Protection Agency**

EXECUTIVE SUMMARY

This report describes the degree of compliance regarding the implementation and effectiveness of the environmental and social mitigation measures for the Panama Canal Expansion Program, Third Set of Locks Project (the "Program") during the period of November 1, 2008 through April 30, 2009. The environmental and social requirements for the Program are presented in the following documents:

- Environmental Management Plans (EMPs), which are part of the Environmental Impact Studies (EsIA) of the Program; and
- DIEORA IA-632-2007 Resolution promulgated by the National Environmental Authority (ANAM, Spanish acronyms) that authorizes the execution of the Program.

Under contract with the Panama Canal Authority (ACP), Environmental Resources Management (ERM) conducted the following compliance verification tasks: (1) revision of contracts between the ACP and Program contractors, (2) revision of monthly and quarterly environmental mitigation measures reports from contractors and the ACP, (3) revision of training logs of contractors and ACP personnel, (4) revision of communication documents among the ACP, its contactors and the public, (5) revision of environmental monitoring and environmental and social follow-up plans, (6) field verification visits carried out by ERM in March and April 2009, (7) interviews performed by ERM to ACP representatives, contractors and Program personnel, and (8) documents provided by the ACP. The information provided by the ACP included the EMPs, ANAM's Resolution DIEORA IA-632-2007, documentation pertaining to verification of the Program personnel presently active (contractors and ACP personnel) and documentation from ACP's Environmental Management and Follow-up Branch (IARM).

ERM verified compliance with the environmental and social requirements of those Program components being executed during the current reporting period. The activities under execution during this reporting period correspond to the Excavation of the Pacific Access Channel Phase 1 (PAC-1), Phase 2 (PAC 2), and Phase 3 (PAC 3); the Widening and Deepening of the Pacific Approach Channel; and the activities related to the Widening and Deepening of Gatun Lake's Navigational Channel and the Deepening of the "Corte Culebra".

As a result of the aforementioned activities, ERM has confirmed that the execution of the various Program components comply with the applicable environmental and social requirements. In general, the mitigation measures have been implemented effectively in all the areas impacted by the Program as it pertains to the commitments established under the EMPs and requiements of the Resolution.

1 PROGRAM PROMOTER

The promoter of this project is the Panama Canal Authority (ACP), an autonomous agency of the Panamanian Government, created by way of the Political Constitution of the Republic of Panama and organized under Act 19 of June 11, 1997. ACP is the entity responsible for promoting the execution of the mitigation measures described on the environmental management plans (EMPs) included in the environmental impact studies. Below is the general information on ACP:

Promoter:	Panama Canal Authority
Location:	ACP Administration Building, Altos de Balboa, Ancón, Panamá.
Legal Representative:	Mr. Alberto Alemán Zubieta
Personal Identity Card:	8-404-837
Web Page:	www.pancanal.com
Contact person:	Daniel Muschett Manager

Environmental Management and Follow-up Branch (IARM)

Phone number:	(507) 276-1295
Fax number:	(507) 276-1291
E-mail address:	dmuschett@pancanal.com

2 INTRODUCTION

This report presents the results of ERM inspections and documentation review related to the implementation and effectiveness of the environmental and social impact mitigation measures for the Panama Canal Expansion Program, Third Set of Locks Project (the "Program") carried out by the ACP and its contractors during the period of November 1, 2008 through April 30, 2009. The environmental and social requirements for the Program are presented in the following documents:

- Environmental Management Plans (EMPs), which are part of the Environmental Impact Studies (EsIA) of the Program. The various EMPs were consolidated under the EMP included in the Category III EsIA prepared by ACP and approved by ANAM for the execution of the Program; and
- DIEORA IA-632-2007 Resolution promulgated by the National Environmental Authority (ANAM, Spanish acronyms) that authorizes the execution of the Program.

Under contract with the Panama Canal Authority (ACP), Environmental Resources Management (ERM) conducted the following compliance verification tasks: (1) revision of contracts between the ACP and Program contractors, (2) revision of monthly and quarterly environmental mitigation measures reports from contractors and the ACP, (3) revision of training logs of contractors and ACP personnel, (4) revision of communication documents among the ACP, its contactors and the public, (5) revision of environmental monitoring and environmental and social follow-up plans, (6) field verification visits carried out by ERM in March and April 2009, (7) interviews performed by ERM to ACP representatives, contractors and Program personnel, and (8) documents provided by the ACP. The information provided by the ACP included the EMPs, ANAM's Resolution DIEORA IA-632-2007, documentation pertaining to verification of the Program personnel presently active (contractors and ACP personnel) and documentation from ACP's Environmental Management and Follow-up Branch (IARM).

The report is organized by grouping the main components of the project in sections; that is to say, all works related to the excavation of the Pacific access channel are described in the same section, followed by all activities related to the widening and deepening of Gatun Lake and the Culebra Cut and, finally,

all works associated with the widening and deepening of the Pacific approach channel. Each component's description includes a compliance matrix.

Components such as the design and construction of the locks, the dredging of the Atlantic approach channel, and the increase of Gatun Lake's maximum operational level, which are still pending for execution, are mentioned in a general way on the report, indicating their current status.

3 PROGRESS OF THE CANAL EXPANSION PROGRAM[1]

3.1 PACIFIC ACCESS CHANNEL EXCAVATION

During the first quarter of 2009, the contractor for the first phase of the Excavation of the Pacific Access Channel (PAC I), Constructora Urbana, S.A. (CUSA) – excavated approximately 1.2 million cubic meters of the Paraiso hill, for a total of approximately 6.9 million cubic meters of excavated material to date. During this reporting period, the contractor fractured an estimated 484 thousand cubic meters of rock through 20 detonations using 146 tons of explosives. In addition, the contractor began work for the repair of sewer system for the new Borinquen road, which revealed problems with the concrete piping. The contractor also completed the installation of the 30-centimeter-thick base of the first kilometer of the southern track and continued the leveling of the remaining sections of the road.

In the second phase of the Pacific Access Excavation Channel (PAC 2), the contractor, CILSA-Minera Maria (CILSA), excavated approximately 1.5-million cubic meters of earthen material from the access channel, as well as from the Cocoli river deviation channel during the first quarter of 2009. To date, CILSA has removed, approximately, a total of 4.4-million cubic of material. The contractor fractured approximately 847-thousand cubic meters of rock through 68 blasts and 270 tons of explosives.

On January 15, 2009, the ACP gave MECO, S.A., the contractor for the third phase of the Pacific Access Excavation Channel (PAC 3), the order to proceed with project activities. MECO presented the main project plans including the Environmental, Safety and Quality plans, as wells as its organizational structure and resources. The ACP reviewed and commented on the plans, schedules and preliminary requirements. In March 2009, the contractor began the assembly of a Terex OK-120 excavator in preparation for the excavation activities to be commenced in April 2009. Also, in March, the contractor cleared approximately eight acres of sites contaminated with munitions and explosives of concern (MEC).

[1] Información obtenida del informe trimestral de avance de la obra enero-marzo 2009, www.pancanal.com

Lastly, Electricas de Medellín Ltda., the contractor for the relocation of the electrical transmission lines, completed the installation of the foundations and of ten electrical towers (per project requirements), and began the installation of the power lines.

3.2 *IMPROVEMENTS TO THE NAVIGATION CHANNELS*

Dredging International, the contractor for the widening and deepening of the Pacific Entrance Channel project, removed approximately 575-thousand cubic meters of dredged material during the first quarter of 2009, for a total (to date) of 1.8-million cubic meters, which represents 20% of the contract's total volume. At the end of January, the contractor stopped work for 15 days to provide maintenance to Vlaandere XIX dredge and to rotate the discharge piping so as to extend its useful life.

Survey and public dissemination activities, required prior to the project's drilling and blasting phase, began in March 2009. Also, most of the work to raise the elevation of the berms of the Velasquez Disposal site was completed. On February 13, part of the northern section of the berm collapsed. This section is being repaired by ACP personnel.

In Gatun Lake, the ACP dredged approximately 729-thousand cubic meters for a total, to date, of 4.5-million cubic meters. This represents 21% of the contact's total volume. Drilling and underwater blasting were conducted during this quarter, as well as vegetation clearing and terrain leveling in the San Pablo reach. During this quarter, the ACP fractured 68-thousand cubic meters of underwater rock through drilling and blasting in the San Pablo and Juan Grande reaches. Earth work was completed in the San Pablo reach. Also, the ANAM approved the Wildlife Rescue Plan in the island of De Lesseps, followed by ACP's implementation of the plan. In addition, the clearing of vegetation was begun in preparation for earth work in the island of De Lesseps.

Dredging activities were not conducted in the Culebra Cut during January or February. In March, the ACP dredged approximately 36-thousand cubic meters in the Bajo Obispo reach using the IL Pricipe, rented, dredge, for an approximate total of 90-thousand cubic meters, to date, representing an estimated 3% of the total volume to be dredged.

The activities for the widening and deepening of the Atlantic Entrance project have not begun. Therefore, their integration to the environmental follow-up process will be done at the commencement of field activities.

3.3 *IMPROVEMENTS TO WATER SUPPLY*

In February, the ACP began the design to increase the maximum operational level of Gatun Lake, and continued with a review of the project's scope of work.

At the end of February, Louis Berger Group, the contractor in charge of the Socio-environmental Management Plan, submitted its report that included topographic survey, inventory, property assessments, and socioeconomic profile in the islands of Gatun Lake, including Barro Colorado Natural Monument and the Gigante Peninsula. These are managed by the Smithsonian Institute of Tropical Research. This management plan will be incorporated to the Program's socioeconomic requirements.

3.4 *DESIGN AND CONSTRUCTION OF POSTPANAMAX LOCKS*

This component of the Expansion Program has not begun. Therefore, its integration to the environmental follow-up process will be done at the commencement of field activities.

4 PURPOSE, SCOPE OF WORK AND METHODOLOGY

4.1 PURPOSE

The purpose of this report is to describe the degree of compliance regarding the implementation and effectiveness of the environmental and social mitigation measures for the Program during the period of November 1, 2008 through April 30, 2009. These measures include those contained in the EMP, as well as those under the resolution section that authorizes the Program activities of the EsIA. The verification activities are based on compliance reports review, including plans and programs submitted by the contractors responsible for developing ACP works, reports by the ACP, and interviews with ACP personnel and contractors, as well as visits to the Program sites to confirm the information received.

Appendix A presents a list of all documents reviewed to prepare this report, whereas *Appendix B* shows a list of the individuals interviewed during the field inspection and work meetings. All mitigation measures implemented to this moment are related to the Project construction phase. To date, all the implemented measures are associated with the Program's construction stage.

4.2 SCOPE OF WORK

The PMA form the EsIA Category III and the ANAM Resolution DIEORA IA 632-2007 of November 9, 2007 (*See Appendix C*) were used in the verification of the environmental compliance of the various Program components.

In summary, the work developed by ERM to prepare this report included:

- A review of relevant reports and documents (*see the list on Appendix A).* Prior to visiting ongoing projects, ERM conducted a thorough review of the monthly reports submitted by the contractors and their environmental experts.
- In order to identify all implementation measures applicable to the requirements under the PMA, ERM prepared a log of commitments from Chapter 8 of the Category III EsIA (*see Appendix D*).
- Review of the entire phone call and e-mail logs for telephone number *800-0714* and e-mail address *ampliacion@pancanal.com* installed by ACP to receive complaints, reports, and requests for information. The Implementation of this mechanism is considered important to document

complaints and concerns expressed by the communities affected by the expansion works *(see Appendix E)*. This information was complemented with a review of the contractors' phone call and complaint logs related to Program activities.

- Meetings held between the ERM team and members of IARM's Engineering and Programs Administration Department of ACP to discuss in greater detail, and prior to the field visits, the requirements of the verification efforts. These included the logistics in conducting field visits to project areas to confirm the implementation of the EMP, define the scope of work, and discuss the methodology and contents of the report.
- Field visits to inspect the effectiveness in the implementation of the EMP and the plans and programs included therein, and interviews to project contractors and ACP staff that are responsible for the implementation of the mitigation measures. A photographic log of the field visits is included in *Appendix F*. The field visits were conducted in November 2008 and in March and April 2009 as follows:

ERM's technical team that participated in the November 2008 visits consisted of Dr. Andres Meglioli – Project Director, Mr. Eduardo Cedeño, Manager, ERM Panama, S.A., and Dr. Rene Ledesma, specialist in natural resources management. In Addition, Mr. Jose Miguel Guevara, geographer, participated in the visits to the San Pablo Reach and Mindi Dredge, conducted on Thursday, November 13.

In the March 2009 visit, ERM members consisted of Dr. Andres Meglioli; Mr. Pedro Panzardi, Partner-in-Charge of ERM-Panama office; Mrs. Damaris Negron, Project Manager and Quality Control Manager; Dr. Emlen Myers, social and cultural resources specialist; Mr. Eduardo Cedeño; and Mr. Jose Miguel Guevara.

Mrs. Damaris Negron, Dr. Emlen Myers and Mr. Jose Miguel Guevara participated in the verification visit of April 2009.

The inspection program was conducted as shown in **Table 1**, below.

Table 1 Inspection Program

First Site Visit	Program Component Inspected
Wednesday the 12 of November 2008, from 8:30 a.m. to 5:00 p.m.	▪ Dredging of the Navigation Channel for the Pacific Approach by contractor Dredging International de Panamá, SA; ▪ Excavation of the Pacific Access Channel Phase 2 (PAC 2) by contractor CILSA-Minera Maria; ▪ Excavation of the Pacific Access Channel, Phase 1 (PAC 1) by contractor Constructora Urbana, S.A (CUSA).
Thursday the November 13, 2008, from 8:30 a.m. to 5:00 p.m.	▪ Widening and Deepening of the Gatun Lake and Culebra Cut by the ACP's Dredging Division with support from external contractors; ▪ Camino de Cruces National Park native species reforestation Project, which is a part of the ecological compensation program of the ACP's Canal Expansion Program.
Friday November 14, 2008 from 8:30 a.m. to 5:00 p.m.	▪ Excavation of the Pacific Access Channel (PAC 2) by contractor CILSA- Minera Maria; ▪ Construction activities and the Cocoli River divertion channel.

Second Site Visit	Program Component Inspected
Monday March 2, 2009, from 8:30 a.m. to 4:00 p.m.	▪ All day Meeting with ACP to listen to reports form ACP environmental staff assigned to Program contractors, and to plan logistics of weeks visits;
Tuesday March 3, 2009, from 8:00 a.m. to 5:00 p.m.	▪ PAC-1 site visit and PAC-3 staff visit. PAC-3 staff is doing pre mobilization planning PAC-1 field offices;
Wednesday March 4, 2009, from 8:00 a.m. to 5:00 p.m.	▪ PAC-2 site visit; ▪ Visit to archaeological "chance find" excavation at Bordada Juan Grande, Punta Mamey Oeste; ▪ Visit to potentially affected household sites at Gatun Islands of Gallina and Gallina Clueca.
Thursday March 5, 2009, from 8:00 a.m. to 5:00 p.m.	▪ Visit to Dredging International site; ▪ Visit to Potential Atlantic-side work camp; ▪ Visit to Atlantic side communities Mindy, José D. Bazán (Davis), Arco Iris, Margarita, Colon; ▪ Visit to Pacific side community of Diablo; ▪ Visit to Gatun Lake dredging site (at Mindi dredge) and De Lesseps Island.
Friday March 6, 2009, from 7:00 a.m. to 3:00 p.m.	▪ Visit to the Campana National Park reforestation site; ▪ Closeout meeting, all ACP IARM Staff, all ERM Team.

Third Site Visit	Program Component Inspected
Tuesday 21 April 2009 8:00 a.m. to 5:00 p.m.	▪ Opening meeting with the ACP; ▪ Visit and PAC 1 and PAC 3 project tours; ▪ Visit and tour of PAC 2 project areas.
Wednesday 22 April 2009 8:00 a.m. to 5:00 p.m.	▪ Visit and boat tour of Gatun Lake; ▪ Visit and tour to the island of De Lesseps in Gatun Lake; ▪ Visit and car tour of Tanque Negro Norte and Tanque Negro Sur disposal site. ▪ Visit and car tour in the Loma Borracho area; ▪ Car tour to the potential camp site for the workers of the widening and deepening of the Atlantic Entrance Channel in Colon.
Thursday 23 April 2009 8:00 a.m. to 2:00 p.m.	▪ Visit to the administrative offices and Dredging International camp; ▪ Boat tour to the widening and deepening of the Pacific Entrance Channel project; ▪ Visit to the Clamshell No. 53 dredger.

4.3 *METHODOLOGY*

For the evaluation of compliance with the PMA, the same methodology was used herein as that used in the first bi-annual report dated December 2008. This methodology employs matrices that describe the Program's mitigation measures, the activities implemented to comply with the requirements of the management plan, the observations made by ERM, and whether a given requirement complies or not with the applicable measure, or if instead, the measure is not applicable. This methodology provides a high degree of assurance regarding the verification of whether a specific measure complies or not, and of its effectiveness.

The compliance matrices include only those mitigation measures that are applicable during the current or future inspection periods for any given project component.

In order to facilitate reading and evaluation of the implementation of the mitigation measures, the following section of this report presents a description of each of the Program components. Program components currently active during the foregoing reporting period are: the Excavation of the Pacific Access Channel Phase 1 (PAC-1), Phase 2 (PAC 2), and Phase 3 (PAC 3); the Widening and Deepening of the Pacific Approach Channel; and

the activities related to the Widening and Deepening of Gatun Lake's Navigational Channel and the Deepening of the Culebra Cut. Each of these Program components includes a mitigation measures compliance matrix.

Verification of the mitigation measures for the design and construction of locks, the widening and deepening of the Atlantic Approach Channel, the elevation of Gatun Lake's maximum operational level, and the excavation of the Pacific Access Channel Phase 4 (PAC 4) will be added to the corresponding bi-annual report once the activities of said components begin.

5 VERIFICATION OF THE PROGRAM'S ENVIRONMENTAL AND SOCIAL REQUIREMENTS

This section describes the compliance status with the Program's mitigation measures during the period of November 1, 2008 through April 30, 2009. Based on the inspections conducted by ERM, following the aforementioned methodology, it is concluded that the socio-environmental mitigation measures have been implemented effectively in the Program's active components during the examined time period.

Following is a description of the degree of compliance for each active Program component.

5.1 EXCAVATION OF THE PACIFIC ACCESS CHANNEL

The mitigation measures referred to in this section pertain mainly to the PAC 1 and PAC 2 Program phases, given that the PAC 3 field activities had just begun in March 2009, whereas PAC 4 has not yet been bid. The activities PAC 3 consisted of the cleanup of approximately eight acres of sites contaminated with Munitions and Explosives of Concern (MEC), vegetation clearing, fauna rescue and relocation, surveying of topography in the northern portion of the project, and construction of temporary project facilities.

In November 2008, and March and April 2009, ERM visited the following project areas:

PAC 1 – Paraiso hill excavation site; main camp, where equipment maintenance shops are located; fuel storage area; materials and hazardous and non-hazardous wastes storage area; Borinquen road detour area; new electrical transmission towers; and deposit sites for the material excavated from site T6.

In the April 2009 visit, the excavation activities in PAC 1 were near completion and the contractor, CUSA, was developing a demobilization plan of the main camp.

PAC 2 – excavation sites; Cocoli river deviation channel; Borinquen road detour area; equipment maintenance shops; main camp, where fuel,

materials, and hazardous and non-hazardous wastes storage areas are located; and excavation material deposit sites *(See Appendix F*).

PAC 3 – temporary camp and area north of the project where the contractor was conducting vegetation clearing and fauna rescue. Prior to ERM's visit of April 2009, the contractor had completed the cleanup of the UXOs at the northern portion of the project *(See Appendix F*).

5.1.1 Mitigation Measures Compliance Observations

The following sections summarize in narrative form the general compliance status with the EMP's mitigation measures by the project promoter and contractors. A compliance matrix is presented at the end of these sections that details the mitigation measures following a "*comply*" or "*do not comply*" format, and the observations and activities performed for the implementation of the mitigation measures. A column is included for those measures considered as not applicable; that is, measures not being implemented given that the activity triggering the mitigation has not yet commence.

5.1.1.1 Mitigation Plan Measures

5.1.1.1.1 Air Quality, Noise and Vibration Control Program

- Air Quality Control Program

  ERM reviewed the monthly mitigation measures reports, submitted to the ACP by Program contractors, corresponding to the period of November 2008 to April 2009. According to these reports, air quality mitigation measures had been implemented at PAC 1, PAC 2 and PAC 3. The specific air quality mitigation measures reviewed by ERM in these reports are as follows: (1) maintenance records for heavy equipment and machinery used in the Program, (2) description of water spraying procedures for dust suppression, (3) records of training for heavy equipment operators, (4) description of solid waste incineration restrictions, and (5) records of solid waste disposal at the Cerro Patacon, and (6) records of the regulation of vehicular-traffic speed.

  The contractors for PAC 1, PAC 2 and PAC3 provided ERM with preventive maintenance reports for the heavy equipment and machinery used in the Program. According to these records, these contractors are following the required maintenance schedules for their heavy equipment

and machinery, therefore complying with the air quality control program in this regard.

Compliance with the prohibition of on-site solid waste burning is observed in all excavation contracts. Evidence of on-site solid waste burning was not observed during the field inspections, or in records or reports from project contractors or the ACP.

During the field visits, ERM observed tank trucks used for the spraying of water on earthen roads and other construction areas during active use. This measure is described in the PAC 1, PAC 2 and PAC 3 contractors' monthly reports. This procedure is effective in controlling fugitive dust is the project areas (*See Appendix F*).

During the field visit of March 2009, ERM observed lack of appropriate traffic control signs and absence of traffic control personnel at the PAC 2 location known as the Road to the South Disposal Site. This observation, which contrasts with the adequate implementation of traffic control measures observed in other PAC 2 locations, was quickly reported to the contractor. These issues were corrected as confirmed during ERM's visit of April 2009 (*See Appendix F*).

ERM inquired about the standard safety practices implemented by the vehicle operators with emphasis on the measures implemented by the contractors to ensure safe operating speeds. According to interviews conducted by ERM with PAC 1, PAC 2 and PAC 3 personnel, training related to speed limits is provided to heavy equipment operators on a regular basis. Further, a speed recorder is installed on each heavy equipment vehicle to track daily maximum speed. The data generated by each speed recorder is retrieved daily and reviewed by a designated person to verify compliance with established speed limits. If speed limits are exceeded, the operator receives a verbal warning. A written warning is given to the operator upon a second violation of the speed limit. An operator is dismissed from the Project if a third speed limit violation occurs.

- Noise Control Program

According to the PAC 1, PAC 2 and PAC 3 implementation reports of the mitigation measures, the equipment is inspected for proper operation conditions, equipment preventive maintenance is conducted, nearby residential communities are notified regarding the blasting operations

schedule, blasting operation schedules are kept per agreements with the ACP (from 6:00 a.m. to 6:00 p.m. on work days, from 8:00 a.m. to 6:00 p.m. on Saturdays, and from 10:00 a.m. to 6:00 p.m. on Sundays). Regarding occupational noise levels, ERM reviewed the records of the distribution of noise protection equipment to Program workers for the PAC 1, PAC 2 and PAC 3. ERM also reviewed training records for vehicle operators, who are taught to avoid unnecessary use of horns, alarms, sirens and to the shut off of equipment during downtime. Therefore, the mitigation measures for occupational noise have been implemented effectively.

Details regarding the measurement of noise levels are found in the section entitled "Monitoring Plan".

- Vibration Control Program

ERM reviewed the Program Blasting Plans for PAC 1 and PAC 2, and confirmed that both incorporated the mitigation and safety measures indicated in the EMP. The contractor for PAC 3 has contracted the services of Sybol, a company that specializes in blasting, to develop the blasting plan. Blasting operations have not been conducted in PAC 3 during the foregoing evaluation period.

The monthly mitigation measure reports for PAC 1 and PAC 2 include the type and quantity of explosives and procedures used during blasting operations (*See Appendix G*).

During ERM's field visit of March 2009, CILSA personnel, PAC 2 contractor, reported that rock fragments fell onto the roof of the maintenance shed of the golf course at the Tucan Country Club during Project blasting activities. This incident was immediately notified to the representative of the golf club, and an incident investigation was conducted. As a result of the investigation, CILSA amended its Blasting Operation Plan to prevent further incidents of this kind, and the Tucan Country Club was reimbursed for the roof's repairement costs. This situation is being handled through the insurance company, as required in the contract. Evidence of the actions taken by CILSA and ACP are properly documented in the administration files of the project. Copy of the Settlement, as a proof of case closure, is included in *Appendix S*.

Blasting operations have not been conducted in PAC 3 during the foregoing evaluation period. However, MECO was in the process of

meeting with the Paraiso community with regard to future blasting activities that will be conducted as part of the project (*See Appendix F*).

5.1.1.1.2 Soil Protection Program

According to the contractors' monthly reports, soil mitigation measures are being implemented. The specific measures reviewed by ERM in these reports were: (1) landslide control measures, (2) soil erosion and sedimentation control measures, (3) slope stabilization measures, and (4) soil compaction measures.

The Quality Control Report dated March 2009 for PAC 2 indicates that the following activities are conducted: measurement of slopes in the North Excavation project area; measurement of soil compaction at the new Borinquen Road; and installation of geotextile membranes along the banks of the Cocoli river deviation channel.

The following measures related to hydro-seeding activities are being implemented in PAC 1 and PAC 2 according a review of the contractors' monthly reports and field visit verifications: erosion control blanket installation, drainage system installation in deposits for rocky material (French drains), and installation of energy-dissipating structures in potentially unstable areas.

GRASSTECH, in charge of the hydro-seeding of PAC 1 and PAC 2 project areas, has conducted hydro-seeding in the Cocoli river deviation channel, and in the new track of Borinquen road (*See Appendix F*).

Activities requiring soil protection measures have not been conducted in PAC 3.

5.1.1.1.3 Water Resources Protection Program

Based on the monthly mitigation measure reports and site visits, ERM verified that the water resources are being protected. Measures observed and documented included the compaction of excavated materials at the disposal sites (i.e. disposal sites 1, 2, 3, and 4), drain installation, installation of sediment traps at vehicle wash locations, and culvert construction for road drainage control.

Domestic waste water is also being handled as specified in the EMP. The PAC 1 and PAC 2 Project administration buildings are connected to a septic

system and to the ACP sanitary sewer system, respectively. Maintenance records of portable toilets were provided in the contractors' monthly mitigation measure reports.

During the field visit of March 2009, ERM observed that earthen material that had been transported and compacted at the *Sur 1* disposal site revealed cracks in areas adjacent to the Cocoli River alluvial plain. This issue had been reported in the February 2009 contractor's report for PAC 2, and confirmed by the Project's ACP representative. On April 8, 2009, the ACP presented an investigation report describing the mitigation measures to be implemented to prevent potential negative impacts to the river (see *Appendix H*). Among these measures were the removal of approximately 80,000 cubic meters of unclassified material. French drains were to be installed at the base of the disposal site once soil removal was completed. In the field visit of April 2009, ERM confirmed that approximately 80% of the earthen material had been removed from the affected areas. The removed material was transferred to other areas of the *Sur 1* disposal site not showing unstability problems. The ACP is evaluating alternate disposal sites to compensate for the loss in capacity due to the unstability problems in certain sectors of the *Sur 1* disposal site.

Housekeeping and waste management practices had improved at the PAC 1 and PAC 2 project areas since ERM's November 2008 field visit, as observed on the following visits. Deficiencies related to fuel management and spill prevention had been addressed and corrected adequately. For example, at the PAC 2 Project Area, secondary containment was provided for the fuel storage tanks and tanks truck were stationed on impermeable concrete slabs provided with concrete berms. Also, the vehicle accesses of the truck maintenance shops were covered with crushed gravel to minimize muddy and slippery surfaces.

In PAC 3, a sediment trap was installed at the unnamed creek located in the northern portion of the Project (*See Appendix F*).

5.1.1.1.4 Flora and Fauna Protection Program

To verify compliance with the Flora and Fauna Protection Programs in the EMP, ERM reviewed the following documents: (1) contractors' monthly mitigation measures reports, (2) Camino de Cruces National Park reforestation reports for PAC 1, (3) Altos de Campana National Park reforestation reports for PAC 1, (4) report of training seminar at the plant nursery for the Piedras Gordas reforestation project, (5) report of training

seminar at the plant nursery for the reforestation project at Bajo Grande in Ojo de Agua Calabazo, (6) report of training seminar at the plant nursery for the reforestation project at CIFO Chiriqui, (7) report of training seminar at the plant nursery for the reforestation project at Parque Nacional Chagres y Parque Nacional Omar Torrijos Herrera. In November 2008, ERM visited the Camino the Cruces National Park and in March 2009 visited the Altos de Campana National Park. Based on document reviews and field visits, ERM verified that the mitigation measures for the protection of flora and fauna are being implemented effectively.

- Flora

The re-vegetation programs undertaken by the PAC 1 and PAC 2 contractors at the Program construction areas have the following objectives: (1) mitigate the direct biological impacts of vegetation removal; (2) install permanent erosion control in cleared areas to avoid soil loss; and (3) leave a visually appealing green landscape after construction is complete. ERM verified that construction and site re-vegetation are being conducted in appropriate areas such as slopes and road shoulders. All of the site re-vegetation work for both Projects is being done by GRASSTECH, who also does follow-up fertilization and maintenance. Records of hydro-seeding activities are available in the contractors' monthly reports.

The ACP will conduct maintenance of the reforested area for five years and has contracted the company Geo Forestal, S.A. to execute the maintenance program. Maintenance activities include clearing, fertilization, reseeding, pest control, and fire control. ERM reviewed the reforestation follow-up reports prepared by Geo Forestal, S.A. This document includes a progress report up to January 2009 regarding reforestation activities. According to this report, project personnel conduct periodic visual inspections to verify growth in reforested areas.

Project PAC 2 affected 72 hectares of secondary forest for which 145 hectares of compensatory reforestation will be completed. Thirty hectares are being reforested within the Altos de Campana National Park. The remaining 115 hectares will be planted in 2009 in the Omar Torrijos National Park in 2009.

ERM reviewed the February 2009 reforestation follow-up reports for the Altos de Campana National Park. This document includes a progress report since February 2009, when reforestation activities began. ERM visited the reforestation area in March 2009 and confirmed that the reforestation activities were in compliance with the reforestation plan.

As a general recycling measure, some of the vegetation material removed from areas cleared for PAC 2 is stacked and reused as energy dissipating structures at the Southern Deposit site.

The companies Forestal Los Carpatos and JS Chacon conducted the three reforestation projects that compensate for a portion of the PAC 3 project. These companies are conducting training for the establishment and operation of the plant nurseries in the various communities chosen for this purpose.

- Fauna

The Pan-American Association for Conservation (APPC, Spanish acronym), with the support of the US Forest Service Institute of Tropical Forestry, has implemented the mitigation measures for the rescue and relocation of wildlife in PAC 1 and PAC 2.

For fauna at PAC 1, the final fauna relocation report identified various relocation areas. Wildlife was relocated in the surroundings of areas of rescue in PAC 1, as well as to nearby national parks such as Soberania and Las Cruces. The fauna was also relocated to areas of plantation and fragmented secondary forest along the western bank of the canal that runs parallel to the PAC 1 section of the Borinquen Road.

The fauna protection program includes training for the staff of the PAC 1 contractor, CUSA. The training informs workers about the rescue program and its objectives, and provides instruction on how to respond when animals that need rescue are encountered. Training records for these topics, along with attendance lists, are provided in CUSA's monthly mitigation measure reports. Based on the reported information, ERM verified that the rescue and relocation efforts from this project have been successful.

At the PAC 2 project area, the fauna rescue and relocation efforts also have been successfully executed by specialists of the APCC. Species identification for each rescued animal is provided and included in the Program's inventory of rescued animals. Rescued animals from PAC 2 locations were relocated to nearby national parks including Soberanía and Camino de Cruces. Staff members from APCC and ANAM were present during the release of the animals, and the event was documented with photographs.

As in PAC 1, the PAC 2 fauna protection program includes staff training. The training informs workers about the rescue program and its objectives,

and provides instruction on how to respond when animals that need rescue are encountered. Training records for these topics, along with attendance lists, are provided in CILSA's monthly mitigation measure reports. Based on the reported information, ERM verified that the rescue and relocation efforts from this Program have been successful.

In PAC 3, the company CODESA has been contracted to aid in the rescue and relocation of wild animals. In cleanup areas of unexploited ordinances, the personnel conducting cleanup (from the company ISTHMIAN) have been trained to rescue the wild animals encountered in those areas. Personnel from CODESA are stationed in the perimeter of the project areas to complete the relocation procedure once the animals have been rescued. ERM interviewed a specialist from CODESA while in the process of animal rescue operations. The specialist explained how the rescue and relocation procedure was carried out. The specialist indicated that once the rescue is carried out, the animals are inspected by a veterinarian before they are relocated to the Soberania National Park in accordance with ANAM. If the animals show lesions or disease, they are transferred to the Metropolitan National Park where they are treated by specialized personnel. In the environmental follow-up report corresponding to March 2009, MECO included a report regarding the fauna rescue process as carried out by CODESA and a daily log that includes an inventory of rescued animals in the project area (*See Appendix I*).

To reduce disturbance of animals that might remain in the PAC 1, PAC 2 and PAC 3 construction areas, employees have been instructed not to use horns or whistles unless absolutely necessary. Program vehicles and equipment are kept in good condition and have engine mufflers to minimize noise levels. Regarding risk reduction of collision with wild animals, warning signs indicating maximum vehicle speed were observed.

5.1.1.1.5 Solid and Hazardous Waste Management Program

The management of solid and hazardous wastes follows ACP's waste management policies. During the field visits of November 2008 and March 2009, and March and April 2009, ERM observed that trash bins were provided at office areas and that at the construction sites, color coded 55-gallon drums were used for the collection of different types of waste (i.e., blue for dry trash, grey for inorganic waste, green for organic waste, black for oil residues, and yellow for diesel fuel residues; *See Appendix F*).

Final disposal of solid waste is performed by DIMAUD for PAC 1 and PAC 3, and by the company Serviaseo for PAC 2. The domestic wastes of all three project areas are hauled to the Cerro Patacón sanitary landfill. The PAC 1, PAC 2 and PAC 3 monthly reports include final disposal certificates and payment receipts for waste disposal.

The PAC 1 and PAC 3 project administration buildings are connected to a septic system, whereas that of PAC 2 is connected to the ACP sanitary sewer system. The Project construction areas are provided with one portable toilet for every 20 workers. The portable toilets are periodically maintained by TESCAN in all three projects. Maintenance records are provided in the contractors' monthly reports (*See Appendix F*).

During the field visits ERM confirmed that the industrial and hazardous wastes generated at the Program areas are handled according to the ACP and international policies and regulations. These wastes include the following: used lubricants, used filters, refrigerant, and spent acid-filled batteries. The following companies manage the recycling of the used oil: DIMAUD in PAC 1, NAVES Supply in PAC 2 and Reciclaje DJ in PAC 3.

Based on the documentation reviewed along with the field visits, ERM verified that the PAC 1, PAC 2 and PAC 3 projects are in compliance with the EMP's solid waste management requirements.

5.1.1.1.6 Materials Management Program

The Materials Management Programs for the PAC 1, PAC 2 and PAC 3 include the management of flammable and combustible liquids and compressed gas cylinders. ERM reviewed the contractors' monthly reports and verified compliance of the program during the field visits to PAC 1, PAC 2 and PAC 3 project areas. Also, PAC 1 and PAC 2 contractors provided copies of their respective Contingency Plans. These include the names and phone numbers of the emergency contacts as well as the procedures to be followed should an emergency occur in their project areas. ERM reviewed these contingency plans and verified that they were updated, adequate for the project areas, to the materials that are handled, and for the type of emergencies that may occur.

At the PAC 1 and PAC 2 project areas, training regarding hazardous material handling is offered to project personnel as verified in the monthly reports. These trainings include topics such as: the elimination of ignition sources (i.e. cigarettes, spark, etc.) during the handling of combustible and

flammable materials; emergency response procedures for loading and unloading of diesel fuel, the use of material safety data sheets (MSDS) and procedures for the handling and storage of compressed gas cylinders, among others.

In March 2009, ERM noted improvements over material management practices at PAC 2 compared to the November 2008 visit. These improvements include the following:

1. The liquid fuel storage shed, located adjacent to the PAC 2 maintenance shop was equipped with a secondary containment.
2. The parking area for the diesel fuel tank truck at PAC 2 was provided with an impervious concrete slab and berm (*See Appendix F*).

At both Program areas, PAC 1 and PAC 2, ERM observed adequate chemical spill and fire control emergency equipment such as fire extinguishers, absorbent material, and emergency exit signs, among others.

5.1.1.1.7 Socioeconomic and Cultural Program

The effectiveness of the measures designed to stimulate the national economy and increase revenues to the treasury through job creation is reflected, among other things, in the magnitude of the labor force, services provided, and goods acquired by local subcontractors. This process has a multiplier positive effect over the national economy through the generation of salaries and contracted services. By September 30, 2008, the companies CUSA, CILSA and MECO had employed more than 1,190 individuals, including administrative personnel, workers (assistants, maintenance personnel and warehouse personnel), and heavy equipment operators.

Furthermore, these three PAC contractors have jointly subcontracted the services of the following companies:

- DESARROLLO ECOLOGICO Y AMBIENTALES
- ELECTRICA DE MEDELLIN
- CARDOZE Y LINDO, S.A.
- TECNOLOGIA SANITARIA, S.A.
- ENVIROLAB
- AUSTIN CARIBBEAN, S.A.
- ASOCIACION PANAMERICANA PARA LA CONSERVACION

- ECOAMBIENTE S.A.
- LIVING PANAMA, S.A.
- MINERIA, EXPLOSIVOS Y SERVICIOS, S.A.
- TECNILAB, S.A.
- GRASSTECH
- FUNDACIONES, S.A.
- SERVIEQUIPO
- PRO-ONE S.A.
- MURGOS ARQUITECTOS S.A.

The ACP contracting process has made a concerted effort to match contract size and technical requirements so as to make individuals, small and medium sized contracting businesses as well as larger enterprises eligible. In this way the Program's positive impact on Panama's construction and consulting services industry have been maximized, and will not only extend the capacity and experience of larger firms.

ACP has included some clauses in the terms of reference of the projects about the participation of rural communities in activities such as nursery, planting and maintenance projects. Recruitment, the acquisition of field experience, and training in tree pruning sustainable practices represent a substantial socio-economic benefit for rural communities near protected areas where the ACP develops its reforestation projects.

Another positive socio-economic impact of the Program is the work experience and on-the-job training that the contractor and subcontractor employees are receiving regarding environmental and social issues. When considering that at its peak, the ACP has as a goal the employment of well over 6,000 workers, it is apparent that the environmental and social training associated with the Project EMP has the opportunity to make a difference in the common work practices of the national labor force, not only because of the size of the number of workers trained, but also because of the prestige and influence of ACP as an institution.

- Training

CUSA has contracted the services of DECASA for the implementation of the EMP environmental programs in PAC 1. CUSA's monthly reports provide evidence of the list of participants of the training sessions. Within the foregoing evaluation period, project personnel was trained in topics such as erosion control, forest fire prevention, archaeological protection, hydrocarbon and chemical spill prevention, solid waste management, and disease vector control, among others.

Eco-Ambiente has been hired by CILSA to conduct training of project workers regarding environmental issues and the health and safety program for PAC 2. ERM reviewed the training attendance lists for this reporting period provided in the contractor's monthly report. According to these reports, the following topics were discussed: African bees, hand care on the job, ACP Regulations 106 and 108, disease control, heart attacks, wounds and bleeding, human values, and snake bites. Also, lectures were given on the following environmental topics: legal and criminal aspects of environmental legislation, disease vectors and pest control, forests and cutting, animal rescue, erosion control, forest fire prevention, protection of archeological artifacts, hydrocarbon and chemical spill prevention, solid waste management, contamination through the improper disposal of batteries. The main objectives of these trainings were the dissemination of knowledge and the creation of awareness regarding the importance and conservation of the environment.

Regarding occupational safety and health, CILSA has an adequate program concerning health issues and accident risk management, and it has and infirmary and ambulance at its facilities. Since February 2009, CILSA has contracted an environmental manager and an environmental engineer to implement the EMP, coordinate the pertinent monitoring activities, and prepare the monthly reports.

MECO, the contractor for PAC 3, contracted the services of CODESA to implement the environmental program for the project. During the foregoing reporting period, CODESA has begun the preparation of trainings and documentation regarding environmental, and health and safety topics. During March and April 2009, when the contractor began work, training to project personnel focused on safe practices during UXOs cleanup, fauna rescue and relocation, and in vegetation clearing practices.

In the visits conducted in November 2008, and in March and April 2009, ERM could confirm that all three project contractors comply with the training requirements of project personnel.

- Archeology

Regarding compliance with the control measure for potential archaeological impacts to archeological sites, the ACP contracted the services of JCG & Associates since October of 2008. The purpose of this contract is to address any call, at any moment, of any archeological finding during the construction phase as a result of earthwork activities.

The contractor for PAC 3, MECO, has contracted the services of an archeologist to identify those areas prompt to archeological findings. During the April 2009 visit, ERM could observe the archeologist at work in the PAC 3 project area, where artifacts of potential archeological value had been rescued (*See Appendix F*).

Based on ERM's review of previous reports, the preconstruction studies already completed by ACP archaeological contractors have been carefully prepared to appropriate professional standards. The studies include required data such as maps, technical drawings and references. Through review, it was determined that the new studies corresponding to the foregoing reporting period comply with professional standards.

- Paleontology

The ACP has contracted the Smithsonian Tropical Research Institute (STRI) to conduct the study and rescue of paleontological artifacts at the excavation and dredging sites of the Program. Under the contract, STRI paleontologists monitor work progress of the finding and identification of fossil beds, collect samples from the deposits encountered, interpret the geological context of the findings, and prepare bimonthly and annual reports. The first annual report dated December 6, 2008, reports that the collection obtained is one of the most significant and representative fossil collections ever recovered from a tropical environment. Geographically, work is being conducted selectively for all areas subject to construction based on the relative importance of the geological bedding encounter.

ERM reviewed the bi-monthly STRI report, for the foregoing reporting period, which covers the activities of the paleontology program undertaken in February and March 2009. Besides scientific activities, the report mentions

the public disclosure of project findings by STRI personnel, including visits to national and international schools. These activities include the presentation of findings as well as visits to the sites containing the findings.

- Infrastructure

Regarding compensation for impacts to public infrastructure, ERM observed workers of the electric company ELECTRICAS DE MEDELLIN LTDA relocating the 230 Kva electrical transmission line. This project consists in the construction of ten new high tension transmission towers to replace the existing towers that are being removed to make way for the Canal Expansion Program, and therefore complying with the requirements for compensation of public infrastructure. The new line is 4.1 Km in length and passes over areas with relatively sparse vegetation. The new line was completed and the change in electrical service was conducted without power interruption in April 2009, which coincided with ERM visit.

Based on the information provided by ACP, contractors, and ERM visits, it is concluded that the socioeconomic and cultural plan implemented in the PAC projects comply with the EMP requirements.

5.1.1.2 Monitoring Plans

5.1.1.2.1 Air Quality Monitoring

The University of Panama, contracted by ACP, is conducting monthly monitoring for air quality at seven monitoring stations: (1) Miraflores Locks, (2) Gatun Locks, (3) Pedro Miguel Locks, (4) Gatun Fire Station; (5) Gamboa ACP office (6) Paraiso residential community, and (7) Cocoli construction site. Some of these monitoring stations (e.g., the Miraflores, Gamboa, Gatun, and Pedro Miguel stations) were installed to monitor air quality resulting from the Canal's normal operations. The results obtained from these stations are compared with air quality levels at the project areas. In addition, the concentrations obtained from monitoring stations are compared to the air quality standards published by the United States Environmental Protection Agency (USEPA), and with corresponding levels under the ACP regulation (*See Appendix J*).

ERM reviewed the air monitoring quarterly reports corresponding to the 12 months of 2008 and to the first quarter of 2009, and compared the results to the standards of ACP and USEPA for the stations corresponding to PAC 1, PAC 2 and PAC 3. According to these reports, monthly average

concentrations for NO_2 in the stations corresponding to PAC 1, PAC 2 and PAC 3 are below the NO_2 standards for the ACP and USEPA values. In the Cocoli station, the monthly average concentrations for PM_{10} exceeded the ACP criterion for the months of March, May, July, September and December 2008, and February and March 2009. According to the quarterly reports, the obtained PM_{10} concentrations are influenced by Program activities, given that the station is located in close proximity to the PAC 2 project areas. The ACP relocated the PAC 2 monitoring station across the project administration offices. This new location is more representative to the impacts of the Program to neighboring communities (*See Appendix F*).

ERM has suggested the use of the most current USEPA method for calculating contaminant's average concentrations, given that the method now used is not updated and yields results that may be improved. The new suggested method requires the collection of data for a longer time period, and yield more accurate results to be compared with the standards for verification of compliance.

5.1.1.2.2 Noise Monitoring

EnviroLAB was contracted by CUSA to conduct quarterly monitoring events of environmental noise at PAC 1. Measurements of environmental noise were conducted at the communities of Paraiso and Pedro Miguel in August 2008 (results were included in the November 2008 mitigation measures report from CUSA). The results revealed a daytime environmental noise level at the Paraiso Community of 67.1 dBA (the National Regulatory level for daytime environmental noise is 60 dBA). The report states that noise from sources other than Project activities, such as birds, ships, television unit under operation and people engaged in domestic conversations, among others, could have influenced the results. In other words, it is understood that environmental noise levels have interfered with the measurement of noise directly related to Program activities.

At Pedro Miguel community, noise measurements were conducted for a 24-hour period. The average result during daytime was 64.5 dBA (16-hour average) and 64.8 dBA (8-hour average) during nighttime (the National Regulatory level for nighttime environmental noise is 50 dBA). Similarly to observations at Paraiso community, the report states that noise from sources other than Project activities, such as insects, traffic, people and dogs, among others, could have influenced the results. All monthly reports submitted by CUSA from September 2008 through March 2009, documented no complaints regarding environmental noise levels.

According to CILSA's December 2008 mitigation measures report, environmental noise levels complied with regulatory levels in the PAC 2 project site. Noise monitoring was conducted at the project boundary with Tucan Country Club (i.e., residential area closest to the PAC 2 project site).

5.1.1.2.3 Vibration Monitoring

Seismographs are being used at PAC 1 and PAC 2 to measure vibration levels during blasting events. At PAC 1, measurements were taken at ETESA 230 Kv transmission towers, which are considered to be potentially vulnerable vibration receptors considering their structure, location and importance. As reported in CUSA's monthly mitigation measures reports, no damaging vibration levels have been measured at the towers.

Neighbors of PAC 1 and PAC 2 project areas (including the Tucan Country Club in PAC 2) were notified of the schedule and duration of blasting operations. Vibrations were not reported at potentially sentive receptors in areas near PAC 1 and PAC 2 during the current evaluation period.

ERM reviewed the PAC 1 and PAC 2 occupational vibration-monitoring records. These were found to comply with DGNTI-COPANIT 45 – 2000.

5.1.1.2.4 Water Quality and Sediment Monitoring

The objective of this monitoring program is to ensure that the water quality mitigation measures are in place and working as intended

PAC 1

Water quality monitoring for PAC 1 is being conducted by the *Laboratorio de Analisis Industriales y Ciencias Ambientales de la Univesidad Tecnologica de Panama*. According to the technical report for the water quality in Rio Grande, prepared by IARM in January2009, four monitoring events were conducted (one event for each of the months of March, May, October and November 2008) where five surface water samples were collected: three surface water samples from Rio Grande, and two samples (collected at one meter from bottom) from the Corte Culebra Navigation Channel).

Another monitoring event was conducted in April 2009. During this event, two surface water samples were collected from Rio Grande, and four samples from Lake Gatun (two surface samples and two samples at one meter from bottom).

Water samples were analyzed for physical, chemical and bacteriological parameters following the *Standard Methods for the Examination of Water and Waste Water* published by USEPA. Given that surface water quality standards have not been promulgated in Panama, the analytical results of the sampling events were compared to the values of the corresponding parameters obtained in other rivers of the Panama Canal watershed and to previous values obtained from the Program's baseline study.

Analytical results for organic and inorganic compounds (including heavy metals) in all sampling locations, for the five sampling events, were either below detection levels or within natural occurring levels for compounds readily found in the environment. According to the January 2009 IARM report, the values for conductivity, total dissolve solids, sodium and salinity for samples collected from Rio Grande reveal elevated values compared to values obtained in other rivers of the Panama Canal watershed. However, these values are consistent with the values previously obtained for this river (Program baseline study, *See Appendix K*).

PAC 2

Water quality monitoring is being conducted by Aquatec Laboratorios Analiticos, S.A. (Aquatec) at Pac 2. Personnel from Aquatec collected water samples in April 2008, August 2008 and November 2008 at the following locations: (1) Cocoli river Upstream (Location AA), (2) Cocoli river Downstream (Location AB), (3) Velasquez River, (4) La Fuente creek, (5) Unnamed Creek and (6) Navigation Channel (Location 2). Water samples were analyzed for physical, chemical and bacteriological parameters following the *Standard Methods for the Examination of Water and Waste Water*.

Although the surface water sampling events for April and August 2008 do not correspond to the reporting period for the foregoing report, the analytical results are summarized here to verify if trends exist in the water quality of sampled surface water bodies.

Analytical results for organic and inorganic compounds (including heavy metals) in all sampling locations, for the three sampling events, were either below detection levels or within natural occurring levels for compounds readily found in the environment. Turbidity levels generally increased in August and November 2008 when compared to the values obtained in the water samples collected in April 2008. According to data interpretations by the analytical laboratory, the increase in turbidity coincides with the samples being collected during the heavy rain season.

Aquatec conducted monitoring of surface waters in April 2009. This monitoring event, corresponding to the second event performed in the dry season, was conducted on April 22, 2009 at the following sampling locations: (1) navegation channel 1, (2) navegation channel 2; (3) Cocoli river (upstream); (4) Cocoli river (downtream); (5) La Fuente creek; and (6) Velazquez river.

Analytical results for organic and inorganic compounds (including heavy metals) in all sampling locations were either below detection levels or within natural occurring levels for compounds readily found in the environment. The turbidity level in Cocoli river was 23.79 NTU at the upstream sampling point and 219.60 NTU at the downstream location. The turbidity levels in the remainint poits were below those obtained in the 2008 monitoring events.

Table 2, below, presents the matrix listing the mitigation measures and the degree of compliance observed during ERM's verification visits.

Tabla 2 Pacific Entrance Excavation

<table>
<tr><th colspan="2">BIANNUAL REPORT OF THE IMPLEMENTATION AND EFFECTIVENESS OF THE MITIGATION MEASURES INCLUDED IN THE ENVIRONMENTAL IMPACT STUDY – CATEGORY III
WIDENING AND DEEPENING OF THE PACIFIC ENTRANCE OF THE PANAMA CANAL</th></tr>
<tr><td>PROJECT: Panama Canal Expansion Program: Widening and Deepening of the Pacific Approach Channel Phase 1: PAC-1/ Earthwork and Leveling of the Cartagena Hill
CONTRACTOR: CONSTRUCTORA URBANA SA (CUSA)</td><td rowspan="3">Location: The project is located in Arraijan and Burunga Counties, Arraijan District, Province of Panama.</td></tr>
<tr><td>PROJECT: Panama Canal Expansion Program: Widening and Deepening of the Pacific Approach Channel Phase 2 (PAC 2)
CONTRACTOR: CILSA, S.A.</td></tr>
<tr><td>PROJECT: Panama Canal Expansion Program: Widening and Deepening of the Pacific Approach Channel Phase 3 (PAC 3)
CONTRACTOR: MECO</td></tr>
<tr><td>REPORT: ERM 002 – June 2009: Mitigation Measures Implmented from November 2008 through April 2009</td><td>PHASE: ■ CONSTRUCTION □ OPERATION □ CLOSURE</td></tr>
<tr><td>ENVIRONMENTAL MONITORING AND FOLLOW UP PAC 1 AND PAC 3 PROJECTS: DESARROLLO ECOLÓGICO Y AMBIENTALES (DECASA)</td><td>ENVIRONMENTAL MONITORING AND FOLLOW UP PAC 2: ECOAMBIENTE S.A.</td></tr>
<tr><td colspan="2">ANAM Resolution No. DIEORA IA-632-2007. – EsIA Approval date: 9 November 2007</td></tr>
</table>

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
MITIGATION MEASURES, CONTROL AND COMPENSATION PROPOSED IN THE PMA AND IN THE APPROVAL RESOLUTION				
Air Quality Control Measurements				
1. All combustion motors shall be adequately maintained to maximize combustion efficiency and minimize contaminant emissions.	In PAC 1 and PAC 3, vehicles and heavy equipment maintenance is performed by CUSA and MECO, respectively, and by the company Cardoze & LINDO. At PAC 1, the monthly monitoring reports submitted by the contractor contain records of preventive maintenance performed to its vehicles and heavy equipment at 250, 500, 1000, 2000, 3000 and 6000 hours of operation. In CAP 2, the contractor built a maintenance shop to provide preventive maintenance to all equipment assigned to the project. Maintenance records are kept in the contractor's administrative office. Vegetation clearance began at the PAC 3 project area in April 2009. MECO provided in its April monthly monitoring report evidence of the maintenance records performed to the machinery used in their project area.	X		
2. Combustion motors (of the heavy equipment to be used for dry excavations) shall be provided with exhaust systems, and filters (when applicable) that are in good operating condition. It is recommended that the age of the equipment usage not exceed 10 years.	It is verified, according to preventive maintenance records that all equipment is in good operative conditions and that the maximum allowable hours of operation are not exceeded before conducting preventive maintenance. Engine filters are replaced periodically. According to interviews with project representatives from the different project areas, the heavy equipment used in the PAC 1, PAC 2 and PAC 3 project areas is less than 10 years old.	X		
3. During the dry season, wet working areas shall be maintained to minimize dust dispersion.	PAC 1, PAC 2 and PAC 3 project areas are provided with tank trucks used for the spraying of water on earthen roads and other construction areas during active use or whenever necessary. During the March and April 2009 field visits, ERM observed that tank trucks were spraying water at the three project areas (i.e. PAC 1, PAC 2 and PAC 3). The contractor's monthly monitoring reports	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	include evidence (pictures) of the water tank trucks used in the project areas.			
4. Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust dispersion is prevented because of such operations.	Excavated material and other materials (stones, gravel, etc.), are properly transported to disposal sites established for that purpose in the PAC 1, PAC 2 and PAC 3 project areas. Materials extracted from the earth's crust are classified and placed in their corresponding deposit sites according to their later use. Contractors maintain records on the amount of material removed and placed in the deposit sites. Related records were reviewed by ERM during the April 2009 site visit.	X		
5. Ensure that the loading and unloading of materials is done minimizing ambient dust dispersion.	It is verified through visual inspection that loading and unloading of materials are conducted according to the established procedures. These activities are reported by the contractors in their monthly monitoring reports which also include photos. Materials are deposited in their corresponding deposit sites according to their classification and are compacted to ensure that the dispersion of dust into the environment is minimized.	X		
6. Material mixing equipment shall be hermetically sealed.	It is verified that material mixing equipment comply with the required specifications.	X		
7. Stored materials (gravel, sand) shall be covered and confined to avoid their being wind-drifted.	At the PAC 1, PAC 2 and PAC 3 project areas materials such as sand and gravel are confined and covered with blankets, whereas, at the PAC 1 and PAC 2 project areas, material extracted from the excavation areas are transported to their corresponding deposit sites.	X		
8. ACP shall regulate the speed limit within the area of the Project.	The PAC 1, PAC 2 and PAC 3 project areas are provided with traffic control signs and traffic control personnel. During the field visit of March 2009, ERM found several deficiencies such as the lack of of traffic control signs or traffic control personnel at a PAC 2 Project location (i.e., the Road to the South Disposal Site). These deficiencies were addressed by the ACP and the PAC 2 contractor. In the April 2009 site visit, ERM revisited all project areas related to PAC 1, PAC 2 and PAC 3 and confirmed that all of them were in compliance with the applicable traffic	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	control requirements.			
9. Temporary roads shall be adequately compacted and humidified, or superficially treated and maintained.	Activities were carried out to keep earthen areas and temporary roads to the north and south of the project areas moistened and clean. Compaction of temporary roads is conducted using heavy equipment.	X		
10. Wastes shall not be incinerated on site.	Contractually, burning of solid waste in all project areas is prohibited. Each project has specific procedures for waste management and facilities for the temporary storage of solid waste.	X		
11. A system of oxidizing catalyzes to reduce CO, HC and particle emissions shall be adapted to the filters of diesel vehicles and equipment used for the construction.	Equipment used in the PAC 1, PAC 2 and PAC 3 project areas are provided with filters and catalysts according to the manufacturer's specifications. During the March and April 2009 site visits, ERM confirmed that the machinery did not emitted black smoke through their exhaust systems. Photos of the machinery used in the project areas are included in the contractor's monthly monitoring reports.	X		
12. Reduce idle time for engines in operation (measure specified in the Category III EsIA for Paraiso Hill PAC 1).	Heavy equipment operators and maintenance personnel have been notified of the prohibition to leave machinery running for more than fifteen minutes in a stationary place. CUSA's Maintenance Supervisor conducts periodic walkthroughs within the PAC 1 project area to verify compliance with this requirement.	X		
13. Avoid unnecessary usage of horns and exhaust adapters measure specified in the Category III EsIA for Paraiso Hill PAC).	Equipment available for this Project does not have horns and exhaust adapters.	X		
Foul Odor Control Measurements				
1. Establish a vehicle fleet preventive maintenance program.	The PAC 1, PAC 2 and PAC 3 contractors included in their monthly reports evidence of preventive maintenance provided to the heavy equipment used in their project areas. ERM observed in the March and April 2009 site visits the project areas heavy equipment maintenance shops. At the project areas the management of chemical	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	substances such as oil, grease, diesel, coolant, etc., which are used in preventive maintenance, activities are also inspected on a periodic basis. No complaints have been reported regarding objectionable odors related to the usage of chemical substances or heavy equipment with combustion engines in the PAC 1, PAC 2 and PAC 3 project areas.			
2. Provide adequate engine maintenance to avoid generation of offensive odors and air emissions.	Based on ERM's revision of the contractor's monthly monitoring reports, it is concluded that preventive maintenance is provided to all the heavy equipment used in the PAC 1, PAC 2 and PAC 3 project areas.	X		
Noise Control Measurements				
1. Assess, noise emission conditions, and critical sites, to define the need to establish additional control measures.	It is verified on site that all equipment and vehicles are in good conditions, operators and field personnel are provided with adequate personal protective equipment. Vehicles at the project do not have horns and exhaust adapters.	X		
2. Maintain all rolling and construction equipment in good conditions and with adequate noise silencers.	For the project areas it was verified that heavy equipment receives adequate mechanical maintenance. In addition, contractors keep equipment maintenance records.	X		
3. Minimize, to the extent possible, the length of operation of noise emitting sources and avoid having idle equipment in operation.	It is verified on site that heavy equipment that is not in operation is immediately turned off. Instructions have been given to field personnel to reinforce compliance with this measure and to create awareness on the importance to minimize air pollution generated by heavy equipment engine fumes.	X		
4. Organize the loading and unloading of trucks, and handling operations for the purpose of minimizing construction noise on the work site	It has been verified on site that this activities are being conducted properly without creating unnecessary noises.	X		
5. Comply with the requirements and standards for noise control.	There is a chronogram for monitoring noise level at the construction site and surrounding activities areas, this chronogram is executed according to the activities being conducted at the Project areas. Environmental noise	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	monitoring was conducted at the PAC 1 project area. At the PAC 3 project area, environmental noise baseline measurements were conducted during the current reporting period.			
6. Comply with the requirements, according the type of explosive utilized, concerning the distance of structures and populated centers, defined by their manufacturer and by the competent authorities	Explosive materials handling requirements are being followed.	X		
7. Due to existing Canal operations, blasting operations shall be limited to a daily schedule between 0600 and 1800 hours.	The PAC 1, PAC 2 and PAC 3 contractors are responsible for blasting operations at their respective project areas. Each contractor has a Blasting Plan revised and approved by the ACP. These Blasting Plans include blasting activities schedules in compliance with applicable requirements. The contractors include in their monthly monitoring reports records of the dates and time at which blasting activities are conducted. ERM revised these reports and confirmed that blasting activities are being conducted during the required timeframes.	X		
8. The Contractor shall comply with all Government standards, regulations and ordinances related to noise level controls applicable to any contract-related work.	Monitoring has been conducted and the results are below government standards at PAC 1 and PAC 2. At PAC 3 only baseline monitoring has been conducted as blasting activities have not been started.	X		
9. On job sites that are near homes, work generating noise greater than 80 dB shall not be executed in the surroundings between eight o'clock at night (8:00 p.m.) and six o'clock in the morning (6:00 a.m.).	PAC 2 does not have communities nearby its boundaries. At PAC 1, the company EnriroLAB was contracted to conduct environmental noise monitoring. The data included in the contractor's August monthly report indicated that noise levels generated by the project activities are below the regulatory levels.	X		
10. Communicate and coordinate opportunely with sensitive receivers of required construction work that will produce high noise levels and could affect them.	The communities of Paraíso and Pedro Miguel are notified before blasting activities are conducted at PAC 1. At PAC 2, no sensitive receptors (communities) are located nearby project boundaries. At PAC 3, blasting activities were not performed during the current revision period. However, during the April 2009 site visit, the PAC 3 contractor showed ERM the flyers that were to be	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	distributed among the communities that would be impacted by their programmed blasting activities.			
11. Maintain the communities that are near to the Project development sites informed about the programming of construction work and activities of major noise generation.	Information is not limited to the nearby communities, but is communicated nationwide through TV programs, radio broadcasting, communications to the Nation, newspaper supplements and through the ACP webpage. Communities and public institutions (Police and Firefighters) close to the project, Paraiso and Pedro Miguel are kept informed continuously about the explosion blast programmed associated to PAC 1. CUSA field office has a direct phone line (232-3561/232-3562) for communication with the community and general public. ACP also has a general reception of claims and questions where public can expose their grievances or concerns about the construction operations at the toll free 800-0714. Questions or comments can also be sent to the email ampliacion@pancanal.com. Moreover, there is a procedure for following up complaints made by the surrounding communities of the construction sites.	X		
12. Avoid the unnecessary use of alarms, horns and sirens.	Instructions have been given to field personnel in order to prevent unnecessary noise. The ACP conducts periodic inspection to the project sites to reinforce this measure.	X		
13. Stationary equipment producing noise shall be located away from sensible receivers.	No stationary equipment (such as concrete plants, electrical-powered engines, etc.) is being used at any of the projects. At PAC 1, the nearest community is located within 450 meters from the site. At PAC 2 no sensitive receptors have been identified.			X
Vibration Control Measurements				
1. Limit the vibration velocity to that established in the contract documents (specification) for the purpose of protecting structures that could be potentially affected.	At PAC 1 and PAC 2, records for all blasting-related activities, including seismograph measurements, are maintained by the contractors and the ACP to ensure that they are in compliance with the contract specifications.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	These records are included in CAP 1 monthly reports and are kept in the administration offices at PAC 2. During the April 2009 site visit, ERM revised PAC 2 administrative records and confirmed that the contractor is keeping all the required documentation in compliance with their Blasting Plan. The PAC 3 contractor did not conducted blasting activities during the current revision period.			
2. The Contractor shall provide within his/her task group with a qualified blasting consultant to prepare and present for approval a blasting plan and to lead the blasting work, including initial blasting test supervision, with the objective of establishing baseline effects and conditions.	Eng. Osvaldo Diaz is the blasting specialist for PAC 1. At PAC 2, CILSA developed a Blasting Plan that was certified by Austin Caribbean, a company specialized in blasting activities. This plan includes information related to the dates, times, elevations, weather conditions, in which blasting activities will be conducted, type and amount of explosive, seismograph information and vibration calculations. At PAC 3, a Blasting Plan was also developed including all the mentioned requirements. This plan was evaluated and approved by the ACP. Blasting activities at PAC 3 will begin after the current reporting period.	X		
3. Monitor vibrations in critical (sensitive) sites during the construction period.	Follow up has been given to the vibration monitoring results received in July 2008 for PAC 2. Heavy equipment maintenance is verified on a frequent basis. Also, PAC 1 Blasting Plan requires vibration monitoring at structures located nearby the project boundaries.	X		
4. Conduct structural integrity inspections prior to blasts on critical (sensitive) structures.	PAC 1 and PAC 2 blasting specialists have conducted necessary inspections to critical structures.	X		
5. Inform the public living and working in the vicinity about the possible effects of the project.	Blasting activities at PAC 2 have to be notified to the occupant of the Tucán Country Club golf course maintenance shop. During the March 2009 blasting activities, rock fragments impacted the roof of the Tucan Country Club golf course maintenance shop. The Project contractor notified inmediately the owner of the golf course regarding this event and proceeded to conduct an investigation of the incident. The investigation resulted in the revision of the Blasting Plan and the indemnification	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	of the golf course owner for the damages made to the roof of the maintenance shop. The situation was solved adequately. Evidence of the corrective actions implemented by the contractor and ACP are adequately documented in the project's administrative files. At PAC 1 and PAC 3, the contractors visit nearby communities to distribute flyers containing information related to blasting activities. Also, posters including related information are posted at the nearest shopping center, health center, police station, schools and fire station.			
6. Notify the affected public when blasting works are to be performed.	Information was distributed to all personnel involved directly and indirectly in blasting activities conducted at the PAC 2 project area, and to the communities located nearby PAC 1 and PAC 3.	X		
7. Apply the Blasting Plan to be developed and implemented by the Contractor, and which shall be subject to ACP approval.	The contractors are in compliance with this measure. Compliance with the corresponding blasting plans are evaluated by the ACP and by the contractors. Records including the date, time, amount of explosive material and seismograph readings are included in PAC 1 monthly monitoring reports. At PAC 2 all records related to blasting activities are kept in files at the project's administration offices. ERM revised both the information provided by the PAC 1 contractors and the PAC 2 administrative files to confirm compliance with applicable requirements. Both contractors were in compliance with these requirements. Regarding PAC 3, no blasting records were included in the monitoring report corresponding to the month of April because no blasting activities were conducted during this period.	X		
8. Appropriate quality control measures of blasts in order to ensure an adequate control process.	Blasting activities at PAC 1 and PAC 2 are controlled according to their respective Blasting Plans. These plans are developed by specialized personnel and approved by the ACP. The projects blasting plans were reviewed by ERM during the site visits.	X		
9. Comply with requirements and regulations of	PAC 1 and PAC 2 are in compliance with applicable	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
competent authorities regarding the use of explosives.	requirements regarding the handling of explosive materials. Explosive materials are transported to the project site only when blasting activities are conducted. During the current reporting period these materials were under strict surveillance and control.			
10. Comply with the requirements provided by the manufacturer for the handling of explosives and detonators.	Applicable requirements are considered in the contractors' blasting plans. Explosive material residues are removed by the contractors once blasting activities are concluded and are disposed off in compliance with applicable regulations.	X		
Soil Protection Program				
Bankments Settlement Control				
1. Monitor slope deformation and movements.	Compliance with this requirement is verified by the contractor through field visits to the project areas and project activity logs at PAC 1. At PAC 2, daily field inspections are conducted to verify earthwork activities and to take topographic measurements. A Quality Control Plan is developed for the project on a monthly basis. Activities related to slope stabilization, hydro-seeding, soil compaction and topography are included in the Quality Control Plan. Earthwork activities have not had started at PAC 3 during the current reporting period.	X		
Bankments Settlement Control				
1. Stabilize slopes and construct terraces.	The implementation of this mitigation measure was verified through visual inspections. During the March and April 2009 site visits ERM observed that slope leveling was conducted at the PAC 1 and PAC 2 project areas. It was also observed that leveling activities were being conducted by the project contractors. Excavation activActivities at CAP 3 at the time of the April 2009 site visit were very limited. Only clean up of explosives of concern (UXOS), the relocation of fauna and clearing of vegetation from the project area was being	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	conducted. The contractors included in their monthly reports progress of the implementation of mitigation measures which included the stabilization and leveling of slopes.			
2. Reduce slopes load and provide an impervious surface at the site.	The implementation of mitigation measures related to reducing the load on the slopes and the impermeabilization of their surfaces were corroborated during the field visits of March and April 2009. The contractors include in their monthly reports the progress of the implementation of mitigation measures.	X		
3. Diminution in the descending grade of design of the most unstable slopes, utilizing a slope ratio that guarantees its stability.	Slopes at 2% and special configurations during excavation are being followed by CUSA field engineers as well as by the ACP Project Manager. The same applies to PAC 2. Activities at PAC 3 during the current reporting period were limited to vegetation clearance and fauna rescue. Therefore, this measure does not apply to that project element.	X		
4. Systematic installation of horizontal or inclined drainage in unstable slopes at spacing located according to the hydrogeological conditions of each site, to the depths of the faults, once they have been identified.	ERM confirmed in the March and April 2009 site visits that drainages have been built according to this requirement for PAC 1 and 2. For PAC 2, a revision of the project administrative records was conducted, in which all field data related to slope stabilization activities are included.	X		
Sedimentation and Soil Loss Control				
Soil conservation				
1. During the rainy season, protect exposed soil surfaces with stabilizing material, such as screen, straw, and planting the areas subject to erosion.	Hydro-seed blankets have been installed at several areas of the PAC 1 project, such as the Cocoli river deviation channel. Grasstech has been contracted to install the erosion control blankets and to give maintenance to hydro-seeded areas at the PAC 1 and PAC 2 project areas.	X		
2. Utilize water flow retention structures, such as riprap and stone paving, at the drainage structure inlets and outlets.	Riprap has been installed at the Northern slope areas and the Cocoli river deviation channel as an erosion control measure.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
3. Place sediment traps inside the excavation sites which allow the accumulation of the eroded soil.	Sediment traps have been installed to control sedimentation from the Northern slope and South Disposal site 2.	X		
Slopes Stabilization				
1. Slopes with cuts of up to 5 m in height shall be terraced maintaining slope inclination at 1:3 to 3: 1.	This mitigation measure was not required for the PAC 1. However, the contractor implements it as a best practice. The PAC 2 contractor keeps documentation related to slope stabilization at the project site. ERM revised PAC 2 project files in the April 2009 site visit and confirmed that slope stabilization was being implemented according to the applicable requirements.	X		
2. Stabilize the exposed side of slopes utilizing stabilizing materials, such as biodegradable mats.	Biodegradable blankets have been installed in the slopes of the Cocoli river deviation channel and at other project areas.	X		
3. Install underground drainage inside saturated slopes and reduce surface infiltration utilizing longitudinal sub-drainages at slope toes to avoid saturation of the soil profile.	Natural drainage patterns have been maintained using canalization, ripraps, and other surface drainage systems. Saturated conditions have not been observed at the material disposal sites which require the construction of underground drainage systems. The design of the Borinquen road included the installation of catch basins and concrete swales covered with riprap.	X		
4. Stabilization of sites prone to slope wash, sinking, landslides and other massive movements.	Field visual inspection and mandatory recommendations. ERM confirmed that this aspect is evaluated through visual inspections and through records documentation. During a March 2009 field inspection, the PAC 2 contractor observed a series of cracks and fissures at the South 1 disposal site. The situation was communicated to the ACP's project representatives and an investigation was conducted. During the field visit of March 2009, ERM observed that earthen material that had been transported and compacted at the Sur 1 disposal site revealed cracks in areas adjacent to the Cocoli River alluvial plain. On April 8, 2009, the ACP presented an investigation report describing the mitigation measures to be implemented to	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
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	prevent potential negative impacts to the river. Among these measures were the removal of approximately 80,000 cubic meters of unclassified material. This volume was calculated based on topographic measurements conducted on site in March 2009. French drains were to be installed at the base of the disposal site once soil removal was completed. The purpose of the construction of the French drain will be to stabilize the swamp area and create a support to the bottom for future filling material that would be conducted in the zone. Finally, it was recommended to evaluate alternate disposal sites for the disposal of excavated material.			
5. Verify stabilization of cuts along new access roads in the construction areas	ACP and PAC 1 and PAC 2 representatives conduct periodic visual inspections to verify the stability of slopes.	X		
Measures for control soil compaction				
1. Perform the major number of earth moving during the dry season.	PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement. ERM revised the contractors working schedules which indicated that the greater volume of earthwork would be conducted during the dry season.	X		
2. Scarify topsoil in sites that lack vegetation to facilitate the natural vegetation growth and regeneration.	PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement.			
3. Control the slope surface of the deposits to facilitate water drainage.	PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement.	X		
Measures for control soil contamination				

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
1. All rolling equipment, including tractors, tanks, earth moving equipment and vehicles for the maintenance and transportation of fuel and personnel shall be controlled by way of a detailed register that guarantees compliance with the specifications established by the manufacturers regarding the type and frequency of maintenance for each equipment that guarantees the operating efficiency of the motors. Additionally, greasing, supplying, and transferring of fuels and lubricants in the field shall comply with these requirements.	As described above, the PAC 1, PAC 2 and PAC 3 contractors are in compliance with the maintenance of heavy equipment. Evidence of maintenance records is included in the contractors' monthly monitoring reports. Containers are provided to deposit waste generated during heavy equipment maintenance activities at PAC 1, PAC 2 and PAC 3. Wastes are managed in accordance with applicable requirements. The contractors have hired companies that specialize in handling and disposal of hydrocarbon residues. In the case of PAC 1, PAC 2 and PAC 3 use DIMAUD, NAVES Supply and DJ Recycling, respectively. In each project area spill control equipment is available. PAC 1 was the only project that was in its final phase at the time of the April 2009. However, heavy equipment maintenance activities have not had concluded. The contractor would be developing a decommissioning plan for the camp to deliver the facilities to the ACP when the project is totally completed. This decommissioning plan will include remediation activities for the maintenance workshop if they are needed.	X		
2. Training of Specialized Personnel in Fuel Handling and Machinery and Equipment Maintenance.	PAC 1, PAC 2 and PAC 3 contractors have offered training sessions to their personnel regarding fuel handling and heavy equipment maintenance. Evidence of training records is included in their monthly monitoring reports.	X		
3. Control de dump sites and temporary installations. If justified by the magnitude of the spill or dump, the Contingency Plan shall be activated.	Compliance was verified on site at PAC 1, PAC 2 and PAC 3. Contractors provided ACP with their corresponding Contingency Plans. ERM reviewed the plans during its March and April 2009 site visits. The PAC 3 contractor included its Contingency Plan in its environmental management system.	X		
4. Blasting control. If blasting utilization is necessary, they shall be executed with adequate control, place special canvases over the rocks before the blasts and dispose of the	PAC 1 and PAC 2 contractors are in compliance with the activities of their blasting programs.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
wastes generated in authorized dump sites.				
Water Resources Protection Program				
Measures to control the effects of excavations over quality of waters				
1. Control and maintenance of machinery, and construction equipment.	The Maintenece department provided equipment logs for all equipment used in the proyect. In PAC 1 vehicles and heavy equipment maintenance is performed by CUSA, and by the company Cardoze & LINDO. At PAC 1, the monthly monitoring reports submitted by the contractor contain records of preventive maintenance performed to its vehicles and heavy equipment at 250, 500, 1000, 2000, 3000 and 6000 hours of operation. In PAC 2, the contractor built a maintenance shop to provide preventive maintenance to all equipment assigned to the project. Maintenance records are kept in the contractor's administrative office. In the PAC 3, MECO contractor is building a maintenance workshop for machinery and equipment used in the project. At the time of the visit in April 2009, the camp (including mechanical maintenance workshop) from MECO was under construction.	X		
2. Training of specialized personnel in the handling of fuel and maintenance of machinery and equipment.	PAC 1, PAC 2 and PAC 3 contractors have offered training sessions to their personnel regarding fuel handling and heavy equipment maintenance. Evidence of training records are included in their monthly monitoring reports..	X		
Measures to prevent deterioration in water quality during inland disposal of excavated material				
1. Compaction of dredge material.	Field inspections are conducted to verify material compaction activities at the disposal site South 1, 2, Victoria and T6.	X		
2. Installation of temporary and permanent drainages.	Drainages have been installed where they are required.	X		
3. Use of sedimentation traps.	In compliance. The structures included in the General Hydrology Resources Protection and Erosion Control Plan for the northern slope and the Cocoli river deviation	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	channel have been completed, this has contributed to reduce the amount of sediments carried out by stormwater. At PAC 3, a sediment trap or "rip-rap" was installed in the unnamed creek located in the north portion of the project area.			
Measures to prevent deterioration of water quality due to deviation of Cocoli River				
1. Verify the slope is adequate to reduce sediment situation.	Compliance with this requirement was verified through visual inspections.	X		
Measures to control water quality deterioration due to Construction, Operation and Abandoned of temporary installations				
1. The adequate management of waste water, including sewage and grey water generated in the field installations and work fronts.	PAC 2 installed a heavy equipment wash area nearby its maintenance shop. TecSan was contracted at the three project areas (i.e. PAC 1, PAC 2 and PAC 3) for the supply and maintenance of portable toilets. PAC 1 and PAC 3temporary offices are connected to septic tanks. PAC 2 temporary offices are connected to the existing ACP sanitary sewer. Therefore, the project is in compliance with this requirement.	X		
2. Prevention of hydrocarbon spills and their treatment (oil/water separator if applicable) in workshops, and in any other area where equipment maintenance and machine construction works are performed.	All fuel storage tanks at PAC 1 are provided with secondary concrete dikes. They also are provided with emergency equipment such as fire extinguishers, spill control equipment and appropriate signs. Also, the PAC 2 and PAC 3 contractors provided their fuel storage tanks with secondary containment and emergency equipment. At PAC 3, facilities observed during the ERM April 2009 site visit, were temporary as the contractor was in the start up phase of the project and permanent structures were under construction.	X		
3. Construction of sedimentation traps on aggregate exploitation sites and rehabilitation of those sites.	This measure does not apply. This type of activity is not conducted at the project areas.			
4. Retention of fine sediments generated during crushing through sedimentation and wash water clarification basins, if applicable.	This measure does not apply. This type of activity is not conducted at the project areas.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
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5. Retention and sedimentation of effluents generated when cleaning the concrete plants.	This measure does not apply. This type of activity is not conducted at the project areas.	X		
6. Removal of portable latrines at the end of the Project (measure specified in the Category II EsIA for PAC 11; for the rest of the components it is included in the environmental recovery post operation plan.).	The project has not been concluded. Cleaning up and maintenance is conduced periodically.	X		
Measures to control hydrological regime				
1. Control the new drainage patterns.	Temporary roads are provided with swales to maintain drainage patterns at the project sites. At PAC 3, during ERM's visit from April 2009, no access roads have been built as the project was in its preliminary organization phase and undergoing the construction of the project main camp. The PAC 3 contractor was conducting topographic surveying to the northern portion of the project site in order to design appropriate drainage systems.	X		
2. Channel runoffs through new drains.	The General Hydrology Resources Protection and Erosion Control Plan included a design for the channeling of run off at the South 1 and T6 disposal sites.	X		
3. Utilize retention dikes, infiltration ditches, cross walls, among others.	Earthwork at the northern slope and at the Cocoli river deviation channel has been concluded. They were provided with adequate drainage control structures.	X		
4. Provide adequate and opportune maintenance to the works.	Adequate maintenance is provided by the PAC 1 and PAC 2 contractors whenever necessary to ensure the effectiveness of the mitigation measures for the control of water hydrological regime. Earthwork at PAC 3 had not begun during the current reporting period.	X		
Flora and Fauna Protection Program				
Measures to control the lost of vegetation cover				
1. The working area limits shall be clearly marked with stakes or flagpoles.	Project areas are identified with stakes and flagpoles when vegetation clearing activities are conducted at PAC 1, PAC 2 and PAC 3.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
2. Comply with ecological indemnity in accordance with Resolution AG-0235-2003/ANAM.	Payments corresponding to the PAC 1, PAC 2 and PAC 3 project areas were made. Evidence of such payments were provided to ERM for its revision.	X		
3. During the construction, moving equipment shall be operated in such manner that minimum deterioration is caused to the vegetation and surrounding soils.	Visual inspections are conducted to verify the minimization of vegetation deterioration and is communicated to the operators of heavy equipment. The PAC 1 and PAC 2 contractors include follow up activities in their monthly monitoring reports. Vegetation clearance and fauna rescue was been conducted at PAC 3 during ERM's April 2009 site visit.	X		
4. Train operators on the procedures of clearing the vegetation cover.	Contractors offer training sessions to their personnel in which vegetation clearance topics are included. These trainings were offered at the PAC 1, PAC 2 and PAC 3 project areas prior to the beginning of vegetation clearance activities. Training records are included in their monthly reports.	X		
5. Under no circumstance shall vegetation be dumped in areas where drainage channels would be obstructed.	According to established procedures, vegetative material is stacked and confined at the project areas to prevent obstruction of drainage channels.	X		
6. Tree pruning shall be performed by trained personnel.	Tree cutting and pruning is conducted by specialized personnel following established safety procedures.	X		
7. Utilize part of the biomass (trunks and stakes) as energy dispersers to reduce the effects of hydro erosion, stakes and rods.	Biomass (i.e. tree pruning and cutting residues) was utilized to dissipate energy and reduce hydraulic erosion. At PAC 2, residues of tree prunning were used as energy dissipation structures at the South 2 disposal site.	X		
8. Reforestation and revegetation.	Reforestation plans corresponding to the PAC 1 and PAC 2 impacted areas have been effectively implemented in coordination with ANAM. Re-vegetation measures have been implemented through hydro-seeding at applicable project areas such as road shoulders and slopes. The company GRASSTECH was contracted at PAC 1 and	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	PAC 2 to conduct hydro-seeding, fertilization and maintenance. Follow up activities are documented in PAC 1 monthly monitoring reports. At PAC 2, follow up activities are included in their monthly Quality Control Report. Reforestation and hydroseeding at PAC 3 has not been necessary as the project is in its initial phase during this reporting period.			
Measurements for Control lost of forestry potential				
1. Mark the trail area before performing the fell, thus guaranteeing that the area to be felled is exactly the one necessary to realize the proposed works.	Compliance was verified through visual inspections.	X		
2. Include planting of forest native species in the Reforestation Plan.	The projects are in compliance with their reforestation plans.	X		
3. Explore the alternative use of felled forest resource, or donate it to a social welfare institution.	Material is used in slope stabilization and erosion and sedimentation control practices. .	X		
4. Direct tree falls towards the direct impact area to avoid damage to trees in the adjacent areas which should not be impaired.	The projects are in compliance with this requirement.	X		
Measures to control the loss of terrestrial habitat				
1. Reforestation, as a means of compensation heeds both the vegetation cover loss and the habitat impairment, and offers an alternative in the areas where reforestation is to be carried out.	Project PAC 1 affected 55.7 hectares of forest, for which 115 hectares of compensatory reforestation were completed within the Camino de Cruces National Park (PNCC, Spanish acronym). In the November 2008 site visit, ERM was accompanied by ACP representatives Karina Vergara and Javier Morón, and found that the activities are being developed according to the schedule proposed in the Reforestation Plan. Plant species and selection of the reforestation site were made by the ACP in coordination with ANAM. The ACP will support the maintenance of the reforestation effort in this area for a period of five years and has contracted the company Geo Forestal, S.A. to execute this program. Maintenance activities include clearing, fertilization, planting, wildfire	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	prevention, pest control and reseeding. ERM reviewed the January 2009 reforestation follow up report for the Camino de Cruces National Park issued by Geo Forestal, S.A. This report included an update on the reforestation activities conducted to January 2009. According to this report, project staff conducts periodic visual inspections to verify the growth of the reforested areas. The plants generally showed a good development with good color in the foliage. The re-seeding 4,856 plants was conducted with focused fertilization, management of water drainage and fire control activities. In the PAC 2 project area were impacted 72 acres of forest which were compensated for 145 hectares in the Altos de Campana National Park. ERM in March 2009 visited the park and found that the tasks are being developed according to the schedule proposed in the Reforestation Plan. The compensation of the remaining 115 hectares of CAP 2 will be held during 2009 in the Division General Omar Torrijos National Park. In the PAC 3 project area, the company Forestal Los Carpatos will conduct reforestation activities. The company is conducting training for the construction and operation of nurseries in various communities selected for this purpose.			
Measures to control the disturbance of wildlife				
1. Avoid unnecessary noise generated by whistles, horns, sirens, pipes, and running engines, etc.	Workers have been instructed not to use this type of equipment in an unnecessary manner in the work areas. Daily inspections are conducted as part of monitoring. Training sessions have been offered to raise awareness on the effects of noise disturbance to the fauna of the area.	X		
2. Verify that noise mufflers of motorized equipment (vehicles, equipment and machinery) are in good condition.	Contractors are in compliance with the maintenance program. They include evidence in their monthly monitoring reports.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
3. Coordinate the rescue of animals that enter the working areas.	APPC personnel (fauna rescue) was present during activities at project areas. Fauna rescue activities were effectively implemented at the PAC 1 and PAC 2 project areas. Rescued animals were relocated in habitats with similar characteristics to those from which they were removed. APPC personnel is available for both projects on an on-call basis to attend situations were animals are accidentally introduced in the project areas. ERM visited the PAC 3 project area in April 2009. During that period, the contractor MECO was in the phase of mobilizing heavy equipment, establishing the main camp, cleaning up UXOs , clearing of vegetation and rescuing fauna. According to MECO representatives, the company CODESA has been contracted to aid in the rescue and relocation of wild animals. In cleanup areas of unexploited ordinances, the personnel conducting cleaup (from the company ISTHMIAN) have been trained to rescue the wild animals encountered in those areas. Personnel from CODESA are stationed in the perimeter of the project areas to complete the relocation procedure once the animals have been rescued. ERM interviewed a specialist from CODESA while in the process of animal rescue operations. The specialist explained how the rescue and relocation procedure was carried out. The specialist indicated that once the rescue is carried out, the animals are inspected by a veterinarian before they are relocated to the Soberania National Park in accordance with ANAM. If the animals show lesions or disease, they are transferred to the Metropolitan National Park where they are treated by specialized personnel. In the environmental follow-up report corresponding to March 2009, MECO included a report regarding the fauna rescue process as carried out by CODESA and a daily log that includes an inventory of rescued animals in the project area.			

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
4. Train construction works personnel on wildlife protection and poaching prevention procedures.	Contractors are in compliance with this requirement. Evidence of training records is included in their monthly reports.	X		
5. Direct lighting towards specific worksites, avoiding lights on fauna habitat.	Contractors are in compliance with this requirement.	X		
Measures to control the risk of abuse of wild animals				
1. Strict velocity control shall be generally implemented for all Project vehicles.	Field observation and placement of signs indicating the speed limit.	X		
2. For the purpose of preventing the growth of vegetation that obstructs visibility, maintenance shall be provided to access road shoulders.	Placement of stones. Has been given the proper maintenance on the shoulders of roads. Verified through field inspections.	X		
3. Informative signs shall be produced regarding the crossing of fauna in pertinent.	Adequate signaling has been installed at fauna crossing intersections in the areas corresponding to PAC 1 and PAC 2.	X		
Measures for the Control of poaching				
1. Prohibit workers to practice any type of hunting or fishing within the Project Area.	Training sessions have been offered to project personnel to communicate the prohibition of pouching. Similarly, informative briefings are offered to the workers in the field.	X		
2. Prohibit or regulate the use of firearms within the Project premises.	The entry of fire arms into the project sites is prohibited under contract agreement. Workers are offered briefings on this topic. The contractors' Environmental, Health and Safety supervisors conduct periodic inspections to the project areas to verify compliance with this requirement. No incidents have been reported during the current reporting period.	X		
3. Comply with the laws and standards established by the Autoridad Nacional del Ambiente (Panama's National Environmental Authority) on wildlife protection.	Visual inspections are conducted by contractors' to verify that fauna rescue and subsequent relocation is conducted in adequate locations. The project is in compliance with applicable laws and regulations regarding wildlife protection.	X		
4. Place warning signs indicating hunting	The contractors have installed signs within the different	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
prohibition.	project areas prohibiting pouching. Training sessions have been offered on this topic.			
5. Implement an Environmental Training Program for the workers.	Records are available documenting training sessions on environmental, health and safety topics.	X		
Measures to control the direct elimination of wildlife				
1. Verify effective implementation of the wildlife rescue and relocation operation.	It is observed and verified that fauna rescue personnel are present in project areas.	X		
Waste Management Program				
1. Verify proper solid waste management.	Inspections area conducted to ensure that solid waste is properly collected on a weekly basis at the project areas. Contractors include waste disposal manifests and payment receipts in their monthly monitoring reports. Solid waste is hauled at PAC 1, PAC 2 and PAC 3 by the "Dirección Municipal de Aseo Urbano y Domiciliario" (DIMAUD) to the Cerro Patacon Sanitary Landfill.	X		
Training on solid wastes				
1. Train workers with regard to solid waste management regulations before they start working.	Workers are trained as soon as they begin working at the project areas. At the PAC 1, PAC 2 and PAC 3 project areas, a color-coded based system has been established to clasify the different waste streams. The colors indicate solid waste classified as organic, recyclables and hydrocarbon-derived. Trash cans and 55-gallon containers area provided with colors according to waste classification and personnel is trained through informative briefings regarding the adequate disposition of solid waste and the use of trash cans and 55-gallon drums. During the current reporting period signs and leaflets have been placed and distributed indicating the required procedure to classify residues at the project areas. This initiative which has contributed to a better classification of the waste.	X		
Containers for solid waste collection				
1. Establish a proper location for and labeling of solid waste containers.	Color-coded containers have been distributed within the different project areas to segregate residues according to	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	their classification.			
Method of solid waste recycling				
1. Contractor shall investigate recycling opportunities.	During the current project phases there is no significant generation of recyclable waste since the majority of the wastes are of domestic type. PAC 1, PAC 2 and PAC 3 use collection service for recyclable materials from DIMAUD, NAVES Supply and DJ Recycling, respectively. Options are being investigated for heavy equipment tire recycling.	X		
2. Contractor shall verify local recycling options.	During the current project phases there is no significant generation of recyclable waste since the majority of the wastes are of domestic type. Waste oil is recycled through an specialized company. PAC 1, PAC 2 and PAC 3 use collection service for recyclable materials from DIMAUD, NAVES Supply and DJ Recycling, respectively.	X		
Guidelines for the safe transport of solid wastes				
1. Drivers of vehicles carrying solid waste shall avoid making unauthorized and unwarranted stops along the transportation route.	Solid waste from the PAC 1, PAC 2 and PAC 3 project areas is hauled directly from the sites to the Cerro Patacon Landfill. The three contractors use the municipal service of DIMAUD for the transporation of solid waste and ,therefore, they are in compliance with the requirements established for this activity. To date, no incidents or concerns have been filed regarding the transportation of solid waste.	**X**		
2. Vehicles transporting solid waste shall be equipped with the following features: cover (such as a tarps or nets) to prevent spilling solid waste along the route; be PACable of operating without breaking down in severe weather conditions; design PACacity shall be observed without overloading, and the vehicles shall be cleaned up frequently to prevent unpleasant emissions.	At PAC 1 small quantities of solid waste are generated. Solid wastes are transported in plastic bags to the Cerro Patacon sanitary landfill twice a week. Payment receipts made to Cerro Patacon are provided in the monthly monitoring reports. PAC 2 and PAC 3 use a municipal service for transporting their solid waste therefore, they are in compliance with applicable regulations regarding this activity.	**X**		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
Final Solid Waste Disposal				
1. Residues shall be disposed off at the Cerro Patacón sanitary landfill.	Projects are in compliance with this requirement. Evidence is provided in the monthly reports issued by the contractors.	X		
Wastewater				
1. At short-term work sites, portable field toilets shall be provided at a rate of one per each 20 workers.	There are portable toilets at the different project areas, in compliance with safety standards and contractual terms. In projects PAC 1, PAC 2 and PAC 3 maintenance and supply of portable toilets is carried out by the company TECSAN. The contractors include evidence of maitenance provided by the company in the monthly environmental monitoring reports. During the site visits of November 2008 and March and April 2009, ERM observed the use of portable toilets in different project areas. Regarding liquid effluents generated in the offices located in the projects main camps, these are collected in septic tanks in the case of PAC 1 and PAC 3. In the offices of the PAC 2, liquid effluents go to the existing ACP sanitary sewer.	X		
Hazardous waste				
1. Verify that a hazardous waste management system is in place.	Contractor collects hazardous waste in 55 gallons drums, in a area segregated for this purpose, where adequate measures for spill control haven been taken.	X		
2. Final elimination shall be authorized and performed at facilities designed for this purpose o recycling centers.	There is a hazardous waste management program in place. Recoil y SIASA, S.A. are the two companies responsible for collection, processing and/or reutilization of used oil for both PAC 1 and 2, respectively. Contractors' authorized representatives are present during pick up operations of hazardous waste.	X		
3. Contractor shall pack and label all hazardous wastes in a secure manner.	The project is in compliance with the hazardous waste management program.	X		
Inspection of the storage area of hazardous waste				

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
1. Verify that periodic inspections are conducted at storage areas and that they comply with established regulations.	Daily inspections are made to all fuel oil and compressed gas cylinders storage areas.	X		
2. Inspect on a regular basis tanks and containers used for residues.	Daily inspections are conducted to hazardous waste storage areas to verify compliance with the manual for handling of hazardous wastes and materials.	X		
3. All drums and containers in the hazardous waste storage area shall be inventoried and listed in a permanent record	Contractors are in compliance with this requirement. There is a procedure to keep track of 55-gallon drums used for the collection of hazardous waste.	X		
4. No drum or container in the storage area that is marked "Hazardous Waste" may remain more than two months in that location.	Tracking of hazardous waste is in place at the project areas to ensure that it is removed from before a two-month period. Containers are removed on a weekly basis.	X		
Transportation of hazardous waste				
1. The Contractor shall use drums and/or containers in good condition.	It was verified through field inspections that tanks and/or containers are in good condition.	X		
2. All containers shall be marked as hazardous by means of labels or decals.	Contractors are in compliance with these requirements. It was verified in the field.	X		
3. A record shall be kept of all containers transported to their final disposal site.	Evidence of payment receipts from the hauling company for hazardous waste are included in the contractors monthly reports.	X		
Materials Management Program				
Procedures for the handling of hazardous materials				
1. The movement of materials more than four meters long shall be made by groups of workers, posting one employee at every four meters.	ACP complies with this measure.	X		
2. 55 gallon drums may only be loaded manually, and drums with a larger storage PACacity shall be moved with wheelbarrows of other machinery.	Manual movement of 55-gallon drums is not permitted. Informative sessions have been provided to workers at PAC 1, PAC 2 and PAC 3, in order to stress the importance of these measures.	X		
3. The maximum load a worker may move manually may not exceed 50 pounds.	Handling of load which exceeds 50 pounds is not allowed. Informative sessions have been provided to	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
Mechanical handling equipment shall be used for loads exceeding the allowed weight limit.	workers at PAC 1, PAC 2 and PAC 3, in order to stress the importance of these measures.			
4. Employees shall use the necessary protection equipment for the work they perform, especially when such work involves the movement of objects with sharp edges, slivers, nails, or other hazardous objects.	It was verified that employees had the proper equipment for handling materials.	X		
5. When using wheelbarrows, employees shall observe the following: ▪ Ensure that the area over which the load will be moved is flat. ▪ When unloading onto containment areas, chocks must be placed in the unloading area. ▪ Never turn your back on a load.	Informative sessions have been provided at PAC 1, PAC 2 and PAC 3, in order to stress the importance of these measures.	X		
Hazardous Materials Management				
Transfer, storage and use of explosives				
1. The Contractor submit all the necessary information confirming that the personnel performing activities requiring the use of explosives are qualified for such work, and are also familiar with the safety regulations on explosives.	Eng. Osvaldo Diaz is the blasting specialist for PAC 1. At PAC 2, CILSA developed a Blasting Plan that was certified by Austin Caribbean, a company specialized in blasting activities. In PAC 3, the company Sybol was contracted for the development of the plan. All of the plans include information related to the dates, times, elevations, weather conditions, in which blasting activities will be conducted, type and amount of explosive, seismograph information and vibration calculations.	X		
2. Those in charge of the blasting have a device to detect electrical storms in a radius of 10 miles during the transportation, storage, and handling of explosives .	This measure has been implemented.	X		
3. The quality and manufacturing standards shall comply with Panama and international standards.	ACP complies with this measure.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
4. 4. There shall be a shipping manifest for the explosives to be used, stating their date of shipment, their date of arrival, the name of the Contractor, the type and name of the hauler, and its classification according to United Nations standards.	The project complies with this measure and with national regulations regarding this matter.	X		
5. All shipping manifests for explosives shall clearly state the contents of the shipment, and their Material Safety Data Sheets shall be on the outside of each box.	In compliance with this measure.	X		
6. The delivery of the explosives shall be planned in advance to avoid surpluses. This planning must be made with the assistance of a blasting plan stating the quantity of explosives, and starters, 6and the location at the plant.	Deliveries are planned according to the blasting program or plan.	X		
7. Any vehicle to be used by the Contractor to carry explosives shall be approved by the Panama Canal Authority.	ACP verifies and approves the explosives transportation to the Project areas.	X		
8. Storage facilities containing explosives shall display proper signage according to the type of facility and to the provisions of Publication #1 of the Institute of Makers of Explosives (IME).	There are no explosive material storage areas at the project sites. This was verified by ERM during the November 2008 and the March and April 2009 site visits.	X		
9. Explosives shall be used according to their storage date, giving priority to the oldest, provided they have not deteriorated.	This measure has been included in the blasting plans from the different contractors.	X		
10. At the time of the blasting, the perimeter shall have proper safety warning signage, barricades, and cones. In addition, the area shall have berms of a similar or larger diameter than that of the tires of the largest vehicle transiting the area.	PAC 1 and PAC 2 are in compliance with this measure according to their blasting plans. No blasting activities have been carried out in PAC 3.	X		
11. Blasting design and optimization rules established by the manufacturers for	In compliance with the requirement.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
conditions such as the verticality of the holes, time fuses, and the properties of the explosives shall be followed. Likewise, each blast hole shall be inspected for obstructions.				
Materials Handling				
Flammable liquids, solvents and fuels				
1. Eliminate all ignition sources that may generate hazards, such as, lamps, cigarettes, welding, friction, sparks, and chemical reactions.	Employees have been notified about safety procedures and requirements to follow in their working areas, contractor's environmental and safety personnel verify through field inspections compliance with these requirements.	X		
2. Flammable liquid and solvent storage areas shall maintain adequate ventilation in order to prevent the accumulation of vapors.	Flammable liquids, solvents and fuels storage areas are provided with adequate ventilation in PAC 1, PAC 2 and PAC 3. This requirement was verified by ERM in the November 2008 and March and April 2009 site visits.	X		
3. Storage areas shall have the necessary fire extinguishing equipment, appropriate for the type of material stored. In addition, all personnel must be knowledgeable about the use and location of this equipment.	The different project areas are provided with fire extinguishers, which are inspected on a monthly basis. However, some fire extinguishers were identified at PAC 1 and PAC 2 with expired inspection dates. The PAC 3 contractor was building the project camp with their respective maintenance shops and material storage areas at the time of the April 2009 site visit. Fire extinguishers were observed in compliance with this requirement.	X		
4. Storage areas with oil, hydraulic fluids, solvents, paints, and other liquid items used on construction machinery shall be located in a specific area protected from the rain.	PAC 1, PAC 2 and PAC 3 have hydrocarbon storage areas.	X		
5. Whenever the work requires the use of flammable liquids, solvents, and fuel in confined spaces, Panama Canal Authority regulations that apply to this type of space shall be followed.	Verified through daily inspections.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
6. Dispensers shall be equipped with the appropriate grounded safety vent and valves with an automatic lock.	Dispensers are provided with a safety vent and automatic lock.	X		
7. Verify that fuel or any other hazardous liquid storage drums are kept inside a secondary container with a minimum PACacity of 110% of its volume.	Diesel fuel storage tanks at PAC 1 and PAC 2 comply with all required technical specifications and are provided with secondary containment dikes with a capacity to contain 110% of the tank volume. No stationary fuel storage tanks have been installed at PAC 3. ERM observed during the April 2009 site visit, that a portable fuel storage tank was maintained to refill fuel to the project heavy equipment. A secondary containment structure were the stationary fuel storage tank will be installed was under construction at the time of the visit.	X		
8. The fuel unloading area for supplying storage tanks shall be impervious and have a containment to control spills.	When inspections are conducted, all safety and prevention measures related to fuel loading are considred.The loading/unloading area for diesel fuel at PAC 2 is provided with an impervious surface and spill control equipment is located nearby. At PAC 1, this requirement was not included in the corresponding EIA environmental management plan. The contractor was recommended to include in its spill control equipment, sufficient material to place around tank trucks during loading/unloading operations to control spilled material if an incident occurs. During ERM's April 2009 site visit, PAC 3 was starting up operations at the project site and the fuel loading/unloading area was under construction in accordance to applicable requirements.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
9. Verify that during the movement of fuel from trucks to tanks of fuel, it complies with: ▪ Check that the sumps in the unloading area are working properly. ▪ Make sure that there is emergency equipment (to control spills and fires) in good working condition. ▪ Check the stability of the fuel truck at the unloading platform. ▪ Check that the fuel truck has been grounded. ▪ Check the fuel truck connections to the storage tank intake. ▪ Have a representative present during the entire fuel unloading operation. ▪ After transfer operations have been completed, and prior to disconnecting the connecting hoses, make sure that the valves have been turned off. ▪ Daily inspections shall be conducted at containment areas.	Field inspections are performed to verify compliance with this measure. Daily inspections are conducted to verify that sumps are operating properly and that emergency and spill control equipment is are provided. No oil spills or major incidents have occurred during the current reporting period. During fuel unloading operations contactors' authorized representatives are present to verify that all applicable spill prevention measures and loading/unloading procedures are followed.	X		
Compressed gas cylinders				
1. All employees using compressed gas cylinders shall be knowledgeable about the hazards of their handling, and the actions they must take in the case of an emergency.	An informative session about industrial safety took place, short inductions are conducted in different issues related to management materials	X		
2. Periodic inspections shall be conducted on the alarm systems and sites where the equipment is located, to detect any gas leaks. These inspections shall be done according to the manufacturer's recommendations.	At PAC 1, PAC 2 and PAC 3, the contractors' safety representatives perform inspections to detect leaks.	X		
3. All cylinders shall bear markings identifying their contents.	Daily inspections are conducted to check labeling of gas cylinders.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
4. The following precautions must be taken during transportation of compressed gas cylinders: ▪ Do not drag, roll, or slide the cylinders on the ground, ▪ Whenever they are moved manually, a cart especially designed for such purpose shall be used, and each cylinder shall be moved separately, keeping its protective cover in place. ▪ Cylinder storage sites shall be well vented. ▪ Access to cylinder storage sites shall be limited exclusively to authorized personnel.	Inspection during the movement of cylinders. All cylinders are transported in carts according to the ACP procedure. Storage area has good ventilation. Storage area is locked with only authorized personnel access. Signs are used to warn about restriction in PAC 1 and PAC 2 project areas. At PAC 3, no compressed gas cylinders have been introduced.	X		
5. Cylinder storage sites shall be well vented, dry, not hot, and away from incompatible materials, heat sources, and areas that could be affected during an emergency The sites of storage of the cylinders should be well ventilated, dry.	The implementation of this measure was verified on the field.	X		
6. Empty cylinders shall be stored away from full cylinders. However, the same safety standards must be applied to both.	The implementation of this measure was verified on the field.	X		
7. Access to cylinder storage sites shall be limited exclusively to authorized personnel. Also, the necessary safety measures shall be taken at such sites to prevent the cylinders from falling, being hit, or handled by unauthorized persons.	Access to the storage area is restricted only authorized personnel are allowed at the site.	X		
Non-Hazardous Materials Handling				
Worker's rights				
1. The Labor Code of the Republic of Panama requires the employer to provide a safe place	Lockers are provided for workers at the PAC 2 area to store their personal belongings during the work shifts. In	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
to store worker belongings that shall remain in the project's areas.	September they will add more lockers to accommodate additional employees. In PAC 1 remote areas tents are available. PAC 3 main camp was under construction at the closing of the current reporting period. The lockers will be ready as soon as the main camp is established. At the moment they are using temporay facilities for this purpose.			
Food handling				
1. The areas to store these items shall be designed to keep them at the temperature and humidity necessary to adequately preserve their contents.	There are refrigerators (in the building) that is exclusively used to store food prepared by the personnel that access the building.	X		
2. Perform regular maintenance of refrigeration equipment.	Housekeeping personnel clean refrigerators every 3 days and keep the cafeteria area according to adequate hygiene conditions..	X		
3. Verify that all containers have an appropriate cover.	During our inspection we validated that food is stored in closed containers to ensure appropriate hygiene conditions in compliance with requirements.	X		
Materials Storage Areas				
1. Materials storage areas shall be inspected monthly to ensure the proper storage of all materials, their inventory, and that the aisles between the stored materials are kept free from obstructions to allow access to them. These inspections shall be recorded and included in quarterly operation reports.	Ecoambiente conducts field inspections to verify the implementation of these measures at PAC 2 while DECASA conducts monthly inspections for PAC 1 and PAC 3.	X		
2. Inspections shall be conducted at fuel storage areas at least weekly by recording the condition of tanks, containment dikes, sumps, and all related equipment.	Ecoambiente conducts field inspections to verify the implementation of these measures at PAC 2, while DECASA conducts monthly inspections for PAC 1 and PAC 3.	X		
3. Inspections of the personal use storage areas shall be conducted weekly for the purpose of ensuring their cleanliness, and their inspection documents shall be attached to the	Ecoambiente conducts field inspections to verify the implementation of these measures at PAC 2 while DECASA conducts monthly inspections for PAC 1 and	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
quarterly operation reports.	PAC 3.			
Socioeconomic and Cultural Program				
Measures to promote employment				

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
1. Promote the hiring of local manual labor according to recruitment requirements and general policies regarding the work and employment conditions, on the basis of the Equator Principles and the IFC Social and Environmental Sustainability Performance.	The measure of effectiveness is reflected on the quantity of labor, services and deliveries acquired from local subcontractors by CUSA, CILSA and MECO. This dynamic generates a multiplier positive effect on the national economy though the salaries payment and contracted services. Until April 30th, 2009 CUSA, CILSA and MECO had contracted 1,190 people (1,169 locals and 21 foreign) including administrative workers, manual workers (assistants, maintenance, and warehouse staff), and heavy equipment operators. Furthermore, CUSA, CILSA and MECO have contracted services from the following companies: DESARROLLO ECOLÓGICO Y AMBIENTALES ELECTRICA DE MEDELLIN CARDOZE Y LINDO, S.A. TECNOLOGÍA SANITARIA, S.A ENVIROLAB AUSTIN CARIBBEAN, S.A. ASOCIACIÓN PANAMERICANA PARA LA CONSERVACIÓN ECOAMBIENTE S.A. LIVING PANAMÁ, S.A. MINERIA, EXPLOSIVOS Y SERVICIOS, S.A. TECNILAB, S.A. GRASSTECH FUNDACIONES, S.A. SERVIEQUIPO PRO-ONE S.A. MURGOS ARQUITECTOS S.A.	X		
2. Include in the bid specifications the dissemination of employment opportunities	The ACP contracting process has made a concerted effort to match contract size and technical requirements so as to	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
to the country's population through the mass media, as appropriate.	make individuals, small and medium sized contracting businesses as well as larger enterprises eligible. In this way the Program's positive impact on Panamá's construction and consulting services industry have been maximized, and will not only extend the capacity and experience of larger firms.			
Measures to offset the impact of public infrastructure				
1. Build new transmission towers prior to the start of the construction phase to replace those that will be affected.	ERM had the opportunity to observe workers for the electric company ELECTRICAS DE MEDELLIN LTDA moving their 230 Kv electrical transmission line. The project involved the construction of ten new high tension transmission towers to replace the existing towers that are being removed to make way for the Canal Expansion Program. The new line is 4.1 Km long and passes over areas with relatively sparse vegetation. At the time of the most recent ERM visit in April of 2009, the new line had just been completed and the switch in service had already been made without interruption of service.	X		
2. Take the necessary precautions to ensure that public infrastructures are modified without affecting their service.	The replacement of ETESA 230 kV line, corresponding to PAC 1, was executed without affecting electrical power service. At PAC 2, activities involving infrastructure have not initiated.	X		
Measures to prevent the increased risk of diseases				
1. Implement the Solid Waste Management Program of the Panama Canal Authority for the identification of problems relative to the improper handing of solid waste and the design of alternatives using the proper technology according to the features of the region and the waste produced.	PAC 1, PAC 2 and PAC 3, have adequate solid waste management and disposal practices.	X		
2. Strengthen the disease vector control Program of the Panama Canal Authority and the Panama Ministry of Health (MINSA). The aim of this program is to reduce the morbidity associated with vectors, such as those of	Trainings and seminars on vectors control have been given to PAC 1 and PAC 2 personnel.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
leishmaniasis, malaria, Chagas, and dengue fever disease.				
3. Keep health centers in the surrounding areas informed about the progress of the Project and the number of active personnel involved, so they may be prepared to provide emergency treatment, if necessary).	In compliance with the measure.	X		
Measures to prevent the increase in the risk of accidents				
1. Apply a strict policy of work safety education and information for Contractor and Subcontractor personnel.	PAC 1, PAC 2 and PAC 3 contractors have health and safety staff responsible for offering training workers training in all aspects related to safety at workplace and project areas.			
2. Provide all workers with personal protection equipment according to Panama Canal Authority standards, and enforce their use at work sites.	The staff has been provided with adequate safety equipment to perform their duties in all the project areas.	X		
3. Install the appropriate signage at work sites.	It was confirmed that working areas have been properly signalized	X		
4. Implement preventive maintenance programs for machinery and equipment.	It was verified that a preventive maintenance program have been implemented for the project machinery and equipment.	X		
Mitigation measures for the increase in waste generation				
1. Require that Contractors disseminate and enforce compliance by their employees of the requirements established by the Panama Canal Authority in its Materials and Waste Management Manual.	PAC 1, PAC 2 and PAC 3 have adequate waste management and disposal procedures.	X		
2. Establish well defined areas to supply foods and beverages, in order to prevent littering in other Project areas.	Places have been defined for food and rest areas, also garbage cans at locations, properly identified for metal, organics, paper or cardboard, wood, glass and plastic wastes segregation and collection.	X		
3. Install trash cans and signs in areas with greater worker and visitor density.	The measure is met.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
Measures to Mitigate the Effect in the Landscape				
1. Implement an effective control of dust and gas emissions to prevent the rising of gas clouds and/or particulate materials from chimney exhaust, as generated by activities such as excavation and blasting.	The measure is met through the execution of controlled blasting conducted in accordance with safety precautions and environmental safeguards.	X		
2. Disseminate literature about the on going work at lookouts set up by the Panama Canal Authority.	The measure is met.	X		
3. Improve the visual aspect of excavation slopes and fills with replanted vegetation.	The reforestation plan is followed as project activities progress.	X		
Measures to Control the Allocation of Known Archaeological Sites				
1. The hiring of a professional archaeologist for the implementation of an Archaeological Rescue and Salvage Plan.	Since October 2008, ACP hired JCG Associates services in order to analyze sites with archaeological findings detected during earth movements in the expansion project areas (dry excavation and dredging) aiming to evaluate its archeological, historical or cultural value.	X		
2. Archaeological rescue and salvage, if applicable, under a plan that includes various office and field activities; introduce informative material of ongoing Works in lookouts facilities.	ACP complies with the EMP and before initiating activities on known sites, completed the remaining rescue. These works were performed by professional archeologists, using qualified technical equipments, and included the recognition, evaluation, survey	X		
3. Constant monitoring of land movements with the aim of identifying other non-reported archeological findings.	PAC 1, PAC 2 and PAC 3 are in compliance with the monitorings. These monitorings are developed by designated personnel from CUSA, CILSA, MECO and the ACP.	X		
Measures to Control the Allocation of Unknown archaeological and paleontological sites				
1. Stop the activity that generated the discovery, in a radius of at least 50 meters.	The measure has been communicated to the staff, particularly to those driving heavy equipment.	X		
2. Contact a professional archaeologist or paleontologist, as appropriate, and notify the competent authority (National Historic Patrimony Directorate - DNPH-INAC.	ACP complies with the PMA. For the implementation of this measure, it has contracted the Smithsonian Tropical Research Institute (STRI) to perform the study and rescue of paleontology resources in excavating and dredging	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	sites associated to the Panama Canal expansion project			
3. The professional archaeologist or paleontologist shall take the pertinent actions to record the removed substrata and assess the undisturbed context over a prudential period that may not affect project activities, but also may not detract from the quality of a detailed professional recording of information about the discovered site or sites.	The STRI has performed activities that include the search and classification of rocks formations according to their potential, the exploration and rescue of paleontology remains, and their identification. Other performed activities are the preliminary recognition of findings, the development of a geo-referenced database, and collection of rock samples for cross dating by geo chronologic techniques, the measurement of stratigraphic columns, structural data collection, and the preservation of such resources.	X		
4. The promoter shall take action to preserve these resources in the manner they were at the initial moment they were found. The promoter shall protect these resources and be responsible for their preservation until the competent authority informs it about the procedure to be followed.	The measure is met.			
Measures specified in the resolution environmental DIEORA 632-2007				
1. Comply with Law 1 of 3 February 1994, Forestry Law from the Panama Republic.	The ACP and PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement.	X		
2. Prior to the commissioning of the works, the developer must have paid in full the resulting amount to the relevant Regional Administrations of the National Environmental Authority as Ecological Indemnification, pursuant to the provisions of Resolution AG-0235-2003, in addition to the logging, uprooting and mangrove payment rates charged by the competent authority.	Ecological compensation payments have been made in accordance with ANAM resolution.	X		
3. As ecological compensation for the affectation of mangrove ecosystems, secondary forests,	Reforestation plans have been implemented in an efficient manner.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
brushes and others found in terrestrial disposal sites, must replant twice the amount of vegetation and mangrove ecosystem affected, with species native to the area in sites selected in coordination with ANAM and must provide the appropriate maintenance thereof.				
4. Comply with Law 24, of 7 June 1995. Wildlife Protection Law.	The ACP and the PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement	X		
5. Prior to the commissioning of the construction works and/or activities, usage of land and water disposal sites, canalization works, land movement and grading, vegetation clearing and all activities that involve affecting wild animals due to the execution of the Panama Canal Expansion Project, must conduct the rescue and relocation of the fauna; to that effect, the implementation of the Fauna Rescue and Relocation Plan must be coordinated with the relevant Regional Administrations of ANAM.	In PAC 1, PAC 2 and PAC 3, wildlife rescue plans have been executed. In addition, wildlife rescue activities continue as the works progress if the presence of animals is observed.	X		
6. Every six (6) months while the mitigation measures established in the Environmental Management Plan and those included herein are under implementation, submit for the evaluation and approval of the corresponding Environmental Regional Administration a report on the application and efficiency of such measures, pursuant to the guidelines included in the Category III Environmental Impact Study and in this Resolution. Said report shall be prepared by a competent professional and independent from the project developer company to which such Environmental Impact Study corresponds.	The ACP and the PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement	X		
7. Inform ANAM of all modifications and	In October 2008, the ACP requested from ANAM to be	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
changes in techniques and measures that may not be considered in the approved Category III Environmental Impact Study (EIS), for the purpose of confirming whether such modifications or changes require the application of Article 15 of the above-mentioned	allowed to conduct blasting operations during weekends in order to maintain a project schedule without delays in the dry excavation areas. ANAM approved that request through Resolution AG-0250-2009, dated April 13, 2009, which modifies Resolution DIEORA IA-632-2007. Under the new resolution, ANAM authorizes ACP to conduct blasting activities on Saturdays, from 8:00 a.m. to 6:00 p.m., and on Sundays, from 10:00 a.m. to 6:00 p.m. (see *Appendix R*).			
8. Implement effective measures to protect all underground water sources and aquifers located within the project area of influence.	The ACP and the PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement.	X		
9. The developer is bound to prevent erosive effects on the soil of the dredged material deposit sites, as well as to implement effective measures and actions to control superficial run-off and sedimentation.	Measures of the Soil Protection Program are being complied with, especially those aimed at soil erosion and sedimentation control.	X		
10. Install a network of stations to monitor atmospheric emissions; these stations shall monitor the following parameters: nitrogen oxides (NOx), particulate material (PM), particulate material of less than 10 micras (PM10), sulphur dioxide (SO2), carbon monoxide (CO), and lead (Pb). The results of these monitoring processes shall be submitted to ANAM and other competent agencies every six (6) months while project works are underway.	The measure is met. Refer to *Appendix J* -Air Quality Monitoring in the Panama Canal Areas.	X		
11. Once a year submit to ANAM reports with the results of the monitoring activities conducted on water, soil, and air quality, noise and vibrations, during project construction and operation phases through the use of well recognized methodologies; present the respective custody chains, analysis methodologies utilized, measurement	The ACP and the PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
equipment specifications, and their respective gauging certificates, all of which shall be written in Spanish.				
12. The project developer shall be responsible for the integrated management of waste materials from the project area during the project construction and operation phases. Temporary and/or final disposal of these waste materials into water bodies is hereby forbidden. Wastes shall be deposited only in sites that have been previously authorized by the competent authority	The ACP and the PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement.	X		
13. Have all required signs in place in all work sites, materials storage and heavy duty equipment entry and exit sites, during the day and during the night, in coordination with the relevant authorities.	The ACP and the PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement.	X		
14. Prior to the commissioning of any project works, implement all safety and industrial hygiene measures established in our country for the execution of projects of this type.	The ACP and the PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement.	X		
15. Comply with the DGNTI COPANIT 44-2000 Technical.	The ACP and the PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement.	X		
16. Comply with Executive Decree 306 of September 4, 2002, "By which the Regulations for Noise control in Public Spaces, Residential or Living Areas, and in work environments where vibrations are generated, are established."	The ACP and the PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement.	X		
17. Comply with DGNTI-COPANIT-45-2000 Technical Regulations which establish the hygienic and safety conditions required for work environments where vibrations are generated.	The ACP and the PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement.	X		
18. Comply with Law 6 of January 11, 2007,	The ACP and the PAC 1, PAC 2 and PAC 3 contractors	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
which prescribes the Rules on the Management of Oily Residues derived from synthetically-based hydrocarbons for the territory of Panama.	are in compliance with this requirement.			
19. The developer shall be responsible for maintaining vigilance and control on the enforcement of these environmental measures to protect biodiversity during all the different project phases, and shall advise all individuals who may occupy and transit the different project areas, regarding the preservation and protection rules required in order to maintain biodiversity.	This measure is complied with; IARM staff supervises and follows up the activities of the contractors, both in PAC 1 and in PAC 2.	X		
20. Conduct an inventory of the status of any potentially-affected structures, including the Centennial Bridge, and inspect the structures of said bridge after performing any blasting operations that might cause affectations thereto. Shall submit reports on the results of the inspections to the competent authorities before performing such blasting operations.	Structures that could be affected have been identified, preventive and mitigate measures have been taken by applying controlled blasting techniques and adequate planning. To the date of this report, no blasting activities have been conducted nearby the Centennial Bridge (Puente Centenario, in Spanish).	X		
21. The developer shall be responsible for maintaining vigilance and control on the enforcement of these environmental measures to protect biodiversity during all the different project phases, and shall advise all individuals who may occupy and transit the different project areas, regarding the preservation and protection rules required in order to maintain biodiversity.	This measure is complied with; IARM staff supervises and follows up the activities of the PAC 1 and PAC 2 contractors.	X		
22. Prior to the commissioning of the project, place a sign in a visible location within the project area, following the format attached hereto.	Signs with the format required by the resolution are placed in project site.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
23. At all times implement the Agreement between the National Environmental Authority and the Panama Canal Authority on the Coordination of the Environmental Impact Study-or studies, as the case may be- for the project(s) related to the Expansion Program.	The ACP and the PAC 1, PAC 2 and PAC 3 contractors are in compliance with this requirement.	X		
24. Comply with all of the existing Laws, Rules, Decrees, Regulations and Administrative Resolutions of the Republic of Panama, which are applicable for this type of project developments.	There are no evidences of non compliances with regards to this requirement in el PAC 1 or PAC 2.	X		

5.2 GATUN LAKE DEEPENING AND WIDENING, AND DEEPENING OF THE CULEBRA CUT NAVIGATION CHANNEL

The Gatun Lake and the Culebra Cut are two separate Program components. However, the environmental aspects of these components are described together under this section, since the activities involved in both are similar and both are being undertaken with ACP resources with support from rented equipment.

The Gatun Lake project component includes the dredging of more than 19 million cubic meters of earthen material. The Culebra Cut project includes dredging, drilling and underwater blasting of the rocky bottom of the narrowest track of the Canal. The Gatun Lake deepening project and the Culebra Cut drilling and blasting activities began in April 2008.

Excavation activities were conducted during the current reporting period at San Pablo reach, Gatun Lake, Cunnette and Emperador, in the Culebra Cut region. The following activities were taking place during ERM's March and April 2009 visits: dredging, drilling and underwater blasting in the Culebra Cut, dredging at Gatun Lake, and dry excavation at the island of De Lesseps.

5.2.1 *Mitigation Measures Compliance Observations*

In November 2008, ERM visited the Culebra Cut and Gatun Lake projects. In March and April 2009, ERM visited the project areas in Gatun Lake, given that during these months there were no activities at Cubra Cut. These visits were conducted toverify the implementation of the mitigation measures and to confirm the information provided in ACP's project progress reports. ERM conducted interviews with ACP environmental representatives and project managers of these Program components to gain additional information regarding the implementation of mitigation measures.

The following sections summarize in narrative form the general compliance status with the EMP's mitigation measures by the project promoter and contractors. A compliance matrix is presented at the end of these sections that details the mitigation measures following a "*comply*" or "*do not comply*" format, and the observations and activities performed for the implementation of the mitigation measures.

5.2.1.1 Mitigation Plan Measures

5.2.1.1.1 Air Quality, Noise and Vibration Control Programs

The ACP's Dredging Division mantains a preventive program for the heavy equipment used in the project as part of its air quality, noise and vibration control program. According to the environmental follow-up reports provided by ACP, maintenance was provided by Cardoze & Lindo from October to December 2008 and by DDM Rental (owners of Cardoze & Lindo) from January to March 2009.

Regarding dust control and according to the Environmental Follow-up Report prepared by ACP dated Februaty 2009, earthwork in the San Pablo reach was conducted in the wet season and therefore water spraying to control dust was not necessary. ERM visited the island of De Lesseps in March and April 2009, during excavation activities and confirmed that the dust control measures were being implemented in accordance with the mitigation plan. In the Corte Culebra project area, during this evaluation period, the activities were carried out underwater and therefore did not generate any dust.

Regarding noise, there are no sensitive receptors (populated areas, public infrastrure, or others) near San Pablo reach, which is the site for current work at Gatun Lake. Barro Colorado and Orquidia islands, which are occupied and managed by scientist from the Smithsonian Institute, are located near the island of De Lesseps. There are no reported complaints during the current evaluation period regarding noise from heavy equipement in the island of De Lesseps or in the other project areas of the Culebra Cut.

Regarding vibrations, blasting operations were conducted in San Pablo and areas of Cunette and Emperador in the Culebra Cut during the current evaluation period. Blasting in the lake was conducted in areas far from communities or sensitive structures and, therefore, the ACP does not deem the keeping of blasting logs as necessary. The only blasting activity which was carried out near a sensitive receptor was that of San Pablo reach. This blasting did not generate significant vibrations as confirmed by measurements from a seismographer installed in Orquidea island, adjacent to the island of Barro Colorado (Widenig and Deepening of Gatun Lake Environmental Follow-up Report).

No foul odor complaints have been received during the current evaluation period according to ACP logs.

5.2.1.1.2 Soil Protection Program

In November 2008, ERM visited the project site for the dry excavation of the the San Pablo reach and noted that erosion and sedimentation mitigation measures were in place, including the contouring of terrain to 1:1 and 2:3 slopes per EMP specifications.

In March and April 2009, ERM visited the project site for the excavation of the De Lesseps island with ACP representatives. ERM observed that the soil excavated from the island was being deposited into the lake to construct a land bridge to the nearby island of Orquidea, which is part of the natural reserve managed by the Smithsonian Institue. In the visit of April 2009, ACP personnel told ERM that the Tropical Research disvision of the Smithonian Institute had issued a soil reclamation permit to allow for the excavated soil to be transported to a cove in the island of Orquidia (*See Appendix F).*

During the same visit to the island of De Lesseps of March 2009, ERM observed that diesel fuel was stored in three tanks installed on bare ground. Although earth berms were contructed around two of the tanks, these did not contain imperbeable sheeting to prevent a potential spill from percolating into the subsoil and reaching the Gatun Lake. In the visit of April 2009, ERM observed that the aforementioned situation had been corrected by installing all three tanks above dikes containing impervious liners (*See Appendix F*).

5.2.1.1.3 Water Resources Protection Program

The sites in the Gatun Lake undergoing dredging by the Mindi dredge (cut and suction dredge) are far from the intake of drinking water municipal plants and no environmental sensitive sites are impacted that require the implementantation of mitigation measures. Sediments generated from the dredging of the Culebra Cut and Gatun Lake bottom are deposited along the banks of the Canal, at deposit sites such as Frijoles, or in bays, sounds or by forming new beaches. These deposit sites are rapidly revegetated naturally resulting in the minimization of turbidity generated from deposit erosion. In ERM's visit of April 2009, a sediment leak was observed in the piping used to transfer sediments from the Mindi dredge to the Frijoles Disposal site (*See Appendix F*).

A filter was installed in the potable water intake to the Barro Colorado island to trap sediments resulting from excavation activities at the island of De Lesseps. The implementation of this measure was coordinated with the scientists of the Smithsonian Institute, who live and manage the island.

5.2.1.1.4 Flora and Fauna Protection Program

ERM verified the records pertaining to the ecological compensation payments made by the ACP to ANAM for the clearing of vegetation in the Gatun Lake project area. The contract for the reforestation of 30 hectares at the Barú Volcano National Park in Chiriquí was awarded on February 9, 2009 and currently the project is at the plant nursery stage.

Regarding wildlife mitigation measures, ACP awarded a contract to APPC to conduct the rescue of wild animals in the San Pablo Reach and the island of De Lesseps. In September and October of 2008 and in February of 2009, ANAM approved the Wildlife Rescue and Relocation Plans for the above mentioned areas of the Gatun Lake project component.

ERM interviewed an APPC representative during a visit to the San Pablo reach in November 2008. The APPC representative indicated that as part of Project efforts, they are providing awareness training to the ACP project staff regarding methods for wild animal care and rescue. APPC provided ERM with a copy of a training record showing the methodology used to protect wildlife.

Personnel from ANAM conducted an inspection of the island of De Lesseps in order to aprove the ecological indemnization payments made by the ACP. The APPC conducted wildlife rescue in the island of De Lesseps during the vegetation clearing activities of March 2009. During the March 2009 visit to that island, ERM confirmed that this rescue event had been conducted in accordance to the approved plans. Refer to *Appendix L* for evidence of payment of ecological indemnization.

The ACP told ERM, during the visit of April 2009, that additional measures will be taken regarding the training of personnel working in the island of De Lesseps to ensure that wildlife migrating from the adjacent island of Orquidia, a natural reserve, would not be disturb during the excavation project.

5.2.1.1.5 Solid and Hazardous Waste Management Program

Solid waste management plans developed for the Gatun Lake and the Culebra Cut projects follow ACP's waste management policies. The ACP included in their November 2008 and February 2009 quarterly reports information regarding solid waste management training that is offered to their workers and staff members. These records include the training presentations and attendance lists.

Residues and solid wastes from the dredges and drilling barges are segregated into labeled containers based on classification. According to the information included in the quarterly reports, and interviews with ACP representatives, solid waste is hauled and disposed off at the Cerro Patacon sanitary landfill by the Urban and Residential Sanitation Municipal Administration (DIMAUD, Spanish acronym).

Project areas at San Pablo reach and the island of De Lesseps were provided with portable latrines according to the February 2009 quarterly report.

Used oil from dredges, boats and tow-boats is placed in temporary containers and collected by ACP's contamination control and emergency response personnel. This oil is processed in an oil/water separator and is then sold through bidding or used as fuel in ACP's Miraflores thermoelectric plant.

Used oil is processed in an oil/water separator for re-use as a lubricant in ACP's Miraflores thermal plant. Hazardous waste and explosive material residues are managed according to ACP's internal security standards.

Wastewater from the project areas is treated and diposed off in a lagoon in Gamboa.

5.2.1.1.6 Material Management Program

The materials management programs for the Gatun Lake and Culebra Cut projects are being implemented according to ACP's internal environmental standards.

The procedures established by ACP for the management of oils, lubricants and solvents are as follows:

1. Environmental Standard for management and use of oil lubricants and hydrocarbon derivates. July 28, 2003.

2. ESM-108 Environmental Standard for used solvents recovery and management. August 11, 2003.
3. Material and Waste Management Manual. Panamá Canal Authority. October 2003.

ERM verified compliance with these procedures through the review of ACP's quarterly reports, interviews and field visits.

5.2.1.1.7 Socioeconomic and Cultural Resources Program

The ACP Dredging Division has contracted approximately 125 employees since April 2008. ERM observed general compliance with health and safety requirements. Regarding personal training, the ACP has implemented weekly awareness training through talks, lectures and meetings covering a variety of topics related to industrial hygiene, environment, health and safety. Examples of the topics included are: proper handling of fuel and lubricants, and avoiding impacts to local wildlife.

Regarding cultural resources, during the operation of the dredge Rialto M. Christensen in the *Bordada de San Pablo* area, on the east bank of the navigation channel a number of historic artifacts were recovered. These included the remains of railroad cars, dump carts, pieces of steel rail, chains, and telegraph poles along with other items. The ACP notified the *Dirección de Patrimonio Histórico del Instituto Nacional de Cultura (INAC)* on September 15, 2008, which in turn requested in writing that the archeological materials be evaluated by the ACP contracted archaeologist. The evaluation of the artifacts was completed, resulting in the conclusion that the artifacts belonged to the period pertaining to the construction of the Canal by the United States. JCG & Associates evaluated the artifacts found in the San Pablo reach. However, their technical report was not yet available for the revision and approval of ACP at the time of ERM's present report.

In March 2009, ERM visited a site being excavated by JCG & Associates, located in the Juan Grande reach in Punta Mamey Ribera Oeste, where a historic artifact had been found in connection with the Gatun Lake Channel Widening and Deepening. The find consisted of a brick trash incinerator dating to the first decade of the twentieth century during the U.S. Canal construction period. Other artifacts associated with this period were also rescued (glass fragments from bottles, construction materials remains such as bricks of various sizes, and concrete artifacts, among others). It is believed that prior to the canal construction the site was a community, along the railway, known as Mamey. The floodings associated with Canal

construction in the Gatun Lake region forced the relocation of the railway and abandonment of the community early in the second decade of the twentieth century. A technical report on the investigation of the site was prepared by JCG & Associates, which was reviewed by ERM.

ERM also reviewed the bi-monthly report by STRI, which includes the activities carried out under the paleonotological program during the months of February and March 2009. In additional to scientific activities, the report mentions public disclosure activities performed by STRI staff in relation to the program, including national and international school visits. Disclosure activities include presentation of finds information and visits to find sites. Fieldwork conducted during this two month period took place in the area of the planned new Gatun Locks and in the area of the Culebre Cut.

The Gatun Lake and Culebra Cut Deepening and Widening Program component is in general compliance with the requirements of the socio-economics and cultural resources program.

*5.2.1.2 **Monitoring Plans***

5.2.1.2.1 Air Quality Monitoring

Air quality monitoring was not conducted during the current evaluation period given that dredging activities, dry excavation and drilling and blastiong operations were carried out at locations far from communities. The air quality monitoring station closest to the project areas is that of Gamboa, which yielded levels within the ACP standards.

5.2.1.2.2 Noise Monitoring

Monitoring of environmental noise was not conducted during the current evaluation period given that dredging activities, dry excavation and drilling and blasting operations were carried out at locations far from communities.

There are no sensitive receptors such as populated areas, public infrasture, or other, in the San Pablo reach (present work site in the Gatun Lake). The island of Barro Colorado, occupied and managed by the Smithsonian Institute, is located near de island of De Lesseps. No complaints have been reported regarding noise from heavy equipment or blasting activities at the De Lesseps project site.

5.2.1.2.3 Vibration Monitoring

Vibration monitoring is not required at most of the Gatun Lake and Culebra Cut project sites, given that most of the project sites are distant from populated areas. According to the EsIA, vibration monitoring is only required for drilling and blasting activities to be conducted close to the communities of Jose Dominador Bazan, Gamboa, Paraiso, Pedro Miguel, Diablo and La Boca. The ACP follows a plan for blasting activities where type and quantity of explosive and allowed schedules for blasting are specified. ERM reviewed the blasting logs included in the Follow-Up Environmental Report ("*Informe de Seguimiento Ambiental*", in Spanish), prepared by the ACP, dated November 2008 and February 2009.

5.2.1.2.4 Water and Sediment Quality Monitoring

Water quality monitoring in the projects of Gatun Lake and Culebra Cut were conducted at five monitoring stations in 2008. Three of these stations were located south of Rio Grande, whereas two stations were located at the Culbra Cut, at the base of Paraiso hill. Monitoring of the five stations were conducted in March, May, October and November 2008 by *Laboratorio de Analisis Industriales y Ciencias Ambientales de la Universidad Tecnologica de Panama.* Six samples were collected from the water column (from the surface, middle, and bottom) at each of the five locations, and analyzed for organic and inorganic compounds (including metals), and for physical parameters.

Analytical results of the water samples were compared against concentrations obtained from sampling events that had been conducted previous to the beginning of Project activities (i.e., sampling events of December 2005, and February and March 2006), and to levels from other monitoring events that had been conducted in other rivers of the Panama Canal watershed. Water quality analytical results pertaining to the project were either below detection levels or within natural occurring levels for compounds readily found in the environment.

During February 2009, personnel from *Laboratorio de Analisis Industriales y Ciencias Ambientales de la Universidad Tecnologica de Panama* collected water and sediment samples at nine locations of Gatun Lake and Culebra Cut. Simple analyses included organic and inorganic compounds (including metals), and physical parameters. The sampling results revealed that at all sampling locations, the turbity levels were below 40 NTU, the coliform concentration were below 300 MPN and that the concentrations of the

remaining parameters were either below detection levels or within natural occurring levels for compounds readily found in the environment (*see Appendix M*).

Table 3, below, is a compliance matrix for the projects of the widening and deepening of the Gatun Lake and the deepening of Culebra Cut.

Table 3 Widening and Deepening of Lake Gatun and Deepening of the Culebra Cut

BI-ANNUAL REPORT FOR THE IMPLEMENTATION AND EFFECTIVENESS OF THE ENVIRONMENTAL AND SOCIAL IMPACT STUDY – CATEGORY III PANAMA CANAL EXPANSION PROJECT– WIDENING AND DEEPENING OF LAKE GATUN AND DEEPENING OF THE CULEBRA CUT	
PROJECT: Panama Canal Expansion Project: Widening and Deepening of Lake Gatun and Deepening of Culebra Cut	**Location:** Lake Gatun and Culebra Cut
CONTRACTOR: Panama Canal Authority (ACP) – Dredging Division	
REPORT: ERM 002 – June 2009, Mitigation Measures Implemented from November 2008 to April 2009	
ENVIRONMENTAL MONITORING AND FOLLOW UP: ACP	**PHASE: ■ CONSTRUCTION □ OPERATION □ CLOSURE**
ANAM RESOLUTION NO. DIEORA IA-632-2007 – **EsIA APPROVAL DATE: November 9 2007**	

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION				
Air Quality Control Measurements				
1. All engines will be properly maintained to maximize combustion efficiency and minimize pollutant emissions.	ACP through its Dredging Division has a preventive maintenance program for all the equipment used in the Project. Leased equipment is maintained by external contractors. From October to December 2008 and from January to March 2009, preventive maintenance of leased equipment was conducted by their proprietors: the companies Cardoze & Lindo and by CDM Rental.	X		
2. Combustion engines (use of heavy equipment in the excavation dry) must be equipped with exhaust systems and filters (where applicable) in good operating conditions, recommending that it does not go over 10 years of use.	It is verified, according to preventive maintenance records that all equipment is in good operative conditions and that the maximum allowable hours of operation are not exceeded before conducting preventive maintenance. Engine filters are replaced periodically.	X		
3. In dry season, work areas will remain wet to	According to the Environmental Follow Up Report prepared by the ACP, dated February 2009, project activities at the San	X		

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minimize dispersion of dust.	Pablo reach were carried out during the rainy season. Therefore, the use of water dispersion tank trucks was not necessary. During the period of March and April 2009, ACP conducted dry excavation activities in De Lesseps island, located in the Lake Gatun region. ERM visited the project site in March and April 2009 and confirmed that dust suppression measures were implemented according to the mitigation plan.			
4. No waste is incinerated on site.	The burning of solid waste at the project areas is prohibited. Each project area has specific procedures for waste management and facilities for the temporary storage of solid waste.	X		
Nuisance Odor Control				
1. Establish a preventive maintenance program for vehicle fleet.	ACP through its Dredging Division has a preventive maintenance program for all the equipment used in the Project.	X		
2. Provide proper maintenance of the machinery and prevent the generation of nuisance odors polluting the environment.	Preventive maintenance is performed to all equipment used by ACP Dredging Division.	X		
Noise Control Measurements				
1. Verify noise conditions (assess).	Through field inspections is verified that all equipment is in adequate conditions and operators are using their noise protection equipment.	X		
2. Keep all equipment and building stock in good condition and with adequate mufflers systems.	Under this component, heavy equipment (bulldozers) is only used in De Lesseps island. This equipment is provided with required preventive maintenance according to the manufacturer's specifications and is provided with exahust pipe.	X		
3. Minimize, where possible, the operating time of the sources of noise emission and equipment to avoid idle running.	Based on field inspections it is verified that equipment that equipment that is not operating is not in a running mode unnecessarily. Specific instructions have been provided for this purpose.	X		
4. The Contractor shall comply with all rules, regulations and ordinances in reference to	In lake Gatun region and San Pablo Reach, no sensitive receptors are present (no populated communities, public	X		

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government control of noise levels applicable to any work on the Contract.	infraestructure and similar). Nearby De Lesseps island are located the Orquidea and Barro Colorado islands, which are inhabited and administrated by the Smithsonian Institute. During the current reporting period, no complaints have been issued regarding earth moving equipment at De Lesseps island.			
Vibration Control Measurement				
1. Limiting the speed of vibration as set forth in the documents (specifications) of the contract to protect the structures that could potentially be affected	In the Lake Gatun region and San Pablo Reach no sensitive receptors such as town or public and private infrastructure were identified. According to the March 2009 Environmental Follow Up Report prepared by ACP, the only blasting carried out close to a sensitive receptor was conducted in De Lesseps island. A seismograph was installed in the Orquidea island (located adjacent to Barro Colorado island) during the blasting activity and no representative vibrations were recorded.	X		
2. Monitor vibration on critical sites (sensitive) during the period of construction.	In the Lake Gatun region and San Pablo Reach no sensitive receptors such as town or public and private infrastructure were identified. According to the March 2009 Environmental Follow Up Report prepared by ACP, the only blasting carried out close to a sensitive receptor was conducted in De Lesseps island. A seismograph was installed in the Orquidea island (located adjacent to Barro Colorado island) during the blasting activity and no representative vibrations were recorded.	X		
3. Comply with the requirements and regulations of the competent authorities regarding the use of explosives.	The ACP is in compliance with the requirements for explosive handling. In the March 2009 site visit, ERM observed a shed at DeLesseps island used for the storage of explosive materials only when blasting activities are conducted.	X		
Soil Protection Program				
Embankments Settlement Control				
1. Undertake monitoring of slope deformation and motion.	Visual inspections and records of activities are performed.	X		
Landslide Control				
1. Stabilize slopes with a history of recurring landslides, reducing the forces that encourage	ACP performs field inspections and slopes inventory. This activity helps to identify sinking, undermining, cracks and	X		

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settlings digging at the top of the slope or "head" before the dredging of the base or "toe" of the underwater slope.	other phenomena related to slope instability to establish corrective measures.			
2. Reduce the burden without increasing infiltration into the slope and if necessary the sealing surface so as to reduce the infiltration of water into the slope after excavation. According to the Geotechnical Section of the ACP (2002) estimated that "for every meter to be excavated 34 feet below PLD is required to dig 4 to 5 million cubic meters of additional existing slopes."	No related activities have been initiated related to this measure.			X
3. Decrease the degree of slope in the design of the most unstable slopes using a slope to ensure stability.	This measure is accomplished according to the geotechnical design. Slope conformation is done according to the geological characteristics of exposed materials.	X		
4. Systematic installation of horizontal drains on sloping or unstable slopes are located a spacing consistent with the hydrogeological conditions of each site, to the depth of the flaws when they have been identified.	No related activities have been initiated related to this measure.			X
Soil Erosions and Sedimentation Control				
Soil Conservation				
1. Carry out the largest movement of land as far as possible during the dry season, prioritizing the start of operations in the areas of greatest slope of the sector such as Culebra Cut and the locks of the Pacific	Dry excavation activities at DeLesseps island are being carried out during the dry season.	X		
Slope Stabilization				
1. Terrace slopes with cuts of up to 5 m high by maintaining the inclination of 1:3 to 3:1 slopes.	At the tips of the San Pablo reach the conformation of slopes type 1:1 and 2:3 were carried out as required in the EsIA Category III.	X		
2. Stabilize the exposed face of the slopes using biodegradable materials such as mattresses.	Activities conducted during the current reporting period consisted in the dry excavation at De Lesseps island. During			X

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	ERM site visit in March and April 2009, only earthwork was being conducted, therefore, this measure does not apply.			
3. Install underground drains in the saturated slopes and reduce infiltration into the sub-surface using longitudinal drains at the base of the slopes.	No related activities have been initiated related to this measure.			X
4. Sites likely to stabilize landslides, subsidence, landslides and other mass movements.	During the March 2009 site visit, ERM observed earthwork activities at DeLesseps island, in the Lake Gatun region. In the April 2009 site visit, ERM observed that adequate slope stabilization and erosion control was being implemented in that project area.	X		
5. Verify stabilizing cuts roads	During the March 2009 site visit, ERM observed earthwork activities at DeLesseps island, in the Lake Gatun region. In the April 2009 site visit, ERM observed that adequate slope stabilization and erosion control was being implemented in that project area.	X		
Soil Contamination Control				
1. Control and Maintenance of Machinery and Equipment Construction Project, which must be controlled through detailed records to ensure compliance with the specifications, set by manufacturers for the type and frequency of maintenance for each team to ensure efficiency operation of the engines. Collect and recycle lubricants and greases during and after the action of the rolling stock maintenance. When these works are finished such facilities must be remediate if they contain residues of oil or other contaminants	ACP through its Dredging Division has a preventive maintenance program for all the equipment used in the Project.	X		
2. Staff Training Specialist Fuels Management and Maintenance of Machinery and Equipment.	Training has been offered to all workers handling or managing fuels at the project sites. Evidence of training and attendance lists are provided in the quarterly environmental follow up prepared by the ACP.	X		
Water Resources Conservation Program				

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Turbidity reduction during dredging activities				
1. Optimizing the cutting speed, balancing, suction and discharge.	ACP has implemented a preventive maintenance program to keep all equipment in adequate operating conditions and to attain an effective process in the dredging activities at the lake Gatun and Culebra Cut project areas. In the March 2009 field visit, ERM interviewed the captain from the Mindi dredge (in lake Gatun) regarding the implementation of this mitigation measure. He explained that optimization of the cutting speed, balancing, suction and discharge rate are also carried out in order to optimize the efficiency of the dredging.	X		
2. Protect the cutting head or suction.	The measure has been implemented.	X		
3. Optimizing the design of the cutting head.	The measure has been implemented.	X		
Turbidity reduction during water disposal				
1. Download design pro flow density at the exit of the pipe.	Measure verified through field inspection. The measure has been implemented.	X		
2. Curtains use controls sediment in sensitive areas.	The places where dredging is carried out with the Mindi dredge (i.e. cutting and suction dredge) are located away from potable water systems intakes and from environmentally sensitive areas that require the implementation of this mitigation measure. Dredged spoil from the Culebra Cut and lake Gatun is deposited on the banks of the Canal, in places such as the Frijoles deposit site or using bays, inlets or forming new beaches. With regard to potential impacts from the dry excavation of De Lesseps island, a filter to trap sediments was installed in the intake of the Barro Colorado island drinking water system. This measure was implemented in coordination with scientists from the Smithsonian Institute who are the administrators of the island.	X		
3. Coverage of final disposal sites with rocky material at the sites to reach their full potential.	Activities related to this mitigation measure have not started during the current reporting period.			X
4. Coordination of the activities of dredging and deposition, to prevent the discharge of dredged material during the occurrence of fine weather	The Mindi dredge discharges dredged spoil through an enclosed pipeline that runs from the dredge to the Frijoles disposal site. During the April 2009 site visit, ERM observed	X		

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and water currents effects.	that the discharge pipeline was leaking sediments. Material removed from the dry excavation of De Lesseps island is being deposited in a cove of the adjacent Orquidea island as part of land reclamation. This activity was coordinated between the ACP and the Smithsonian Institution, who are the administrators of the island.			
Fauna and Flora Protection Program				
Measurements to control lost of vegetation cover				
1. Comply with ecological indemnity in accordance with Resolution AG-0235-2003/ANAM.	ERM verified the records pertaining to the ecological compensation payments made by the ACP to ANAM for the clearing of vegetation in the Gatun Lake project area.	X		
2. During the construction, moving equipment shall be operated in such manner that minimum deterioration is caused to the vegetation and surrounding soils.	Field inspections are conducted to verify that moving equipment is operated according to these requirements.	X		
3. Train operators on the procedures of clearing the vegetation cover.	Informative talks have been provided to the personnel.	X		
4. Reforestation and revegetation.	According to the April 2009 Environmental Follow Up report, the contracts for the reforestation of 30 hectares at the Baru Volcano National Park in Chiriqui were issued by the ACP on February 5, 2009. The company JS Chacon was held responsible for the reforestation activities in coordination with the ACP. The execution of the plan began already and is currently at the plant nursery stage.	X		
Measurement for of Lost forestry potential				
1. The working area limits shall be clearly marked with stakes or flagpoles.	The compliance with this measure was verified at the field.	X		
2. Include planting of forest native species in the Reforestation Plan.	According to the April 2009 Environmental Follow Up report, the contracts for the reforestation of 30 hectares at the Baru Volcano National Park in Chiriqui were issued by the ACP on February 5, 2009. The company JS Chacon was held responsible for the reforestation activities in coordination with the ACP. The execution of the plan began already and is currently at the	X		

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	plant nursery stage.			
3. Direct tree falls towards the direct impact area to avoid damage to trees in the adjacent areas which should not be impaired.	The cutting plan is being followed.	X		
Control of lost terrestrial habitats				
1. Reforestation, as a means of compensation heeds both the vegetation cover loss and the habitat impairment, and offers an alternative in the areas where reforestation is to be carried out.	According to the April 2009 Environmental Follow Up report, the contracts for the reforestation of 30 hectares at the Baru Volcano National Park in Chiriqui were issued by the ACP on February 5, 2009. The company JS Chacon was held responsible for the reforestation activities in coordination with the ACP. The execution of the plan began already and is currently at the plant nursery stage.	X		
Control of perturbation over the fauna				
1. Avoid unnecessary noise generated by whistles, horns, etc.	Workers have been warned to avoid these types of devices unnecessarily. Daily inspections are performed. Workers have been trained trough informative talks to avoid fauna perturbation with noise. The ACP told ERM, during the visit of April 2009, that additional measures will be taken regarding the training of personnel working in the island of De Lesseps to ensure that wildlife migrating from the adjacent island of Orquidea, a natural reserve, would not be disturb during the excavation project.	X		
2. Verify the installation and maintenance of equipment mufflers motor.	The maintenance program is being followed.	X		
3. Coordinate the rescue of animals entering the work areas.	Personnel from APPC (fauna rescue) were present during the works in the project area. APPC personnel are available upon requirements when accidentally animals enter the project areas.	X		
4. Train staff to work on procedures for protection of wildlife and prevent poaching.	Training has been offered to staff on procedures for the protection of wildlife and the prevention of poaching. Training program.	X		

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Measures for the Control of poaching				
1. Prohibit employees from practice any type of hunting or fishing within the project area.	Workers have been advised trough induction and informative talks of prohibitions within Project areas. Training sessions have taken place at the field with workers.	X		
2. Prohibit or regulate the use of firearms within the premises of the project.	The use of firearms is prohibited in the working premises.	X		
3. Comply with laws and standards set by the National Environment Authority on the protection of wildlife	This is verified with inspections. The rescue and relocations of animals in risk is verified with inspections. No non compliances with the law on wildlife protection have been identified.	X		
Waste Management Program				
1. Supervise the proper management of solid wastes.	Through inspections it is assured that solid wastes are managed and disposed adequately.	X		
Solid Waste Training				
1. Verify safety meetings and training is provided to Contractor personnel.	Informative talks have been provided by ACP to all new personnel. During the month of September informative signs were displayed showing proper disposal of wastes in the project area contributing for a better classification of garbage.	X		
Solid Waste Final disposal				
1. Municipal Solid Waste in the Pacific area will be disposed at Cerro Patacon Sanitary Landfill.	Solid waste generated in the barges and dredges are separated in containers and labeled according to their classification. Organic and domestic waste is deposited in containers and removed by DIMAUD, for final disposal at the Cerro Patacón. The project is in compliance with this measure.	X		
Liquid Effluent				
1. Construction sites will provide at least one portable toilet for every 20 workers.	Project areas at the reaches and at the De Lesseps island are provided with portable latrines.	X		

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Material Management Program				
Hazardous Materials Management				
Transport, storage and use of explosive.				
1. Quality and manufacture regulations must comply with Panamanian and international standards.	This measure is being implemented. .	X		
2. Explosive to be used shall comply with shipping, arrival date, name of the contractor, tope and name of transportation protocols, in accordance with UN norms.	This measure is being implemented and complies with national regulation.	X		
3. Documentation for explosive cargo must clearly indicate its contents, and additionally, in each external box an MSD shall be affixed.	This measure is being implemented.	X		
4. Vehicles used for the transport of explosive shall comply with ACP approval.	ACP verifies and approves explosive transportation to the Project areas. .	X		
5. Explosive storage areas must be clearly identified in compliance with IME Publication No 1 (Institute of Manufacturers of Explosives).	There is not explosive storage in the Project area.	X		
6. Whenever blasting is to take place, adequate signage, barricades and warning cones around the perimeter must be implemented. Additionally, berms o similar or bigger diameter of the tires of the biggest vehicle transiting the area.	Underwater explosions comply with measures and regulations established by ACP.	X		
Material Management				
Flammable, solvents and combustibles				
1. Eliminate all sources of ignition that could generate risk such as lights, cigarettes, sparks, and chemical reactions among.	Workers have been instructed to follow safety rules in their working areas Safety and Environmental department representatives monitor in the field the compliance of rules and procedures.	X		
2. Flammable liquids and solvents storage areas shall be properly ventilated to avoid vapor	Storages area in the floating equipment has all safety measures	X		

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accumulation.	to prevent fires.			
3. Storage areas shall have on site, FIRE extinguisher equipment according to the type of materials stored.	Dredges used in the Project have fire suppression equipment.	X		
4. Comply with ACP regulations whenever a Project requires the use of flammable liquids, solvents and combustibles.	Inspections are performed on a daily basis.	X		
5. Verify that fuel storage tanks or other hazardous materials are properly stored with a secondary contention berm or structure	At the San Pablo Reach was observed fuel storage for the bulldozer working in the area. Nevertheless due to the nature of works and location no containment walls for spills were established. During the same visit to the island of De Lesseps of March 2009, ERM observed that diesel fuel was stored in three tanks installed on bare ground. Although earth berms were constructed around two of the tanks, these did not contain impermeable sheeting to prevent a potential spill from percolating into the subsoil and reaching the Gatun Lake. In the visit of April 2009, ERM observed that the aforementioned situation had been corrected by installing all three tanks above dikes containing impervious liners.	X		
6. Fuel dispensing areas shall be provided with an impervious surface and a berm to prevent spills.	All safety and prevention measures are considered in the inspections conducted during fuel loading operations. ACP has an internal procedure for the loading/unloading of materials.	X		
Non Hazardous Materials Management				
Material for employees				
1. Republic of Panamá establishes that employer's area required providing a safe area to store employee's personal items, for those working on site.	ACP provides installations to its employees to store their personal belongings during work shifts.	X		
Socioeconomic and Cultural Program				
Measures for increases employment generations				
1. Promote the hiring of local manual labor according to recruitment requirements and general policies regarding the work and	Activities for the widening and deepening of the Culebra Cut and lake Gatunl are directed by the Dredging Division of ACP. From April 2008 to April 2009, 125 new employees (all locals)	X		

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employment conditions, on the basis of the Equator Principles and the IFC Social and Environmental Sustainability Performance Standards.	were hired. In addition, the project required the hiring of fauna rescue personnel and leasing of heavy equipment.			
2. Include in the bid specifications the dissemination of employment opportunities to the country's population through the mass media, as appropriate.	The ACP contracting process has made a concerted effort to match contract size and technical requirements so as to make individuals, small and medium sized contracting businesses as well as larger enterprises eligible. In this way the Program's positive impact on Panamá's construction and consulting services industry have been maximized, and will not only extend the capacity and experience of larger firms.	X		
Measures to avoid labor diseases.				
1. Implement the Solid Waste Management Program of the Panama Canal Authority for the identification of problems relative to the improper handing of solid waste and the design of alternatives using the proper technology according to the features of the region and the waste produced.	ACP complies with all internal procedures to manage solid wastes.	X		
2. Strengthen the disease vector control Program of the Panama Canal Authority and the Panama Ministry of Health (MINSA). The aim of this program is to reduce the morbidity associated with vectors, such as those of leishmaniasis, malaria, Chagas, and dengue fever disease.	Talks and seminars take place every week in each works area and floating equipment. Additionally workers receive training at the Ascanio Arosemena training center. Courses include bio-safety, vector control and handling of fauna.	X		
3. Keep health centers in the surrounding areas informed about the progress of the Project and the number of active personnel involved, so they may be prepared to provide emergency treatment, if necessary.	ACP complies with the measure. Health centers are kept informed about the progress of project activities and the number of active personnel involved, facilitating their emergency preparedness.	X		
Measures to prevent risks of work accidents				
1. Apply a strict policy of work safety education and prevention of work accidents to all workers including employees, contractors and	ACP has a very active and effective program to prevent labor accidents. Program is implemented by the Occupational Health and Safety office.	X		

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subcontractors.				
2. Provide all workers with personal protection equipment according to Panama Canal Authority standards, and enforce their use at work sites.	Personnel have been provided with all the appropriate safety equipment to perform its duties at all project areas.	X		
3. Install the appropriate signage at work sites.	It was confirmed that appropriate signage have been adequatelly intalled at work sites			
4. Implement preventive maintenance programs for machinery and equipment.	It was verified that preventive maintenance of machinery and equipment have been implemented.	X		
Measures to minimize affectation to known archeological sites				
1. The hiring of a professional archaeologist for the implementation of an Archaeological Rescue and Salvage Plan.	Since October of 2008, ACP hired the archaeological firm JCG Associates under contract on an on-call basis to address any archaeological discoveries that are made during construction (dry and wet excavation) as the result of earthwork activities.	X		
2. Archaeological rescue and salvage, if applicable, under a plan that includes various office and field activities; introduce informative material of ongoing Works in lookouts facilities.	ACP is in compliance with this measure which appears in the PMA. Before starting the Project ACP completed the rescue of archeological discoveries in the area. This task was undertaken by professional archeologists using technical equipment in reconnaissance, evaluation prospecting and rescue before and during the construction of the project.	X		
Measures to control affectation to archeological and paleontological sites				
3. Stop the activity that generated the discovery, in a radius of at least 50 meters.	This measure has been communicated to all personnel specially those in charge of heavy construction equipment including dredging.	X		
1. Contact a professional archaeologist or paleontologist, as appropriate, and notify the competent authority (National Historic Patrimony Directorate – DNPH-INAC).	Regarding control measures for unknown paleontological sites, ACP is in compliance with measures established in the PMA. To implement the measures Smithsonian Tropical Research Institute (STRI) has a contract with ACP for the rescue and study of paleontological resources of dredging and excavation sites associated with the expansion program. ACP contracted JCG $Anderson in Oct 2008 to verify aruqological findigns and	X		

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	potentials.			
2. The professional archaeologist or paleontologist shall take the pertinent actions to record the removed substrata and assess the undisturbed context over a prudential period that may not affect Project work, but also may not detract from the quality of a detailed professional recording of information about the discovered site or sites.	STRI has conducted research and classification of rock units according to their potential. It has also conducted the exploration, rescue and identification of pale ontological remains. Other activities include the preliminary curing of findings and the creation of a geo-referenced database among other measures.	X		
3. The promoter shall take action to preserve these resources in the manner they were at the initial moment they were found. The promoter shall protect these resources and be responsible for their preservation until the completion of the project.	ACP complies with the measure.			
Measures contained in the resolution 632-2007				
1. Comply with Act 1 of February 3, 1994, Forestry Law of the Republic of Panama.	ACP is in compliance with this requirement.	X		
2. Prior to the commissioning of the construction works and/or activities, usage of land and water disposal sites, canalization works, land movement and grading, vegetation clearing and all activities that involve affecting wild animals due to the execution of the Panama Canal Expansion Project, must conduct the rescue and relocation of the fauna; to that effect, the implementation of the Fauna Rescue and Relocation Plan must be coordinated with the relevant Regional Administrations of ANAM.	All payments were made for the Project areas according to authorizing resolution.	X		
3. As ecological compensation for the affectation of mangrove ecosystems, secondary forests, brushes and others found in terrestrial disposal sites, must replant twice the amount of vegetation and mangrove ecosystem affected,	Reforestation plans were implemented efficiently.	X		

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with species native to the area in sites selected in coordination with ANAM and must provide the appropriate maintenance thereof .				
4. Comply with Act 24, of June 7,1995. Wildlife Protection Law.	ACP is in compliance with this requirement.	X		
5. Prior to the commissioning of the construction works and/or activities, usage of land and water disposal sites, canalization works, land movement and grading, vegetation clearing and all activities that involve affecting wild animals due to the execution of the Panama Canal Expansion Project, must conduct the rescue and relocation of the fauna; to that effect, the implementation of the Fauna Rescue and Relocation Plan must be coordinated with the relevant Regional Administrations of ANAM.	The Project has executed all Fauna Rescue Plans. Fauna rescue continues to be implemented according to the progress of the project.	X		
6. Every six (6) months while the mitigation measures established in the Environmental Management Plan and those included herein are under implementation, submit for the evaluation and approval of the corresponding Environmental Regional Administration a report on the application and efficiency of such measures, pursuant to the guidelines included in the Category III Environmental Impact Study and in this Resolution. Said report shall be prepared by a competent professional and independent from the project developer company to which such Environmental Impact Study corresponds	ACP complies with the measure. This report is evidence of compliance with this requirement.	X		
7. Inform ANAM of all modifications and changes in techniques and measures that may not be considered in the approved Category III Environmental Impact Study (EIS), for the purpose of confirming whether such	ACP complies with the measure.	X		

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modifications or changes require the application of Article 15 of the above-mentioned Executive Decree 209 of 2006.				
8. Implement effective measures to protect all underground water sources and aquifers located within the project area of influence.	ACP is in compliance with this requirement.	X		
9. The developer is bound to prevent erosive effects on the soil of the dredged material deposit sites, as well as to implement effective measures and actions to control superficial run-off and sedimentation.	ACP has an effective response procedure for slides. ACP is in compliance with this requirement.	X		
10. Submit before the Environmental Quality Protection Bureau of the National Environmental Authority (ANAM) and Competent Authorities, prior to initiating any effort, the work plan and activities chronogram for developing environmental monitoring on dredging and spilling activities, which documents shall include, but not be limited to, the following: the safety protocol for motor equipment fuel supplying; a dredged materials disposal scheme considering tides.	ACP is in compliance with this requirement. Monitoring plans are being implemented.	X		
11. While dredging and materials disposal operations are underway, submit before the National Environmental Authority (ANAM-DIPROCA), annual reports on sediments and water quality monitoring activities, as well as the effects of these operations on the impacted area. These monitoring activities shall include but not be limited to physical, chemical and biological analyses of sediments on the following parameters: organic contents; tributyl tin; organo-halogen, organo- phosphorous, or organo-nitrogen pesticides; carbamates; piretroids; herbicides; polychlorinated biphenyls	ACP is in compliance with this requirement. Monitoring of the water column and sediments are being conducted in the project areas.	X		

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(PCB) and polyaromatic hydrocarbons				
12. Install a network of stations to monitor atmospheric emissions; these stations shall monitor the following parameters: nitrogen oxides (NOx), particulate material (PM), particulate material of less than 10 micras (PM10), sulphur dioxide (SO2), carbon monoxide (CO), and lead (Pb). The results of these monitoring processes shall be submitted to ANAM and other competent agencies every six (6) months while project works are underway.	ACP is in compliance with this requirement. Air quality monitoring is being conducted in the project areas, refer to *Appendix J* for air quality monitoring reports.	X		
13. Once a year submit to ANAM reports with the results of the monitoring activities conducted on water, soil, and air quality, noise and vibrations, during project construction and operation phases through the use of well recognized methodologies; present the respective custody chains, analysis methodologies utilized, measurement equipment specifications, and their respective gauging certificates, all of which shall be written in Spanish.	ACP complies with the measure.	X		
14. The project developer shall be responsible for the integrated management of waste materials from the project area during the project construction and operation phases. Temporary and/or final disposal of these waste materials into water bodies is hereby forbidden. Wastes shall be deposited only in sites that have been previously authorized by the competent authority.	ACP complies with the measure.	X		
15. Prior to the commissioning of any project works, implement all safety and industrial hygiene measures established in our country for the execution of projects of this type.	ACP complies with the measure.	X		
16. Comply with the DGNTI COPANIT 44-2000	ACP complies with the measure.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
Technical Regulations, which prescribes the hygiene and safety conditions required for noise-generating working environments.				
17. Comply with Executive Decree 306 of September 4, 2002, "By which the Regulations for Noise control in Public Spaces, Residential or Living Areas, and in work environments where vibrations are generated, are established."	ACP complies with the measure.	X		
18. Comply with DGNTI-COPANIT-45-2000 Technical Regulations which establish the hygienic and safety conditions required for work environments where vibrations are generated.	ACP complies with the measure.	X		
19. Comply with Law 6 of January 11, 2007, which prescribes the Rules on the Management of Oily Residues derived from synthetically-based hydrocarbons for the territory of Panama.	ACP complies with the measure.	X		
20. The developer shall be responsible for maintaining vigilance and control on the enforcement of these environmental measures to protect biodiversity during all the different project phases, and shall advise all individuals who may occupy and transit the different project areas, regarding the preservation and protection rules required in order to maintain biodiversity.	ACP complies with the measure; IARM personnel supervise and monitor the compliance of the widening and deepening of Gatun Lake and Culebra Cut.	X		
21. The developer shall be responsible for maintaining vigilance and control on the enforcement of these environmental measures to protect biodiversity during all the different project phases, and shall advise all individuals who may occupy and transit the different project areas, regarding the preservation and protection rules required in order to maintain biodiversity.	ACP complies with the measure; IARM personnel supervise and monitor the compliance of contractors.	X		
22. Prior to the commissioning of the project, place a	Signs are posted according to the requirements.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
sign in a visible location within the project area, following the format attached hereto.				
23. At all times implement the Agreement between the National Environmental Authority and the Panama Canal Authority on the Coordination of the Environmental Impact Study-or studies, as the case may be-for the project(s) related to the Construction of a Third Set of Locks in the Panama Canal.	ACP complies with the measure	X		
24. Comply with all of the existing Laws, Rules, Decrees, Regulations and Administrative Resolutions of the Republic of Panama, which are applicable for this type of project developments.	ACP complies with the measure	X		

5.3 WIDENING AND DEEPENING OF THE PACIFIC ENTRANCE CHANNEL

The contractor for this project is Dredging International de Panama, S.A. (DI), which had begun dredging and underwater blasting activities in the Pacific Entrance region during the current evaluation period.

5.3.1 Compliance Observations

ERM reviewed the quarterly mitigation measures reports presented to the ACP by DI for the quarters ending in October 2008, and January and April 2009. ERM visited the project sites in November 2008, and in March and April 2009, and visited the main project camp and the cutter and hopper dredger, Clamshell (*see Appendix F*).

5.3.1.1 Mitigation Measures Plan

5.3.1.1.1 Air Quality, Noise and Vibration Control Program

DI submitted to ACP the specifications of the dredgers that will be used during various project phases. These specifications show that the dredgers are equipped with a specialized air emission filter certified for the generation of low air emissions. In its quarterly reports, DI provided the preventive maintenance logs for its vehicles and heavy equipment used in the project. Preventive maintenance is conducted by CYASA, S.A. Motor vehicles are leased to National Car Rental, which provides maintenance to its vehicles. The ACP and project contractor has inspected the equipment used on the project to confirm that this equipment does not generate excessive noise or combustion gases.

Dust control measures have not been necessary given that blasting operations for this project are conducted underwater. In addition, the dredged material is transported through closed piping and, therefore, the material is not exposed to the atmosphere.

No complaints regarding foul odors have been received according to the quarterly reports reviewed.

Monitoring of environmental and occupational noise began in March 2009, according to the quarterly reports. Monitoring results show that environmental and occupational noise levels are below those established by

ANAM's National Regulation. No complaints from surrounding communities have been reported regarding noise levels.

Regarding vibration control during the current evaluation period, the ACP indicated that underwater blasting operations had begun in April 2009. In an interview conducted by ERM to ACP personnel, ACP indicated that the blasting activities were currently being conducted far from sensitive receptors and, therefore, monitoring for vibration levels was not required during the current period.

During the current evaluation period, DI inspected the integrity of critical structures prior to blasting activities, specifically in the Diablo community (*see Appendix O*).

5.3.1.1.2 Water Resources Protection Program

The project offices are connected to a septic tank system with a subsurface discharge after the effluent is processed through a filtration tank. The Program areas contain portable toilets that are maintained by a service contractor. Maintenance records for portable toilet units are provided in the quarterly reports.

During the site visits of November 2008, and March and April 2009, ERM observed that DI had installed erosion protection barriers in the vicinity of its project office. The quarterly reports include evidence of staff training on spill prevention and control as well as of training attendance lists.

In March 2009, ERM visited the Farfan disposal site. This disposal site contains a sedimentation pond to trap sediments pumped from the dredging area. The perimeter of the disposal site contains crushed gravel, boulders and tall grass that jointly act as an erosion control barrier. A silt fence has been installed to act as an energy dissipating barrier for the sediment stream and thus maintain the sediments within the sedimentation pond. ERM observed that at some locations, the height of the sediment column had reached the top of the silt fence. The silt fence, therefore, will need maintenance to preserve the effectiveness of the erosion control measure.

Effluent from the Farfan disposal site in channeled through a head wall that is located perpendicular to the Farfan Road, downgradient from the disposal site. The effluent eventually discharges into the Navigation Channel of the Canal (Pacific Entrance).

Total dissolved solids and total suspended solids analyzes are conducted on a monthly basis at the effluent located in Farfan Road (please refer to **Section 5.3.1.3,** *Environmental Monitoring and Follow-up Plans*).

ERM interviewed the ACP environmental representative in charge of the oversight of the Pacific dredging project regarding EMP mitigation measures for the control of turbidity during dredging. The mitigation measures specifically described in the EMP are the cutting speed, balancing, and suction discharge rate during dredging operations. The ACP representative explained that these processes are an intrinsic part of the efficiency of the dredging operations, but that there is no practical way to quantify them individually.

Water quality monitoring, which includes turbidity analysis, is conducted monthly at seven sampling locations. Three of these locations are used to obtain water quality parameters directly related to project activities, whereas the remaining four sampling points are located in areas adjacent to the disposal sites to verify that disposal activities do not impact surrounding areas.

5.3.1.1.3 Flora and Fauna Protection Program

The flora and fauna protection program includes training for DI staff. The training informs workers about the rescue program and its objectives, and provides instruction on how to respond when animals that need rescue are encountered. Training records for these topics, along with attendance lists, are provided in DI's quarterly mitigation measure reports. Based on the reported information, ERM verified that the rescue and relocation efforts from this project have been successful. In March 2009, ERM's field personnel received training in the flora and fauna protection program.

The access road to offices and Project construction areas was build so as to minimize the clearing of dense vegetation areas. A reforestation plan was not required given that none of the forested areas were impacted.

ERM reviewed the wildlife rescue plan for this project. Wild animals were rescued by the APPC with the support from the Institute for Neotropical Conservation of the United States Department of Agriculture (USDA). According to the final wildlife rescue report, wild animals were rescued from the area of Cocolí adjacent to the Velasquez disposal site (where project offices are located), which consists of 4.9 hectares of tall grasses. Wild animals were relocated to an ANAM-approved area.

5.3.1.1.4 Solid and Hazardous Waste Management Program

The Solid Waste Management Plan developed for the project follows ACP's waste management policies. DI quarterly reports included information regarding solid and hazardous waste management training offered to project personnel, as well as the lists of attendees. The training is repeated if, during the periodic environmental inspections conducted by DI, it is found that solid waste is not being properly managed.

ERM observed during the March and April 2009 field visits that trash bins were provided to office areas. In the construction areas, ERM observed that color coded 55-gallon drums were used for the collection of different types of waste. Color coding is used as follows: blue for dry garbage, grey for inorganic waste, green for organic waste, black for oil residues, and yellow for diesel fuel residues (*see Appendix F*).

According to the quarterly reports, the disposal of organic waste is performed by the company "Aseo Capital". This company hauls wastes to be disposed off at the Cerro Patacón sanitary landfill. Inorganic waste and used oil are managed and recycled by the company DJ Recycling.

During the field visits, ERM confirmed that hazardous wastes generated at the project areas are handled according to the ACP and international policies and regulations. It was observed that lubricants are deposited in dedicated containers and collected by DJ Recycling for recycling. Personnel working in the dredger have received training to manage the waste lubricant oils generated in maintenance activities. Toilet facilities at the dredger are maintained by the company Pedro Jadee, S.A.

Based on the documentation reviewed and field visits, ERM confirmed that the Pacific dredging project is in compliance with the EMP's solid waste management requirements.

5.3.1.1.5 Materials Management Program

The Materials Management Program for DI includes the management of flammable and combustible liquids and compressed gas cylinders. ERM reviewed the contractor's quarterly reports and verified compliance of the program during the field visits to the Pacific Entrance project areas. Also, DI provided ERM with a copy of its Emergency Plan. This plan includes the names and phone numbers of the emergency contacts, as well as the procedures to be followed should an emergency occurs in their project areas.

ERM reviewed the emergency plan and verified that it was updated, adequate to the corresponding project areas and to the materials that are handled, and for the type of emergency that may occur.

During the visits of March and April 2009, ERM observed at the project areas chemical spill and fire control emergency equipment such as fire extinguishers and absorbent material, as well as proper emergency exit signs.

5.3.1.2 Socioeconomic and Cultural Resources Program

Information provided by DI shows that the company has employed 323 individuals as of April of 2009. Archeological artifacts have not been encountered in the project areas. DI reported that no complaints from the general community have been received to date in the project areas.

Regarding the minimization of risks pertaining to job accidents, DI requires that all company personnel wears the proper Personal Protective Equipment (PPE) for each task and to that end has prepared a list of project areas and the corresponding PPE to be used. ERM observed compliance with the use of PPE. ERM could confirm the daily safety inspections conducted by DI safety personnel, and reviewed the attendance lists to training sessions. Job accident logs are kept and maintained by DI. The logs include a root-cause analysis of accidents and recommendations for corrective and preventive measures. DI also complies with training for solid waste management.

5.3.1.3 Monitoring Plans

5.3.1.4 Air Quality Monitoring

Air quality monitoring is not required in the dredging of the Pacific Entrance Channel given that project activities are conducted far from communities. Nevertheless, in June 2009, air quality monitoring will begin in the area of Diablo.

5.3.1.5 Noise Monitoring

In the environmental follow-up quarterly report of February 2009, DI included the environmental noise monitoring results conducted in the vicinity of Diablo community to develop a noise baseline study. These noise levels will be used as a comparison to the levels of noise generated during

drilling and blasting operations that will begin during the next evaluation period.

Monitoring of occupational noise is conducted on a regular basis. Hearing protection equipment is provided to project personnel working in areas where noise levels exceed the established occupational limits for noise.

5.3.1.6 *Vibration Monitoring*

During the site visit of April 2009, ACP representatives indicated that the underwater blasting operations had begun that same month. DI personnel told ERM, during interviews, that current blasting operations were being carried out in areas far from sensitive receptors, so that the monitoring of vibrations were not required for the current period.

The monitoring of vibrations for other Project areas is scheduled according to the construction activity calendar and to the proximity of the project area to sensitive receptors. Nevertheless, DI has contracted the services of a qualified blasting operation consultant who has developed a blasting operations plan that has been approved by the ACP (*see Appendix N*). DI also contracted Serviblasting International, S.A. that conducted three blasting simulations to determine the impact of vibrations to the Diablo community. Six seismographs were used at different sensitive locations in that community. The estimated amount to be used in the blasting operations were calculated from the simulations and included in the blasting-contractor report (*see Appendix O*).

5.3.1.7 *Water and Sediment Quality Monitoring*

Sampling and analyses for water quality and marine sediments at the Pacific Entrance Channel project were conducted by *Centro de Investigaciones Quimicas, S.A.,* from October through December 2008, and from February to March 2009. In the monitoring events of October through December 2008, water samples were collected from the water column (surface, middle and bottom) at seven sampling locations as follows: two locations at the dredging area, two locations at the marine sediments disposal sites (i.e. Tortolita and Tortolita Sur), and three locations adjacent to these disposal sites.

Water samples were analyzed for organic compounds, inorganic compounds (including metals), and physical parameters. Analytical results for organic and inorganic compounds in all samples were either below detection levels

or within natural occurring levels for compounds readily found in the environment.

Marine sediment samples were collected at seven locations within the Project impact area. Marine sediment samples were analyzed for organic compounds, inorganic compounds (including metals), and physical parameters (including grain size distribution). Analytical results for organic and inorganic compounds in all marine sediment samples were either below detection levels or within natural occurring levels for compounds readily found in the environment.

Two water samples were collected in September 2008 in the Farfan disposal site. One sample was collected at the discharge to the disposal site and another at the outfall from the disposal site, towards the Navigation channel. The samples were collected by the *Laboratorio de Analisis Industriales, S.A.* and analyzed for Suspended Solids and Total Solids. The two samples revealed suspended solid concentrations of 772 and 300 milligrams per liter, respectively. The percentage of suspended solids to total solids in the water samples were 3% and 1.2%, respectively.

In 2009, three water quality sampling events were carried out at the project area. Water samples were collected from seven locations. Samples were collected from the water column (surface, middle, and bottom) and analyzed for organic compounds, inorganic compounds (including metals), and physical parameters. Analytical results for organic and inorganic compounds in all samples were either below detection levels or within natural occurring levels for compounds readily found in the environment.

Two water samples were collected in February 2009 at the Farfan dredging material discharge pipe. One sample was collected at the discharge to the disposal site (influent), and another at the outfall towards the Navigation Channel (effluent). The samples were collected by the *Laboratorio de Analisis Industriales, S.A.* and analyzed for Suspended Solids and Total Solids. The analytical results showed an 88.6% percent reduction in suspended solids between the influent and the effluent.

In March 2009, two water samples were collected at the Farfan dredging material discharge pipe. One sample was collected at the discharge to the disposal site (influent), and another at the outfall towards the Navigation Channel (effluent). The samples were collected by the *Laboratorio de Analisis Industriales, S.A.* and analyzed for Total Suspended Solids and Total Solids.

The analytical results showed an 95.6% percent reduction in suspended solids between the influent and the effluent *(see Appendix Q)*.

Table 4, below, is a compliance matrix for the dredging project of the Pacific Entrance Channel.

Table 4 Widening and Deepening of the Pacific Entrance Channel

BI-ANNUAL REPORT FOR THE IMPLEMENTATION AND EFFECTIVENESS OF THE ENVIRONMENTAL AND SOCIAL IMPACT STUDY – CATEGORY III PANAMA CANAL EXPANSION PROJECT– WIDENING AND DEEPENING OF THE PACIFIC ENTRANCE CHANNEL	
CONTRATOR: DREDGING INTERNATIONAL / PANAMA	**LOCATION:** Arraijan and Veracruz Counties, Arraijan District, Panama Province.
PROJECT: Panama Canal Expansion Program: Widening and Deepening of the Pacific Entrance Channel	
REPORT: ERM 002 – November 2008 to April 2009	
ENVIRONMENTAL MONITORING AND FOLLOW UP: Dredging International / Panamá	**PHASE:** ■ CONSTRUCTION □ **OPERATION** □ CLOSURE
ANAM RESOLUTION: DIEORA IA-314-2007.	**EsIA Approval Date:** August 7 2007

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
MITIGATION MEASURES, CONTROL AND COMPENSATION PROPOSED IN THE PMA AND IN THE APPROVAL RESOLUTION				
DREDGING measures				
Measures to reduce turbidity				
· Cutting and suction dredge: ▪ Optimize cutting speed, swinging suction and discharge. ▪ Protect the cutting or suction head. ▪ Optimize design cutting head. · Suction hopper dredger:	DI has implemented a preventive maintenance program to keep all equipment in adequate operating conditions and to attain an effective process in the dredging activities of the Pacific entrance. ERM interviewed in the April 2009 site visit, the captain of the Clamshell No. 53 dredge regarding control of the cutting speed, balancing, and suction discharge rate during dredging operations. The captain explained that these	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
▪ Optimize speed, sucking mouth and pumping deposit ▪ Limiting overflows and / or loading hopper ▪ Reduce water intake ▪ Using a flow rate of return ▪ Reduce the air content in the mixture overflow.	processes are an intrinsic part of the efficiency of the dredging operations, but that there is no practical way to quantify them individually.			
· Use a sound system whose intensity grows gradually to keep the fish, reptiles and mammals outside the danger zone.	According to interviews conducted by ERM to DI representatives in the April 2009 site visit, this mitigation measure has been implemented in the project area. Alarm systems are used to alert personnel working near the project area and communities located nearby on blasting activities.	X		
· Build sediment control dumps, being kept clean and free of obstructions. · Monitor the concentrations of suspended solids in water. · Fill disposal sites at a level below the height of the crown of the dam. · Build intermediate cross walls · Use sedimentation ditches	In March 2009, ERM visited the Farfan disposal site. This disposal site contains a sedimentation pond to trap sediments pumped from the dredging area. The perimeter of the disposal site contains crushed gravel, boulders and tall grass that jointly act as an erosion control barrier. A silt fence has been installed to act as an energy dissipating barrier for the sediment stream and thus maintain the sediments within the sedimentation pond. ERM observed that at some locations, the height of the sediment column had reached the top of the silt fence. The silt fence, therefore, will need maintenance to preserve the effectiveness of the erosion control measure. Effluent from the Farfan disposal site in channeled through a head wall that is located perpendicular to the Farfan Road, down gradient from the disposal site. The effluent eventually discharges into the Navigation Channel of the Canal (Pacific Entrance).	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	Total dissolved solids and total suspended soilids analyzes are conducted on a monthly basis at the effluent located in Farfan Road.			
· Establish vibration limits by sector · Have a qualified consultant to provide a blasting plan and to begin the work of blasting. · Restrict times blasting limit loads snapshots, provide adequate breaking materials and ensure precise drilling blasting holes, plan delivery to and from the site to minimize impacts. · Monitor vibration in critical spots. · Conduct inspections of structural integrity before blasting in critical structures. · Informing about the possible effects, quality control measures, precautions to be taken, and the channels of communication. · Notify the affected public when the work of blasting will be conducted. · Observe limits on the hours of blasting. · Develop and implement a blasting plan.	DI has a blasting specialist who developed the Blasting Plan for the project. The Plan was approved by the ACP. DI contracted the services of Serviblasting International, S.A. which conducted three trial blasting events to determine the impact of vibration in the Diablo community. Six seismographs were used at three locations determined to be sensitive in the community. The report indicated the amount of explosive material to be used during blasting activities based on the results of these trials. Blasting activities are limited to the schedule approved in the EMP. During the current evaluation period, DI inspected the integrity of critical structures prior to blasting activities, specifically in the Diablo community.	X		
Measures for the Control of Air Quality				
1. All engines will be maintained properly to maximize combustion efficiency and minimize the emission of pollutants.	According to the manufacturer's equipment documentation reviewed by ERM, the equipment used in this Project has been selected so as to comply with low air emissions per EMP specifications. DI submitted to ACP the specifications of the dredges that will be used during various project phases. These specifications show that the dredgers are equipped with a	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
	specialized air emission filter certified for the generation of low air emissions. In its quarterly reports, DI provided the preventive maintenance logs for its vehicles and heavy equipment used in the project. Preventive maintenance is conducted by CYASA, S.A. Motor vehicles are leased to National Car Rental, which provides maintenance to its vehicles. The ACP and project contractor has inspected the equipment used on the project to confirm that this equipment does not generate excessive noise or combustion gases.			
2. Combustion engines (of heavy equipment to be used in the excavation dry), must have exhaust systems and filters (where applicable), in good operating conditions, recommending that no more than 10 years of use.	Is verified, according to preventive maintenance that the equipment is in good operating conditions and meets the right time of use. Machinery filters are replaced regularly	X		
3. The fuel storage tanks must be equipped with emission control systems of volatile organic compounds.	During the field inspection there were no fuel storage tanks in the project areas.	X		
4. No waste will be incinerated on site.	It is prohibited to incinerate waste in their areas of work. Each project has facilities and procedures for temporary storage and waste management	X		
Measures to control foul odors				
1. Establish a program of preventive maintenance of fleet vehicles.	The Company CYASA, S.A. is responsible for the implementation of preventive maintenance of all machinery and vehicles used in the project.	X		
2. Provide proper maintenance of the machinery and prevent the generation of nuisance odors polluting the environment.	Preventive maintenance has been carried out to all equipment used in the project site.	X		
Measures to control noise				

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
1. Check noise conditions (assess).	It is inspected in field, that the machinery is safe and that the operators use their equipment to protect against noise.	X		
2. Keep all equipment and building stock in good condition and adequate systems silencers.	The Company CYASA, S.A. is responsible for the implementation of preventive maintenance of all machinery and vehicles used during this period in the project.	X		
3. Minimize, if possible, the operating time of the sources of noise emission and avoid idle equipment in operation.	It is verified in field that the machinery that is not running, is not with the engine running unnecessarily. Have also been instructed to comply with this measure and the importance of compliance.	X		
4. Limit blasting operations at a time between 7:00 am and 6:00 pm and on weekends between 10am to 6pm.	Blasting activities comply with the schedule included in the EMP.	X		
Socioeconomic and Cultural Program				
Measures for increases employment generations				
1. Promote the hiring of local manual labor according to recruitment requirements and general policies regarding the work and employment conditions, on the basis of the Equator Principles and the IFC Social and Environmental Sustainability Performance Standards.	Activities for the dredging of the Pacific entrance are conducted by DI. From April 2008 to April 2009, 323 new employees (78 locals and 245 foreign) were hired. In addition, the project required the hiring of fauna rescue personnel and leasing of heavy equipment.	X		
2. Include in the bid specifications the dissemination of employment opportunities to the country's population through the mass media, as appropriate.	The ACP contracting process has made a concerted effort to match contract size and technical requirements so as to make individuals, small and medium sized contracting businesses as well as larger enterprises eligible. In this way the Program's positive impact on Panamá's construction and consulting services industry have been maximized, and will not only extend the capacity and experience of larger firms.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
Measures to avoid labor diseases				
1. Implement the Solid Waste Management Program of the Panama Canal Authority for the identification of problems relative to the improper handing of solid waste and the design of alternatives using the proper technology according to the features of the region and the waste produced.	DI complies with all internal procedures to manage solid wastes.	X		
2. Strengthen the disease vector control Program of the Panama Canal Authority and the Panama Ministry of Health (MINSA). The aim of this program is to reduce the morbidity associated with vectors, such as those of leishmaniasis, malaria, Chagas, and dengue fever disease.	Talks and seminars take place every week in the main camp administration offices.Workers receive trainings include topics such as bio-safety, vector control and handling of fauna.	X		
3. Keep health centers in the surrounding areas informed about the progress of the Project and the number of active personnel involved, so they may be prepared to provide emergency treatment, if necessary.	DI notifies health centers on the activities being conducted at the project sites.	X		
Measures to prevent risks of work accidents				
1. Apply a strict policy of work safety education and information for Contractor and Subcontractor personnel.	DI has a program to prevent labor accidents. The program is implemented by the Occupational Health and Safety representative.	X		
2. Provide all workers with personal protection equipment according to Panama Canal Authority standards, and enforce their use at work sites.	Personnel have the appropriate safety equipment perform its duties at all project areas.	X		
3. Install the appropriate signage at work sites.	DI complies with the measure.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
4. Implement preventive maintenance programs for machinery and equipment.	It was verified that the ACP have implemented preventive maintenance of machinery and equipment.	X		
Measures to minimize affectation to known archeological sites				
1. The hiring of a professional archaeologist for the implementation of an Archaeological Rescue and Salvage Plan.	Since October of 2008, ACP hired the archaeological firm JCG Associates under contract on an on-call basis to address any archaeological discoveries that are made during construction (dry and wet excavation) as the result of earthwork activities.	X		
2. Archaeological rescue and salvage, if applicable, under a plan that includes various office and field activities; introduce informative material of ongoing Works in lookouts facilities.	DI is in compliance with this measure which appears in the EMP. Before starting the Project DI completed the rescue of archeological discoveries in the area. This task was undertaken by professional archeologists using technical equipment in reconnaissance, evaluation prospecting and rescue before and during the construction of the project.	X		
Measures to control affectation to archeological and paleontological sites				
1. Stop the activity that generated the discovery, in a radius of at least 50 meters.	This measure has been communicated to all personnel specially those in charge of heavy construction equipment.	X		
2. Contact a professional archaeologist or paleontologist, as appropriate, and notify the competent authority (National Historic Patrimony Directorate - DNPH-INAC).	Regarding control measures for unknown paleontological sites, ACP is in compliance with measures established in the EMP. To implement the measures Smithsonian Tropical Research Institute (STRI) has a contract with ACP for the rescue and study of paleontological resources of dredging and excavation sites associated with the expansion program.	X		
3. The professional archaeologist or paleontologist shall take the pertinent actions to record the removed substrata and assess the undisturbed context over a prudential period that may not affect Project work, but also may not detract from the quality of a detailed professional	STRI has conducted research and classification of rock units according to their potential. It has also conducted the exploration, rescue and identification of pale ontological remains. Other activities include the preliminary curing of findings and the creation of a geo-referenced database among other measures.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
recording of information about the discovered site or sites.				
4. The promoter shall take action to preserve these resources in the manner they were at the initial moment they were found. The promoter shall protect these resources and be responsible for their preservation until.	ACP complies with the measure.	X		
Measures outlined in the environmental resolution 632-2007				
1. Comply with the Law 1 of February 3, 1994, Forestry of the Republic of Panama.	ACP is in compliance with this requirement.	X		
2. Comply with the Law 24, June 7, 1995. Wildlife Act .	The contractor is in compliance with this requirement.	X		
3. Before commencement of works and / or construction work, use of disposal land and water sites, pipe works, motion and leveling of land, vegetation clearance and all involving wildlife affected by the development of the Expansion project of the Panama Canal must make the rescue and relocation of wildlife, which should be coordinated with the regional administrations of the ANAM, the implementation of the Plan of Wildlife Rescue and Relocation.	The contractor developed a Wildlife Rescue and Relocation Plan for the site where the administration office building and main camp are located. As the project progresses and the presence of species in the work areas is observed, the contractor continues the execution of its fauna Rescue Plan.	X		
4. Submit every six (6) months, to the relevant Regional Environmental Administration, for assessment and approval, during the implementation of the mitigation measures in the Environmental Management Plan, and those included in the operative part of this resolution,	ACP is in compliance with this measure.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
a report on the implementation and effectiveness of such measures, as outlined in the Environmental Impact Assessment Category III and in this Resolution. This report shall be prepared by a qualified professional and independent of the Company Promoter of the project to which the Environmental Impact Assessment in question corresponds.				
5. Inform the ANAM of the amendments or changes in the techniques and measures that are not covered in the Environmental Impact Assessment (ESIA) Category III approved, in order to verify if these require the application of Article 209 of this Executive Order 2006.	No amendments to the original EsIA Category III occurred during the current reporting period.	X		
6. Submit to the Department of Quality Environmental Protection of the National Environmental Authority (ANAM) and competent authorities, before the commencement of any activity, the work plan and schedule of activities for the development of environmental monitoring of dredging and dumping, which should including but not limited to: the security protocol for the supply of fuel for motor equipment; scheme of dredged material disposal taking into account the section of the tides; timeline for implementing monitoring plan that includes a timetable of disposition and of the sedimentation and dispersal tests; specification of equipment and personnel used for monitoring.	The contractor, along with the ACP is in compliance with this requirement. The measure is met; the current report is evidence of compliance with this measure	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
7. Submit to the National Environmental Authority (ANAM-DIPROCA) during the dredging and disposal of material, annual reports of the quality monitoring of sediment and water, in addition to the effects on the impacted area. This monitoring should include analysis of physical, chemical and biological sediments but not limited to the following parameters: organic content; Tributyltin, halogenated organic pesticides, phosphorus, nitrogen, carbon, pyrethroids, herbicides, polychlorinated biphenyls (PCBs) and polyaromatic hydrocarbons.	The ACP and the contractor are in compliance with this requirement, monitoring of the water column and sediments are being collected and analyzed at several locations of the project area.	X		
8. Installing a network of stations for monitoring air emissions, this network of stations must monitor the following parameters: nitrogen oxide (NOx), particulate matter (PM), particulate matter less than 10 microns (PM10), sulfur dioxide (SO2), carbon monoxide (CO) and lead (Pb). The result of surveys conducted, must be submitted to the Competent Institution in ANAM biannually for the duration of the work.	The measure is met. See *Appendix J* Monitoring Air Quality in the Panama Canal Area.	X		
9. Submit annually to the ANAM, reports with the results of surveys conducted on water quality, soil, air and vibration during the construction and operation phase of the project using methods of recognized references, submit the respective chains of custody, the analysis methodologies used, specifications of measuring equipment and calibration certificate concerned, all of these must be presented in Spanish.	The ACP and the contractor are in compliance with this requirement.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
10. The developer of the project will be responsible for the management of waste to be produced in the project area during the construction and operation of the project. It is prohibited the provisional and / or end disposal of waste in or near the causes of water bodies. The waste must be deposited at sites approved by competent authority.	To the date there has been no breach by improper handling of wastes.	X		
11. Implement security measures and industrial hygiene established in our country for this type of project, prior to the commencement of works.	The contractor is in compliance with this requirement.	X		
12. Comply with the Technical Regulation DGNTI COPANIT 44-2000, set for hygiene and safety conditions in work.	The contractor is in compliance with this requirement.	X		
13. Comply with Executive Order 306, September 4, 2002, "through which establishes rules for the control of noise in public spaces, residential areas or room, as well as in work environments.	The contractor is in compliance with this requirement.	X		
14. Comply with the Technical Regulations DGNTI COPANIT 45-2000, set for hygiene and safety conditions in work environments where they generate vibrations.	The project is in compliance with this requirement.	X		
15. Comply with Law 6 of January 11, 2007, which states on the handling of oily residue from synthetic oil based on the national territory.	The project is in compliance with this requirement.	X		
16. The developer will be responsible for maintaining surveillance and control for compliance with these measures of environmental protection to biodiversity above	Met with the measure, IARM staff conducts surveillance and monitors the activities of deepening and widening of the Pacific access channel.	X		

MITIGATION MEASURES, MONITORING, SURVEILLANCE AND CONTROL DESCRIBED IN THE PMA APPROVAL RESOLUTION	ACTIVITIES/COMMENTS	Compliance		
		Yes	No	Not Applicable
mentioned in all phases of the project and to warn all those who occupy the land and passing in the project area, the conservation rules and protection required for the maintenance of biodiversity.				
17. The developer will be responsible for maintaining surveillance and control for compliance with these measures of environmental protection to biodiversity above mentioned in all phases of the project and to warn all those who occupy the land and passing in the project area, the conservation rules and protection required for the maintenance of biodiversity.	Met with the measure, IARM staff makes surveillance and monitoring of contractors.	X		
18. Place before starting the implementation of the project, a sign in a visible place within the project area, according to the attached format.	There are signs installed according to the format attached to the resolution.	X		
19. Run at all times the Agreement between the National Environmental Authority and the Panama Canal Authority for the Coordination of the Study (ies) of the Environmental Impact of the plan to build a third set of locks on the Panama Canal.	The project is in compliance with this requirement.	X		
20. Comply with all Laws, Decrees, Rules and Administrative in the Republic of Panama for the development of this type of projects.	Not presented evidence of a breach of these rules applicable to the project.	X		

5.4 WIDENING AND DEEPENING OF THE ATLANTIC ENTRANCE CHANNEL

This Program component has not begun. Therefore, verification of the mitigation measures will be conducted once this project begins its construction phase.

In April 2009, ERM visited the Tanque Negro Norte and Tanque Negro Sur disposal sites where the ACP is conducting geotechnical studies (*see Appendix F*). These are the planned disposal sites for the dredged material that will be generated from the project for the widening and deepening of the Atlantic Entrance. Both of these sites have been historically used by the ACP to deposit dredged material generated from the routine maintenance of the Canal. ACP expects to improve the conditions of the berm before initiating dredging activities.

5.5 ELEVATION OF MAXIMUM LEVEL OF GATUN LAKE

This Program component has not begun. Therefore, verification of the mitigation measures will be conducted once this project begins its construction phase.

The company Louis Berger is currently implementing the Socio-environmental Management Plan for Gatun Lake. According to March 2009 quarterly report, the following activities were conducted during the current evaluation period:

- Site plan and topographic surveying and mapping of current and projected maximum operational water level at the islands of Lake Gatun. These surveys were conducted for all the structures encountered in the islands.
- Inventory, in the islands of Gatun Lake, identifying all structures located within the topographic elevations corresponding to the current and projected maximum operational water level of the lake.

5.6 DESIGN AND CONSTRUCTION OF POSTPANAMAX LOCKS

This Program component has not begun. Therefore, verification of the mitigation measures will be conducted once this project begins its construction phase.

5.7 REQUIREMENTS REVIEW OF ANAM RESOLUTION DIEORA IA-632-2007

It was confirmed that the mitigation measures implemented in the Program generally comply with the requirements established in the ANAM Resolution as most of the requirements in the Resolution are also contained in the EMP. The ANAM Resolution specifies compliance with the following main requirements:

- Law 1 of February 3, 1994; Forestry Act of the Republic of Panama. Note: Payments for ecological compensation were submitted per Resolution AG-0235-2003
- Law 24 of June 7, 1995; Wildlife Act.
- Installation of a network of air emission monitoring stations to monitor nitrogen oxide, particulate matter, sulfur dioxide, carbon monoxide, and lead.
- Technical Regulation DGNTI COPANIT 44-2000; Conditions of hygiene and safety in work environments where noise is generated.
- Technical Regulation DGNTI COPANIT 45-2000, Conditions of hygiene and safety in work environments where vibrations are generated.
- Law 36 of May 17, 1996; Establishes controls to prevent environmental pollution caused by fuel and petroleum hydrocarbons.

Compliance with ANAM Resolution requirements is described in the matrix entitled "Compliance with ANAM Resolution DIEORA IA-632-2007", above.

5.7.1 Bi-Annual Report

The Resolution establishes the reporting requirements for the Program.

ACP contracted the services of Panamá Environmental Services (PES) to conduct a semiannual verification of the mitigation measures and monitoring programs for the first semester of 2008. The first semiannual report was submitted to ANAM by ACP in June 2008.

Following submittal of the first bi-annual report in June 2008, ERM was contracted by ACP, to replace PES, to conduct the semiannual verification report for the second semester of 2008. This report was submitted to the ANAM by ACP in December 2008.

5.7.2 *Program Modifications*

Under the Resolution, ANAM requires the ACP to notify that agency regarding changes to the Program that were not included in the Category III EsIA.

During the March 2009 field visit, the ACP told ERM was that an alternate location for the disposal of excavated material at PAC 2 was under evaluation. The new disposal site is located within the project area and, therefore, approved for the used of the Program.

In October 2008, the ACP requested from ANAM to be allowed to conduct blasting operations during weekends in order to maintain a project schedule without delays in the dry excavation areas. ANAM approved that request through Resolution AG-0250-2009, dated April 13, 2009, which modifies Resolution DIEORA IA-632-2007. Under the new resolution, ANAM authorizes ACP to conduct blasting activities on Saturdays, from 8:00 a.m. to 6:00 p.m., and on Sundays, from 10:00 a.m. to 6:00 p.m. *(see Appendix R)*.

5.7.3 *Health and Occupational Safety Program*

The DIEORA Resolution requires ACP to develop an occupational health and safety program for the Panama Canal Expansion Program. The Program's occupational health and safety efforts are included in the contractors' monthly and quarterly reports. The program includes occupational noise monitoring, vibration monitoring, personal protective equipment requirements and health and safety audits. In addition, each project has an ACP representative that oversees the implementation and compliance of the health and safety program.

5.7.4 *Ecological Compensation Plan*

The requirement for ecological compensation is established under the Resolution and included in the EMP.

In compliance with Resolution, the ACP submitted payments for ecological compensation for the various Program components where vegetation was impacted. Payments were calculated based on the type and quantity of vegetation impacted in the various project areas. ERM verified the receipts of the payments made by ACP to ANAM regarding ecological compensation and, therefore, confirmed compliance with this requirement of the Resolution.

5.7.5 Reforestation Plan

The requirements for reforestation are established under the Resolution and included in the EMP, and specifies the reforestation of two hectares for every one hectare of impacted during the development of the Program, as a compensatory measure.

Project PAC 1 affected 55.7 hectares of forest, for which 115 hectares of compensatory reforestation were completed within the Camino de Cruces National Park. Plant species and selection of the reforestation site were made in coordination with ANAM. The ACP will support the maintenance of the reforestation effort in this area for a period of five years and has contracted the company Geo Forestal, S.A. to execute this program. Maintenance activities include clearing, fertilization, planting, wildfire prevention, pest control and reseeding. ERM reviewed the January 2009 reforestation follow up report for the Camino de Cruces National Park issued by Geo Forestal, S.A. This report included an update on the reforestation activities conducted to January 2009. According to this report, project staff conducts periodic visual inspections to verify the growth of the reforested areas. When required, additional planting is conducted and native plant species are brought to the Project Area from local nurseries established for this purpose. ERM visited the site in the November 2008 and verified that reforestation activities were in compliance with the plan.

Project PAC 2 affected 72 hectares of forest for which 145 hectares of compensatory reforestation will be completed. Thirty hectares are being reforested within the Altos de Campana National Park. The reforestation activities of the remaining 115 hectares began in 2009 in the General Omar Torrijos National Park.

ERM reviewed the February 2009 reforestation follow up report for the Altos de Campana National Park. This report includes an update of reforestation activities since project initiation until Feabruary 2009. ERM visited the site in March 2009 and verified that reforestation activities were in compliance with the plan.

As a general recycling measure, some of the vegetation material removed from areas cleared for PAC 2 is stacked and reused as energy dissipating structures at the Southern Deposit.

As part of ecological compensation for the PAC 3 Project, the company Forestal Los Carpatos will conduct reforestation in the National Park General

de Division Omar Torrijos Herrera in Cocle, CIFO in Chiriqui and in Chagres National Park. This company is offering trainings for the construction and maintenance of plant nurseries at various selected communities.

In February 2009, the ACP awarded the contract for the Gatun Lake Project for the reforestation of 30 hectares in the Volcan Baru National Park in Chiriqui. Currently, the reforestation activities are at the plant nursery stage.

The Pacific Entrance Channel Project does not require a reforestation plan, given that there will be no cutting of trees during project execution.

6 CONCLUSIONS

The EMPs include mitigation measures, monitoring and follow-up plans, and the implementation of monitoring events and control programs. These are designed to reduce, mitigate and, if necessary, compensate for impacts of physical, biological, socio-economic and cultural elements that may take place during the execution of the Panama Canal Expansion Program. Field visits included verification of the following: plans for the control of air emissions, noise, vibration, erosion and sedimentation; restoration of construction sites; water quality and wastewater management; revegetation; reforestation; wildlife rescue; road maintenance; and exploration and rescue of potential archaeological and cultural artifacts. Also included was the verification of risk prevention plans, contingency plans, and environmental education plans, as well as a review of documents pertaining to communications among the ACP, its contractors and the general public. ERM also interviewed key project personnel and performed direct observations through field visits.

As a result of the aforementioned activities, ERM has confirmed that the execution of the various Program components comply with the applicable environmental and social requirements. In general, the mitigation measures have been implemented effectively in all the areas impacted by the Program as it pertains to the commitments established under the EMPs and requiements of the Resolution.

Nevertheless, in the site visits conducted to the Program areas under the current evaluation period, some activities were observed that required improvements to the mitigation plans. Among these are the remediation of the *Sur 1* disposal site in PAC 2, to prevent impacts to the Cocoli river; improvements in traffic control of heavy equipment on the access road to the *Sur* disposal site; improvement in fuel management practices at the PAC 1 and PAC 2 project camps; and improvements to erosion and sedimentation control, as well as to hazardous materials management in the island of De Lesseps in the region of Gatun Lake. These observations do not signify non-complinace, but rather opportunities for improvement in the implementation of the mitigation measures.

The Panama Canal Expansion Program exhibits a high degree of compliance, given the magnitude of the Program. It should be noted that most of the aforementioned observations had been properly corrected by ERM's visit of April 2009.

7 APPENDICES

Appendix A

List of Reviewed Documents

APPENDIX A
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por Resolución DIEORA 632-2007 de la Autoridad Nacional del Ambiente – 2007.

Appendix B

List of Interviewed Personnel

APPENDIX B
LIST OF ACP REPRESENTATIVES AND AND CONTRACTORS INVERVIEWED BY ERM

ACP	
Name	**Position**
Daniel Muschett	Supervisor, Specialist in Environmental Management and Implementation
Javier Morón	Environmental and Energy Control Specialist
Franklin Guardia	Environmental Protection Specialist
Hortensia Broce S.	Environmental Specialist
Mariaeugenia Ayala	Environmental Protection Specialist
Ángel Tribaldos	Environmental Protection Specialist
María Ortega	Environmental Protection Specialist
Arizmendis Montoya	Geographer
Zuleika Mojica	Social Worker
Karina Vergara	Environmental Protection Specialist
Eduardo Shaw	Supervisor, Specialist in Safety, Health and Industrial Hygiene
Thomas Edghill	Project Coordinator Assistant
Ymelda Smith	Environmental Specialist
Luis Castañeda	Environmental Specialist

CUSA- ACP CAP 1	
Name	**Position**
Eduardo Moreno (DECASA)	Environmental Manager
Fernando Delegado (CUSA)	Health and Safety Manager
Ricaurte Salamín	Representing Project Administrator for ACP– CAP 1
Catherine Carrasco	Field Engineer CUSA
Omar Carvajal	Field Engineer ACP CAP 1

CILSA- ACP CAP 2	
Name	**Position**
Gabriel Hernández	Environmental Manager
Eduardo Pino	In Charge of Hydrocarbons Management

Rosmery Duque	Environmental Specialist ECOAMBIENTE
Pedro López	Representing Project Administrator for ACP - CAP 2

MECO - ACP CAP 3	
Name	**Position**
Damian Carles	CAP 3 Manager
Eduardo Moreno Grabriel Hernández Environmental Manager (MECO)	Environmental Education (DECASA)
Eliskha Alvarez (ACP- CAP-3)	Health and Safety
Ricaurte Salamín	Representing Project Administrator for ACP– CAP 3
Alfredo Roach	Representing Project Administrator for ACP– CAP 3
Omar Carvajal	Field Engineer ACP CAP 3
Katherine Carrasco	Field Engineer MECO

Dredging International	
Name	**Position**
Virgilio Flores	Environmental Manager
Johana Lay	Health and Safety Manager
Dirk de Tavernier	Safety and Environmental Manager

Appendix C

DIEORA IA 632-2007 Resolution of November 9, 2007

REPÚBLICA DE PANAMÁ
AUTORIDAD NACIONAL DEL AMBIENTE

RESOLUCIÓN DIEORA IA- 632-2007

La Suscrita Administradora General de la Autoridad Nacional del Ambiente, ANAM, en uso de sus facultades legales, y

CONSIDERANDO:

Que la AUTORIDAD DEL CANAL DE PANAMA (ACP), de generales anotadas en autos, ha concebido el desarrollo de un proyecto denominado "AMPLIACIÓN DEL CANAL DE PANAMA - TERCER JUEGO DE ESCLUSAS", a desarrollarse en los corregimientos de Escobal, Ciricito, Iturralde, Mendoza, La Represa, El Arado, Santa Clara, Nuevo Emperador, Amador, Limón, Nueva Providencia, Sabanitas, Cativá, Ancón, Cristóbal, Burunga, Nuevo Emperador, Arraiján Cabecera y Veracruz, distritos de Panamá, Colón, Arraiján y la Chorrera, provincias de Panamá y Colón.

Que en cumplimiento de lo dispuesto en el artículo 23 de la Ley 41 del 1 de julio de 1998, el día 23 de julio de 2007, el promotor del referido proyecto, a través de su Representante Legal, ALBERTO ALEMAN ZUBIETA, con cédula de identidad personal No. 8-407-834, presentó el Estudio de Impacto Ambiental, Categoría III denominado "AMPLIACIÓN DEL CANAL DE PANAMÁ - TERCER JUEGO DE ESCLUSAS", elaborado bajo la responsabilidad de URS HOLDING, S.A., persona jurídica inscrita en el Registro de Consultores Ambientales habilitados para elaborar Estudios de Impacto Ambiental que lleva la Autoridad Nacional del Ambiente, ANAM, mediante la Resolución IRC 001-98.

Que en virtud de lo establecido en los artículos 42 y 56 del Decreto Ejecutivo 209 de 5 de septiembre de 2006, se remitió el referido Estudio de Impacto Ambiental a las Unidades Ambientales Sectoriales (UAS), del Ministerio de Vivienda (MIVI), Ministerio de Salud (MINSA), Instituto de Acueductos y Alcantarillados Nacionales (IDAAN), Sistema Nacional de Protección Civil (SINAPROC), Ministerio de Obras Públicas (MOP), Ministerio de Comercio e Industrias (MICI), Instituto Nacional de Cultura (INAC), Autoridad del Canal de Panamá (ACP), Instituto Panameño de Turismo (IPAT), Autoridad Marítima de Panamá (AMP) y Autoridad de los Recursos Acuáticos (ARAP) (ver fojas de la 10 a la 25 del expediente administrativo correspondiente).

Que mediante RESOLUCIÓN DIEORA-PROVEÍDO-417-2007, con fecha de 26 de julio de 2007, se admite a la fase de evaluación y análisis del Estudio de Impacto Ambiental, Categoría III titulado "AMPLIACIÓN DEL CANAL DE PANAMÁ - TERCER JUEGO DE ESCLUSAS" (ver fojas de la 26 a la 27 del expediente administrativo correspondiente).

Que mediante nota s/n, recibida el día 28 de agosto de 2007, la Autoridad del Canal de Panamá nos informa que el proyecto no genera impactos negativos significativos sobre el ambiente o lo relativo a las operaciones del canal (ver foja 32 del expediente administrativo correspondiente).

Que mediante nota DNRM-A-402-07, recibida el día 4 de septiembre de 2007, la Unidad Ambiental de la Dirección Nacional de Recursos Minerales del MICI, nos informa que no tienen observaciones al EsIA presentado (ver foja 37 del expediente administrativo correspondiente).

Que mediante nota s/n, recibida el día 11 de septiembre de 2007, la Unidad Ambiental de la Dirección General de Desarrollo Urbano del MIVI, nos informa que no tienen ninguna objeción al estudio presentado (ver fojas de la 41 a la 43 del expediente administrativo correspondiente).

Que mediante nota s/n, recibida el 13 de septiembre de 2007, el Centro de Estudios de Recursos Bióticos de la Facultad de Ciencias Naturales, Exactas y Tecnología de la Universidad de Panamá, remite sus comentarios y observaciones al referido estudio, los cuales fueron valoradas en la solicitud de información complementaria y en la parte resolutiva del presente documento. Se le envió nota a la Universidad de Panamá para informarle que sus observaciones fueron consideradas en la evaluación del referido estudio (ver fojas de la 44 a la 49 del expediente administrativo correspondiente).

Que conforme a lo establecido en el artículo 27 de la Ley 41 de 1 de julio de 1998, "General de Ambiente de la República de Panamá", y en el Decreto Ejecutivo 209 de 5 de septiembre de 2006, fue sometido el Estudio de Impacto Ambiental en evaluación al período de consulta pública dispuesto para tales efectos, según consta en fojas de la 121 a la 122 y de la 124 a la 127 del expediente administrativo correspondiente.

Que mediante nota s/n, recibida el día 21 de septiembre de 2007, el promotor presenta el informe de los resultados de los foros públicos realizados como parte de la consulta formal a la ciudadanía del EsIA en evaluación (ver fojas de la 54 a la 170 del expediente administrativo correspondiente).

Que mediante nota DIEORA-DEIA-AP-725-0210-07, del 12 de octubre de 2007, la Dirección de Evaluación y Ordenamiento Ambiental, solicita información complementaria (ver fojas 179 a 180 del expediente administrativo correspondiente).

Que mediante notas 948-07 DNPH y 961-07 DNPH, recibidas el 10 de octubre de 2007, la Unidad Ambiental de la Dirección Nacional de Patrimonio Histórico del Instituto Nacional de Cultura, nos informa que han decidido aprobar el Estudio de Impacto Ambiental (ver fojas 188 y 189 del expediente administrativo correspondiente).

Que mediante nota s/n, recibida el día 18 de octubre de 2007, el promotor presenta la información solicitada a través de la nota DIEORA-DEIA-AP-725-0210-07 (ver fojas de la 190 a la 221 del expediente administrativo correspondiente).

Que mediante nota DINEORA-DEIA-UAS-1413-1910-07, del 19 de octubre de 2007, se envía la información complementaria a las UAS que participan en la evaluación del Estudio de Impacto Ambiental (ver fojas de la 222 a la 238 del expediente administrativo correspondiente).

Que al momento de la emisión de este acto administrativo las Unidades Ambientales Sectoriales del SINAPROC, ARAP, IDAAN, MINSA, AMP, IPAT y MOP no remitieron sus observaciones referentes al estudio en evaluación.

Que por lo anterior se aplicará lo establecido en el artículo 42 del Decreto Ejecutivo 209 de 2006, que establece que en caso que las Unidades Ambientales Sectoriales no respondan en el tiempo establecido se asumirá que las mismas no presentan objeción al desarrollo del proyecto.

Que la Ley 41 del 1 de julio de 1998 establece que la Evaluación de Impacto Ambiental es un sistema de advertencia temprana que opera a través de un proceso de análisis continuo y que, mediante un conjunto ordenado, coherente y reproducible de antecedentes, permite tomar decisiones preventivas sobre la protección del ambiente.

Que el Informe Técnico de Evaluación, de la Dirección de Evaluación y Ordenamiento Ambiental de 2 de noviembre de 2007, visible en foja de la 252 a la 269 del expediente administrativo correspondiente, recomienda la aprobación del Estudio de Impacto Ambiental, Categoría III, relativo al desarrollo del proyecto denominado "AMPLIACIÓN DEL CANAL DE PANAMA - TERCER JUEGO DE ESCLUSAS".

RESUELVE:

ARTÍCULO 1: Aprobar el Estudio de Impacto Ambiental Categoría III, para la ejecución del proyecto denominado "AMPLIACIÓN DEL CANAL DE PANAMA - TERCER JUEGO DE ESCLUSAS", a desarrollarse dentro del área de compatibilidad con la operación del canal, con todas las medidas de mitigación y Plan de Manejo Ambiental contemplado en el referido Estudio, las cuales se integran y forman parte de esta Resolución, por lo que en consecuencia, son de forzoso cumplimiento.

ARTÍCULO 2: El promotor del proyecto "AMPLIACIÓN DEL CANAL DE PANAMA - TERCER JUEGO DE ESCLUSAS", deberá incluir en todos los contratos y/o acuerdos que suscriba para la ejecución o desarrollo del proyecto objeto del Estudio de Impacto Ambiental aprobado, el cumplimiento de la presente Resolución Ambiental y de la normativa ambiental vigente.

ARTÍCULO 3: En adición a las medidas de mitigación y compensación contempladas en el Estudio de Impacto Ambiental, el promotor del proyecto, deberá cumplir obligatoriamente con lo siguiente:

1. Previo inicio de obras, los planos de diseño, cálculos, ubicación y construcción de todas las estructuras, deberán contar con la aprobación de las autoridades competentes.

2. Cumplir con la Ley 1 de 3 de febrero de 1994, Forestal de la República de Panamá.

3. Previo inicio de obras, deberá haber cancelado el monto resultante en las Administraciones Regionales correspondientes de la Autoridad Nacional del

Ambiente, en concepto de Indemnización Ecológica según lo establecido en la Resolución AG-0235-2003, además de los permisos de tala, desarraigue y tasas de pago de manglares por la autoridad competente.

4. En concepto de compensación ecológica por la afectación de los ecosistemas de manglar, bosques secundarios, rastrojos y otros que se encuentran en los sitios de depósitos terrestres, deberá repoblar el doble de la vegetación y ecosistema de manglar afectado con especies nativas del lugar, en sitios escogidos en coordinación con la ANAM y darle el debido mantenimiento.

5. Cumplir con la Ley 24 de 7 de junio de 1995.

6. Previo inicio de las obras y/o trabajos de construcción, utilización de los sitios de depósitos terrestres y acuáticos, obras de canalización, movimiento y nivelación de tierra, desmonte de la vegetación y todas las que involucren afectación de la fauna silvestre por el desarrollo del proyecto de Ampliación del Canal de Panamá, deberá realizar el rescate y reubicación de fauna, para lo cual deberá coordinarse con las Administraciones Regionales correspondientes de la ANAM la ejecución del Plan de Rescate y Reubicación de Fauna.

7. Presentar, cada seis (6) meses, ante la Administración Regional del Ambiente correspondiente, para evaluación y aprobación, mientras dure la implementación de las medidas de mitigación establecidas en el Plan de Manejo Ambiental, y las que se incluyen en la parte resolutiva de la presente resolución, un informe sobre la aplicación y la eficiencia de dichas medidas, de acuerdo a lo señalado en el Estudio de Impacto Ambiental Categoría III y en esta Resolución. Dicho informe deberá ser elaborado por un profesional idóneo e independiente de la Empresa Promotora del proyecto al que corresponde el Estudio de Impacto Ambiental en cuestión.

8. Informar a la ANAM de las modificaciones o cambios en las técnicas y medidas que no estén contempladas en el Estudio de Impacto Ambiental (EsIA) Categoría III aprobado, con el fin de verificar si estos requieren la aplicación del artículo 15 del citado Decreto Ejecutivo 209 de 2006.

9. Implementar medidas efectivas para proteger todas las fuentes de aguas subterráneas y acuíferos que se encuentran ubicados en el área de influencia del proyecto.

10. Cualquier conflicto que se presente, en lo que respecta a la población afectada por el desarrollo del proyecto, el promotor actuará siempre mostrando su mejor disposición a conciliar con las partes afectadas actuando de buena fe.

11. En todo momento el promotor es responsable legal y financieramente del proceso de negociación, reubicación e indemnización de los pobladores de las comunidades que sean afectados por el desarrollo del proyecto, además de las viviendas, comercios, estructuras públicas y cualquier tipo de infraestructura, propiedades y bienes privados que resulten afectados.

12. Implementar medidas efectivas para el control de sedimentos durante las fases de construcción y operación del proyecto, para no afectar la calidad del agua de las potabilizadoras de Colón, Sabanitas y Miraflores.

13. Implementar medidas de prevención de riesgos y contingencia para el control de la intrusión de cloruros de agua marina, de sobrepasarse los límites máximos permisibles en los cuerpos de agua superficial que se encuentran en el área de influencia y la toma de agua instaladas en diversos puntos del Lago Gatún y el Corte Culebra.

14. El promotor está obligado a evitar efectos erosivos en el suelo de los terrenos donde se depositará el material de dragado, además implementará medidas y acciones efectivas que controlen la escorrentía superficial y la sedimentación.

15. Presentar a la Dirección de Protección de la Calidad Ambiental de la Autoridad Nacional del Ambiente (ANAM) y Autoridades Competentes, previo inicio de cualquier actividad, el plan de trabajo y cronograma de actividades para el desarrollo del monitoreo ambiental del dragado y vertimiento, el cual debe incluir sin limitarse a ello lo siguiente: el protocolo de seguridad durante el abastecimiento de combustible de los equipos a motor; esquema de disposición de material dragado tomando en cuenta la sección de las mareas; cronograma de la ejecución de plan de monitoreo que incluya el horario de disposición y de pruebas de sedimentación y dispersión; especificación del equipo y personal empleado para el monitoreo.

16. Presentar ante la Autoridad Nacional del Ambiente (ANAM-DIPROCA), durante el dragado y la disposición del material, informes anuales del monitoreo de la calidad de los sedimentos y el agua, además de los efectos en la zona impactada. Este monitoreo debe incluir los análisis físicos, químicos y biológicos de los sedimentos pero sin limitarse a ellos en los siguientes parámetros: contenido orgánico; tributilestaño, pesticidas órgano halogenados, fosforados, nitrogenados, carbamatos, piretroides, herbicidas, bifenilos policlorados (PCB) e hidrocarburos poliaromáticos.

17. Realizar monitoreos anuales y presentar los resultados a la ANAM y autoridades competentes de lo siguiente: presentación gráfica de la dispersión de los sedimentos, indicando los parámetros observados de velocidad de sedimentación, velocidad de las corrientes y dirección de la dispersión.

18. Presentar a la ANAM y autoridades competentes, la batimetría con el análisis correspondiente, de los sitios de disposición acuáticos.

19. Instalar una red de estaciones para el monitoreo de emisiones atmosféricas, esta red de estaciones deberán monitorear los siguientes parámetros: óxidos de nitrógeno (NOx), material particulado (PM), material particulado menor de 10 micras (PM_{10}), dióxido de azufre (SO_2), monóxido de carbono (CO) y plomo (Pb). El resultado de los monitoreos realizados, deberán ser entregado

a la ANAM e Institución competente semestralmente durante el tiempo que duren las obras.

20. Presentar anualmente a la ANAM, los informes con los resultados de los monitoreos realizados a la calidad del agua, suelo, aire, ruido y vibraciones, durante las fases de construcción y operación del proyecto, utilizando metodologías de referencia reconocidas, presentar las respectivas cadenas de custodia, las metodologías de análisis utilizadas, especificaciones de los equipos de medición y el certificado de calibración respectivo, los mismos deberán ser presentados en idioma español.

21. Aplicar las medidas de mitigación respectivas en la etapa de construcción en cuanto a las infraestructuras temporales (patio de almacenamiento de materiales y maquinaria, talleres, oficina de campo, vestidores etc.), sitios de préstamo y áreas de botadero.

22. Cumplir con la Resolución AG-0342-2005, que establece los requisitos para la autorización de obras en cauces naturales.

23. Las rutas que se establezcan para el transporte de materiales, deberá estar debidamente señalizada y los camiones deberán contar con la respectiva lona para cubrir los materiales e insumos transportados.

24. El promotor del proyecto, será responsable del manejo integral de los desechos que se producirán en el área del proyecto durante las fases de construcción y operación del proyecto. Se prohíbe la disposición temporal y/o final de estos desechos cerca o dentro de los cauces de cuerpos de agua. Los desechos deberá ser depositados en sitios autorizados por autoridad competente.

25. Contar con la debida señalización de los frentes de trabajo, sitios de almacenamiento de materiales y entrada y salida de equipo pesado en horas nocturnas y diurnas, esto deberá ser coordinado con las autoridades competentes.

26. Contar con la debida concesión de uso de agua y los permisos y aprobaciones emitidas por la autoridad competente, previo a cualquier uso o abastecimiento de agua que requiera el proyecto.

27. Cumplir con la Resolución AG-0466-2002, establecidas para requisitos para las solicitudes y permisos o concesiones para descargas de aguas usadas o residuales.

28. Implementar las medidas de seguridad e higiene industrial establecidas en nuestro país para realizar este tipo de proyecto, previo al inicio de obras.

29. Cumplir con el Reglamento Técnico DGNTI COPANIT 44-2000, establecidas para las condiciones de higiene y seguridad en ambientes de trabajo donde se genere ruido.

30. Cumplir con el Decreto Ejecutivo 306 de 4 de septiembre de 2002, "Por medio del cual se establece el Reglamento para el control de los Ruidos en Espacios Públicos, Áreas Residenciales o de Habitación, así como en Ambientes Laborales".

31. Cumplir con el Reglamento Técnico DGNTI- COPANIT 45-2000, establecidas para las condiciones de higiene y seguridad en ambientes de trabajo donde se generen vibraciones.

32. Cumplir con la Ley 6 del 11 de enero de 2007, que establece las Normas sobre el Manejo de Residuos Aceitosos derivados de Hidrocarburos de base sintética en el territorio nacional.

33. Contar con los permisos y aprobaciones emitidas por la autoridad competente, previo a explotar o extraer material pétreo.

34. El promotor esta obligado a brindar la seguridad y protección a los usuarios, pescadores, lanchas, comerciantes y otros que transitan por las entradas Pacífica y Atlántica del Canal de Panamá, durante el desarrollo del referido proyecto.

35. El promotor será responsable de mantener la vigilancia y control para el cumplimiento de estas medidas ambientales de protección a la biodiversidad antes señaladas en todas las etapas del proyecto y advertirá a todas las personas que ocupen y transiten en los predios del área del proyecto, las normas de conservación y protección necesarias para el mantenimiento de la biodiversidad.

36. Cumplir con la Ley 36 de 17 de mayo de 1996, "por la cual se establecen controles para evitar la contaminación ambiental ocasionada por el combustible y los hidrocarburos".

37. Cumplir con el Reglamento Técnico DGNTI-COPANIT-43-2001 por la cual se reglamentan las condiciones de higiene y seguridad para el control de la contaminación atmosférica en ambientes de trabajo, producidas por sustancias químicas.

38. Cumplir el Decreto Ejecutivo 225 de 16 de noviembre de 1998, "Por el cual se reglamenta la Ley 7 del 3 de enero de 1989, relativa a la protección de la capa de ozono".

39. Contar previamente con la aprobación de las autoridades competentes y coordinar en todo momento con dichas autoridades cuando se tengan que realizar voladuras.

40. Levantar un censo sobre el estado de las estructuras que pudiesen ser afectadas, incluyendo el Puente Centenario, y realizar inspecciones a las estructuras del mencionado puente después de realizar las voladuras que pudiesen causar afectación. Deberá enviar los informes con los resultados de las inspecciones a las autoridades competentes, previo a la realización de las voladuras.

41. El promotor será responsable de mantener la vigilancia y control para el cumplimiento de estas medidas ambientales de protección a la biodiversidad antes señaladas en todas las etapas del proyecto y advertirá a todas las personas que ocupen y transiten en los predios del área del proyecto, las normas de conservación y protección necesarias para el mantenimiento de la biodiversidad.

42. Colocar antes de iniciar la ejecución del proyecto, un letrero en un lugar visible dentro del área del Proyecto, según el formato adjunto.

43. Ejecutar en todo momento el Convenio entre la Autoridad Nacional del Ambiente y la Autoridad del Canal de Panamá para la Coordinación del (los) Estudio(s) de Impacto Ambiental del (los) Proyecto(s) de Construcción de un Tercer Juego de Esclusas en el Canal de Panamá.

44. Cumplir con todas las Leyes, Normas, Decretos, Reglamentos y Resoluciones Administrativas existentes en la República de Panamá aplicables al desarrollo de este tipo de proyecto.

ARTÍCULO 4: El promotor del proyecto correspondiente al Estudio de Impacto Ambiental objeto de la presente Resolución Ambiental, será solidariamente responsable con las empresas que se contraten o subcontraten para el desarrollo o ejecución del proyecto, respecto al cumplimiento del referido Estudio de Impacto Ambiental, que el promotor quedará obligado a cumplir con el Plan de Manejo Ambiental y cualquier otro aspecto establecido en la presente Resolución Ambiental y de la normativa ambiental vigente.

ARTÍCULO 5: Si durante las etapas de construcción o de operación del proyecto al que corresponde el Estudio de Impacto Ambiental objeto de la presente Resolución, el promotor del proyecto decide abandonar la obra, deberá:

1. Comunicar por escrito a la Autoridad Nacional del Ambiente, en un plazo mayor de treinta (30) días hábiles, antes de abandonar la obra o actividad.

2. Cubrir los costos de mitigación, control y compensación no cumplidos según el Estudio de Impacto Ambiental aprobado, así como cualquier daño ocasionado al ambiente durante las operaciones.

ARTÍCULO 6: El promotor del proyecto al que corresponde el Estudio de Impacto Ambiental objeto de la presente Resolución Ambiental, sus contratistas, asociados, personal contratado y subcontratado para la ejecución o desarrollo del proyecto, deberán cumplir con todas las leyes, decretos y reglamentos ambientales.

ARTÍCULO 7: Se le advierte al promotor del proyecto al que corresponde el Estudio de Impacto Ambiental objeto de la presente Resolución Ambiental, que la Autoridad Nacional del Ambiente, ANAM, está facultada para supervisar, fiscalizar y/o verificar, cuando así lo estime conveniente, todo lo relacionado con los planes y programas de manejo y protección ambiental establecidos en el Estudio de Impacto Ambiental, en la presente Resolución y en la normativa ambiental vigente; además suspenderá el proyecto o actividad al que corresponde el Estudio de Impacto

Ambiental referido como medida de precaución por el incumplimiento de éstas disposiciones, independientemente de las responsabilidades legales correspondientes.

ARTÍCULO 8: Advertir al Representante Legal de la AUTORIDAD DEL CANAL DE PANAMÁ (ACP), que si durante la fase de desarrollo, construcción y operación del Proyecto, provoca o causa algún daño al ambiente, se procederá con la investigación y sanción que corresponda, conforme a la Ley 41 de 1998, "General de Ambiente de la República de Panamá", sus reglamentos y normas complementarias.

ARTÍCULO 9: La presente Resolución Ambiental regirá a partir de su notificación y tendrá vigencia hasta de dos (2) años para el inicio de su ejecución.

ARTÍCULO 10: De conformidad con el artículo 54 del Decreto Ejecutivo 209 de 5 de septiembre del año 2006, el Representante Legal de la ACP, podrá interponer el Recurso de Reconsideración, dentro del plazo de cinco (5) días hábiles contados a partir de su notificación.

FUNDAMENTO DE DERECHO: Ley 41 de 1 de julio de 1998; Decreto Ejecutivo 209 de 5 de septiembre de 2006; y demás normas concordantes.

Dada en la ciudad de Panamá, a los Nueve (9) días, del mes de Noviembre del año dos mil siete (2007).

COMUNÍQUESE Y CÚMPLASE,

LIGIA C. DE DOENS
Administradora General

autoridad nacional del ambiente
ADMINISTRACIÓN GENERAL
República de Panamá

BOLÍVAR ZAMBRANO
Director de Evaluación y
Ordenamiento Ambiental

autoridad nacional del ambiente
DIEORA
DIRECCIÓN DE EVALUACIÓN Y ORDENAMIENTO AMBIENTAL

Hoy 12 de Noviembre de 2007
siendo las 3:24 de la tarde
notifique personalmente a [illegible]
de la presente resolución.

Notificador

Notificado

REPÚBLICA DE PANAMÁ
AUTORIDAD NACIONAL DEL AMBIENTE
FORMATO PARA EL LETRERO
QUE DEBERÁ COLOCARSE DENTRO DEL ÁREA DEL PROYECTO,
APROBADO MEDIANTE EL ARTÍCULO TERCERO DE LA RESOLUCIÓN

RESOLUCIÓN No. IA-632 DE 9 DE Noviembre DEL 2007.

Al establecer el letrero en el área del proyecto, el promotor cumplirá con los siguientes parámetros:

1. Utilizará lámina galvanizada, calibre 16, de 6 pies x 3 pies.
2. El letrero deberá ser legible a una distancia de 15 a 20 metros.
3. Enterrarlo a dos (2) pies y medio con hormigón.
4. El nivel superior del tablero, se colocará a ocho (8) pies del suelo.
5. Colgarlo en dos (2) tubos galvanizados de dos (2) y media pulgada de diámetro.
6. El acabado del letrero será de dos (2) colores, a saber: verde y amarillo.
   - El color verde para el fondo.
   - El color amarillo para las letras.
   - Las letras del nombre del promotor del proyecto para distinguirse en el letrero, deberán ser de mayor tamaño.
7. La leyenda del letrero se escribirá en cinco (5) planos con letras formales rectas, de la siguiente manera:

   Primer Plano: PROYECTO: AMPLIANCIÓN DEL CANAL DE PANAMA - TERCER JUEGO DE ESCLUSAS.
   Segundo Plano: TIPO DE PROYECTO: CONSTRUCCIÓN .
   Tercer Plano: PROMOTOR: AUTORIDAD DEL CANAL DE PANAMA (ACP).
   Cuarto Plano: AREA ESPECIFICA: 142,604 Has.
   Quinto Plano: RESOLUCIÓN DE APROBACIÓN DEL ESTUDIO DE IMPACTO AMBIENTAL CATEGORIA III No. IA-632 DE 9 DE Noviembre DEL 2007.

Recibido por:

DANIEL MUSCHETT — Nombre (letra imprenta)

Firma

3-67-969 — No. de Cédula de I.P.

12/Nov/2007 — Fecha

AUTORIDAD NACIONAL DEL AMBIENTE
RESOLUCIÓN No. IA-632-07
FECHA 9-11-07
Página 10 de 11

Appendix D

Requirements Log

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	This commitment register was derived from the Environmental Management Plan (Chapter 8) of the Category III Environmental Impact Study for the Panama Canal Expansion Project – Third Set of Locks prepared in July of 2007.		
	Este registro de compromiso se derivó del Plan de Manejo del Medio Ambiente (Capítulo 8) del estudio de Impacto Ambiental Categoría III para el proyecto de expansión del Canal de Panamá – Tercer Juego de Exclusas preparado en julio de 2007.		
	Reporting		
	Presentación de Informe		
1	ACP shall issue periodic reports on the Project's social and environmental performance and on each program and plan of this EMP for consultation by interested parties and communities. These reports shall be delivered to ANAM (Panama's National Environmental Authority), financial institutions, and disclosed to interested parties through the Project's Web page. The reports shall summarize the results obtained from the monthly reports prepared by an Environmental Specialist and Contractors.	P. 15	EP-9 PS-1
	ACP deberá preparar informes periódicos sobre el rendimiento social y del medioambiente del proyecto, y de cada programa y plan de este Plan de Manejo del Medio Ambiente (*EMP, por sus siglas en inglés*) para consulta de las partes interesadas y de la comunidad. Estos informes se remitirán a la ANAM (Autoridad Nacional del Ambiente), a las instituciones financieras e incluidas para las partes interesadas en la página "Web" oficial del proyecto en la Internet. Los informes deberán resumir los resultados obtenidos de los informes mensuales preparados por el Especialista Ambiental y Contratistas.		
2	As a signatory of the UN Global Compact, ACP shall issue its biannual Social and Environmental Report, which follows the Global Compact Guidelines for Communication on Progress and is distributed to local and international interested parties in printed format, and through the Internet.	P. 15	EP-9 PS-1.3
	Como firmante del Pacto Global de las Naciones Unidas (UN Global Compact), ACP deberá preparar sus Informes Sociales y Ambiental bianuales, siguiendo las directrices del Pacto Global para la comunicación en curso y su distribución para las partes interesadas a nivel local e internacional en formato impreso y através de la Internet.		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
3	The Environmental Specialist shall prepare monthly reports, as well as special reports when unexpected events occur, or when an established objective has been met within the work Program. The Environmental Specialist's monthly reports shall summarize and analyze the results and data submitted in each Contractor's monthly reports, and shall present recommendations and general actions to improve the Project's Environmental Management System. These results shall be sent to the Project Manager and the Contractor's Environmental coordinator within five work days following the month in which the report is prepared. This report shall include the information gathered from the different work fronts, emphasizing the environmental management measures implemented, achievements, and the difficulties encountered. Unexpected events, such as accidents causing spills of toxic or hazardous products, or special and extraordinary programs for repairs and maintenance, or traffic or work related accidents, shall always require special reports to document the magnitude of the impacts and effectiveness of the response.	P. 15	EP-9
	El Especialista Ambiental preparará informes mensuales, así como informes especiales cuando se produzcan eventos inesperados o cuando un objetivo establecido del programa de trabajo se cumpla. El informe mensual del Especialista Ambiental deberá resumir y analizar los resultados y datos incluidos en los informes mensuales de cada contratista. Además, deberá presentar recomendaciones y medidas en general para mejorar el Sistema de Manejo Ambiental del Proyecto. Estos resultados deberán ser enviados al Gerente de Proyectos y al coordinador del Contratista Ambiental a más tardar el día quinto del mes siguiente, del cual el informe fue preparado. Este informe incluirá la información recopilada de los diferentes frentes de trabajo, destacando las medidas de gestión ambiental implementadas, logros y las dificultades encontradas. Acontecimientos imprevistos, tales como accidentes causados por derrames de productos tóxicos o peligrosos, o programas especiales y extraordinarios de reparación y mantenimiento, o accidentes relacionados al tráfico o al trabajo, siempre requerirán un informe especial, el cual documente la magnitud de los impactos y la eficacia de la respuesta.		
	Environmental Management Plan and Management Systems		
	Plan y Sistema de Manejo Ambiental		
4	As part of the permanent maintenance of its Management System, ACP shall duly review and update the Environmental Management Plan (EMP) so that it can adequately address social and environmental matters resulting from a change in Project circumstances, and in accordance with feedback received from interested parties regarding the Plan.	P. 19	EP-4 PS-1.3

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	Como parte del mantenimiento permanente de su Sistema de Manejo, ACP revisará y actualizará el Plan de Manejo Ambiental (EMP), debidamente, el cual pueda abordar adecuadamente señalamientos sociales y ambientales resultantes de un cambio en circunstancias del proyecto, y en conformidad con comentarios recibidos de las partes interesadas en relación con el Plan.		
5	The Panama Canal Authority (ACP) is the Promoter of the Project as well as the entity responsible for the execution of the measures undertaken by this Plan. However, the majority of the mitigation measures of the construction phase shall be executed by the construction Contractors, with the supervision and strict follow-up of the ACP.	P. 20	EP-4
	La Autoridad del Canal de Panamá es el Promotor del Proyecto, así como la entidad responsable de la ejecución de las medidas establecidas en este Plan. Sin embargo, la mayoría de las medidas de mitigación de las fases de construcción deberán ejecutarse por los contratistas de la construcción, con la supervisión y el seguimiento estricto de la ACP.		
6	Each Contractor shall implement an environmental and social management system that shall include all the necessary resources and organization to assure compliance with the EMP. To accomplish this, each contractor shall have, at a minimum, the following key personnel: Project Socio-environmental Manager; Field Environmental Supervisor (Environmental Coordinator); field Occupational Safety and Hygiene Supervisor.	P. 21	EP-4 PS-1.3
	Cada contratista deberá implementar un sistema de manejo ambiental y social, el cual incluya todos los recursos necesarios y organización para asegurar el cumplimiento del Plan de Manejo Ambiental. Para lograr esto, cada contratista deberá tener, como mínimo, el siguiente personal clave: Gerente de Proyecto Socio-ambiental, Supervisor de Campo Ambiental (Coordinador Ambiental) y Supervisor de Salud e Higiene Ocupacional.		
7	Project Environmental Officer, delegated by the ACP/Promoter, shall have the following duties: 1. Ensure compliance with the environmental requirements established in the EMP programs, and with the environmental conditions set for the execution of the Project. For that purpose, he/she shall have the necessary authority to stop all activities that do not comply with the established Standard. 2. Guarantee that the EMP of the Project is appropriately implemented and monitored. 3. Prepare quarterly, semi-annual, and annual reports during the construction, on the compliance, follow-up and disposition of social and environmental issues.	P. 22	PS-1.3

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	El Oficial Ambiental del Proyecto, designado por la ACP/Promotor, deberá ejecutar las siguientes tareas: 1. Asegurarse del cumplimiento de los requerimientos ambientales establecidos en los programas del Plan de Manejo Ambiental y las condiciones ambientales establecidas para la ejecución del proyecto. Para tal fin, el o ella tendrá la autoridad necesaria para detener todas aquellas actividades que no cumplan con las normas establecidas. 2. Garantizar que el Plan de Manejo Ambiental del Proyecto sea implementado apropiadamente y monitoreado. 3. Preparar informes trimestrales, semestrales y anuales durante la construcción, sobre el cumplimiento, seguimiento y disposición de los asuntos sociales y ambientales.		
8	Each contractor shall be obligated to comply with the socio-environmental policies of the Project and with all the requirements and specifications of this EMP and EIS. Also, the Contractor is responsible for guaranteeing socio-economic compliance of all of its Subcontractors and suppliers. The Socio-environmental Manager of each Contractor shall: 1. Ensure that all technical and human resources are available for compliance with the EMP and its programs. 2. Verify that the persons assigned to assist him/her adequately comply with their responsibilities, and ensure that necessary training programs are strictly implemented. 3. Review and approve weekly reports submitted by each work area assistant.	P. 23	EP-4 PS-1.3
	Cada contratista estará en la obligación de cumplir con las políticas socio-ambientales del proyecto y con todos los requerimientos y especificaciones del Plan de Manejo Ambiental y del Estudio Ambiental. Además, el Contratista es responsable de garantizar los cumplimientos socio-económicos de todos sus subcontratistas y suplidores. El Gerente Socio-ambiental de cada contratista deberá: 1. Asegurarse que todos los recursos técnicos y humanos estén disponibles para el cumplimiento del Plan de Manejo Ambiental y sus programas. 2. Verificar que las personas designadas en asistir a el o a ella en el cumplimiento adecuado con sus responsabilidades y asegurarse que los programas de adiestramiento estén estrictamente implementados. 3. Revisar y aprobar los informes semanales sometidos por cada asistente de cada área de trabajo.		
9	Each Subcontractor shall be obligated to comply with the environmental policies of the Project and with all the requirements and specifications of this EMP and EIA.	P. 24	EP-4 PS-1.3

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	Cada Subcontratista estará en la obligación de cumplir con las políticas ambientales del Proyecto y con todos los requerimientos y especificaciones del Plan de Manejo Ambiental y Estudio Ambiental.		
10	The suppliers of materials, goods, and services for the Project shall comply with the IFC Social and Environmental Performance Standards, especially regarding work and working conditions.	P. 24	PS-18
	Los contratistas de materiales, bienes y servicios para el Proyecto deberán cumplir con los parámetros del IFC Social y con las Normas de Rendimiento Ambiental, especialmente con las de respecto a trabajo y condiciones de trabajo.		
	Air Quality		
	Calidad de Aire		
11	All motors shall be adequately maintained to maximize combustion efficiency and to minimize contaminant emissions, and to be operated in accordance with the manufacturers' specifications. The equipment suppliers and Contractors/Subcontractors of the project shall provide written proof of equipment maintenance.	P. 28	PS-2-2.16 PS-3.3
	Todos los motores deberán mantenerse adecuadamente para maximizar la eficacia de la combustión y para minimizar las emisiones de contaminantes, y operar bajo las condiciones estipuladas por las especificaciones del manufacturero. El Suplidor del equipo y el Contratista/Subcontratista del proyecto proporcionarán por escrito prueba del mantenimiento periódico del equipo.		
12	Internal combustion motors (of the heavy equipment to be used for dry excavations) shall be provided with exhaust systems, and filters (when applicable) that are in good operation condition. It is recommended that the age of the equipment not exceed 10 years.	P. 28	PS-2-2.16 PS-3.3
	Motores de combustión interna (de aquellos equipos pesados utilizados para excavaciones en seco) deberán tener un sistema de escape y filtros (cuando sea aplicable) en condiciones deseables de buen funcionamiento. Es recomendable que el tiempo de vida de los equipos no excedan los 10 años.		
13	During the dry season, working areas will be sprayed with water to minimize airborne dust.	P. 28	PS-2-2.16 PS-3.3
	Durante la época seca, las áreas de trabajo deberán ser asperjadas con rocío de agua para minimizar el polvo fugitivo.		
14	Establish adequate locations for storage, mixing and loading of construction materials so as to reduce dust dispersion by the subject operations.	P. 28	PS-2-2.16 PS-3.3
	Establecer lugares adecuados para el almacenamiento, mezcla y carga de los materiales de construcción, para así reducir la dispersión del polvo de las operaciones en asunto.		
15	Ensure that the loading and unloading of materials is done in a way that minimizes ambient dust dispersion.	P. 28	PS-2-2.16 PS-3.3
	Asegurarse que la carga y descarga de los materiales sea realizada de cierta forma que minimice la dispersión del polvo fugitivo.		

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16	Implement controls to prevent the dispersion of dust when handling materials by way of the use of lineal and simple transport systems that avoid multiple transfers, preferential belt and strap transportation of materials in lieu of transport by truck, or installation of dust suppressor or capture systems, among others. Otherwise another alternative shall be presented subject to the Contractor's approval.	P. 28	PS-2-2.16 PS-3.3
	Implementar controles de prevención de polvo fugitivo cuando los materiales sean manejados por medio de la utilización de sistemas de transporte lineal y simple para evitar transferencias múltiples, preferiblemente transportación en banda o correas de materiales en lugar de transportarlos en camión, o instalar sistemas de supresor o capturas de polvo, entre otros. De lo contrario, deberá presentarse alguna alternativa sujeta a aprobación del Contratista.		
17	Material mixing equipment shall be hermetically sealed.	P. 28	PS-2-2.16 PS-3.3
	Equipos de materiales mixtos deberán estar herméticamente sellados.		
18	Crushing of rocky and aggregate materials shall be wet-crushed, or performed with particle emission control systems.	P. 28	PS-2-2.16 PS-3.3
	Los materiales de agregados y el trituramiento de roca deberán se húmedo-cortados, o realizar la misma junto con un sistema de control de emisión de partículas.		
19	The concrete batching and mixing plant shall be provided with filtering systems, and with dust collectors or humidification or other techniques (if applicable) that allow control of particle emissions in all its stages, including unloading, collection, aggregate handling, cement pumping, circulation of trucks and machinery inside the installations.	P. 28	PS-2-2.16 PS-3.3
	La hormigonera deberá proporcionarse con sistemas de filtro y colectores de polvo, humidificación u otra técnica (si aplica) que controle la emisión de partículas en todas sus etapas, incluyendo descarga, colección, manejo de agregados, bombeo de cemento, circulación de camiones y maquinaria dentro de las instalaciones.		
20	Trucks transporting excavated material in areas outside the Project that could emit dust shall be adequately covered with canvas sheeting.	P. 29	PS-2-2.16 PS-3.3
	Material excavado que sea transportado en camiones en áreas fuera del proyecto, que pudiera emitir polvo, deberá estar tapado debidamente con lonas.		
21	Stored materials (gravel, sand) shall be covered and confined to avoid their being subject to wind drift.	P. 29	PS-2-2.16 PS-3.3
	Materiales almacenados (grava, arena) deberán estar tapados y confinados para evitar que estén sujetos a la deriva del viento.		
22	ACP shall regulate the speed limit within the area of the Project.	P. 29	PS-2-2.16 PS-3.3
	ACP reglamentará el límite de velocidad dentro del área del Proyecto.		
23	Temporary roads shall be adequately compacted and moistened, or surface treated and maintained.	P. 29	PS-2-2.16 PS-3.3
	Los caminos de acceso temporales serán compactados y humedecidos adecuadamente, o con superficie tratada y mantenida.		
24	Combustible storage tanks shall be provided with control systems for volatile organic compound emissions.	P. 29	PS-2-2.16 PS-3.3

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	Los tanques de almacenamiento de combustible deberán proporcionarse con sistemas de control para emisiones de componentes orgánicos.		
25	Wastes shall not be incinerated on site.	P. 29	PS-2-2.16 PS-3.3
	La basura no podrá incinerarse en sitio.		
26	Airborne emissions shall comply with ACP standards and World Bank and IFC guidelines in their principal aspects.	P. 29	PS-3.3
	Las emisiones de aire deberán cumplir con las normas de la ACP y Banco Mundial y con las directrices de la IFC en sus aspectos principales.		
27	A system of oxidizing catalyzers to reduce CO, HC and particle emissions shall be adapted to the filters of diesel vehicles and equipment used for construction.	P. 29	PS-2-2.16 PS-3.3
	Sistemas de catalizadores de óxido para reducir el CO, HC y emisiones de partículas deberán adaptarse a los filtros de los vehículos de diesel y a los equipos utilizados para la construcción.		
28	All motors shall be adequately maintained according to the specifications defined by their manufacturers, to maximize combustion efficiency and minimize the contaminant emissions. Proof of maintenance register shall be required by the equipment suppliers and Contractors / Subcontractors.	P. 30	PS-2-2.16 PS-3.3
	Todos los motores deberán mantenerse adecuadamente, siguiendo las especificaciones definidas por sus fabricantes, para maximizar la eficiencia de la combustión y minimizar las emisiones de los contaminantes. Prueba del registro de mantenimiento deberá ser requerida a los equipos utilizados por los Contratistas/Subcontratistas.		
29	Internal combustion engines shall be equipped with exhaust systems and filters (where applicable) kept in good operating condition.	P. 30	PS-2-2.16 PS-3.3
	Motores de combustión interna deberán estar equipados con sistemas de escape y filtros (cuando aplique) mantenidos en condiciones de operación óptimas.		
30	A motor operating schedule shall be established in order to minimize, as much as possible, the operation time of emission sources.	P. 30	PS-2-2.16 PS-3.3
	Un programa de operación de motores deberá establecerse en orden de minimizar, tanto como sea posible, los tiempos de operación de las fuentes de emisión.		
31	Establish a vehicle fleet preventive maintenance program, duly documented, and the same shall be required of Subcontractors.	P. 31	PS-2-2.16 PS-3.3
	Establecer un programa de mantenimiento preventivo de la flota de vehículos, debidamente documentado, y a su vez será requerido a los Subcontratistas.		
32	All motors shall be adequately maintained to maximize combustion efficiency, and minimize contaminant gas emissions that could generate offensive odors.	P. 31	PS-2-2.16 PS-3.3
	Todos los motores deberán mantenerse adecuadamente para maximizar la eficiencia de la combustión y minimizar las emisiones de gases contaminantes que pudieran generar olores ofensivos.		
33	Apply measures contemplated in the Waste Management Program, specifically those measures directed towards ensuring compliance with regulations regarding waste management and its adequate disposal.	P. 31	PS-4.4

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	Aplicar las medidas contempladas en el Programa de Manejo de Desperdicios, específicamente aquellas medidas dirigidas a garantizar el cumplimiento de las normas del manejo de desperdicios y disposición adecuada de los mismos.		
	Noise		
	Ruido		
	Work Front/Receptor communities: Gatun Locks/José Dominador Bazán; Gatun Lake/Gamboa; Pacific Locks/Paraíso and Pedro Miguel; Pacific Entrance/Diabalo and La Boca.	P. 32	PS-4
	Frentes de Trabajo/Comunidades receptoras: Exclusa Gatun/José Dominador Bazán; Lago Gatun/Gamboa; Exclusa Pacífico/Paraíso y Pedro Miguel; Entrada Pacífico/Diabalo y La Boca.		
34	Assess, as the work fronts are located, the noise emission conditions, and critical sites to define the need to establish additional control measures including acoustic barriers.	P. 33	PS-4.4
	Evaluar, como los frentes de trabajo son ubicados, las condiciones de emisión de ruido y las áreas críticas, para así definir la necesidad de establecer medidas de control adicionales, incluyendo barreras acústicas.		
35	Maintain all rolling and construction equipment in good conditions and with adequate noise silencers; equipment suppliers and Contractors shall present maintenance registers for their equipment.	P. 33	PS-4.4
	Mantener todos los equipos de construcción y rolos en buenas condiciones con silenciadores de ruidos adecuados; suplidores de equipos y contratistas deberán presentar registros de mantenimientos de sus equipos.		
36	Minimize, to the extent possible, the length of operation of noise emitting sources and avoid having idle equipment in operation.	P. 33	PS-4.4
	Minimizar, en la medida posible, la longitud de las operaciones de las fuentes de emisión de ruido y evitar tener equipo inactivo en operación.		
37	Organize the loading and unloading of trucks, and handling operations in such a way as to minimize construction noise at the worksites.	P. 33	PS-4.4
	Organizar la carga y descarga de los camiones y manejar las operaciones de tal manera que minimice los ruidos de construcción en las áreas de trabajo.		
38	Comply with the requirements and standards of the competent authorities with relation to the use of explosives.	P. 33	PS-4.4
	Cumplir con los requisitos y normas de las autoridades competentes con relación al uso de explosivos.		
39	Comply with the requirements, according to the type of explosives utilized, distance to be maintained from structures and population centers, defined by manufacturers and by competent authorities.	P. 33	PS-4.4
	Cumplir con los requerimientos, de acuerdo al tipo de explosivo utilizado, en mantener las distancias definidas por los fabricantes y las autoridades competentes, con relación a las estructuras y centros poblacionales cercanos.		
40	Due to existing Canal operations, blasting operations shall be limited to a daily schedule of between 0600 and 1800 hours.	P. 33	PS-4.4

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	Debido a las operaciones existentes del Canal, las operaciones con explosivos serán limitadas a un horario diario de entre las 0600 y las 1800 horas.		
41	The Contractor shall comply with all Government standards, regulations and ordinances related to noise level controls applicable to any contract-related work.	P. 33	PS-4.4
	El Contratista deberá cumplir con todas las normas, reglamentos y ordenanzas gubernamentales relacionadas a los controles de nivel de ruido aplicables a cualquier trabajo.		
42	On job sites that are near homes, work generating noise greater than 80 dB shall not be executed between 2000 and 0600 hours.	P. 34	PS-4.4
	Los lugares de trabajos cercanos a áreas residenciales, el nivel de ruido generado por los trabajos no podrá ser mayor de 80 dB y no se deberán ejecutar entre las 2000 y las 0600 horas.		
43	Timely communication will be maintained between sensitive noise receptor communities regarding scheduling of work that will produce high noise levels that could affect the communities.	P. 34	PS-4.4
	Una comunicación temprana se mantendrá entre las comunidades receptoras a ruidos sensitivos en relación al programa de trabajos que producirá niveles altos de ruidos que podrían afectar las comunidades.		
44	Unnecessary use of alarms, horns, and sirens will be avoided.	P. 34	PS-4.4
	Se evitará el uso innecesario de alarmas, bocinas y sirenas.		
45	Stationary equipment producing noise shall be located away from sensitive receptors. In required cases where noise level is greater than 80 dB at more than 400 m from source are present, acoustic covers (fixed and/or mobile barriers) shall be utilized.	P. 34	
	Equipos estacionarios que producen ruido deberán ser localizados en áreas fuera de los receptores sensitivos. Si surgiera el caso de que el nivel de ruido presente fuera mayor de 80 dB a más de 400 metros de origen, deberá utilizarse cubiertas acústicas (barreras fijas y/o móviles).		
	Vibration		
	Vibraciones		
	Applicable to any blasting, movement and use of heavy construction equipment.	P. 35	PS-2.16 PS-4.4
	Aplicable a cualquier operación con explosivos, movimiento y uso de equipo pesado de construcción.		
46	Limit vibration velocity to that established in the contract documents (specifications) for the purpose of protecting structures that could potentially be affected.	P. 35	PS-2.16 PS-4.4
	Limitar la velocidad de vibración a la establecida en los documentos de contrato (especificaciones) con el propósito de proteger las estructuras que potencialmente podrían verse afectadas.		
47	The contractor shall provide within his/her task group a qualified blasting consultant to prepare and present for approval a blasting plan, and to lead the blasting work, including initial blasting test supervision, with the objective of establishing baseline effects and conditions.	P. 35	PS-2.16 PS-4.4
	El Contratista incluirá dentro de su grupo de trabajo a un consultor calificado en explosivos, el cual preparará y presentará el plan de explosivos a ser aprobado, dirigirá los trabajos que incluyan explosivos, incluyendo la supervisión de las pruebas iniciales, con el objetivo de establecer los efectos de la línea base y condiciones.		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
48	Restrict the blasting times (intervals), limit instant maximum loads, and provide adequate tamping material to guarantee exact drilling of blasting holes, plan delivery from and towards the site to minimize undesired and out of control effects.	P. 36	PS-2.16 PS-4.4
	Se restringirán los tiempos de explosión (intervalos), se limitarán las cargas instantáneas máximas, se realizarán los barrenos adecuados para garantizar la perforación exacta de los agujeros de los explosivos, plan de entrega desde y hacia el sitio para minimizar los efectos no deseados y fuera de control.		
49	Monitor vibrations in critical (sensitive) sites during the construction period.	P. 36	PS-4.4
	Se monitorearán las vibraciones en los lugares críticos (sensitivos) durante el periodo de construcción.		
50	Conduct structural integrity inspections prior to blasts on critical (sensitive) structures (for example: monitor the width and length of cracks and friezes).	P. 36	PS-4.4
	Se realizarán inspecciones de integridad estructural antes de las explosiones en las estructuras críticas (sensitivas) (por ejemplo: monitorear el ancho y longitud de las grietas y cenefas).		
51	Inform the public living and working in the vicinity about the possible effects, control and quality measures, precautions to be taken, and communication channels available to the general public.	P. 36	PS-4.4
	Informar al público que vive y trabaja en la vecindad sobre los posibles efectos, controles y medidas de calidad, precauciones a tomarse, y los canales de comunicación disponibles para el público en general.		
52	Notify the affected public when blasting works are to be performed.	P. 36	PS-4.4
	Notificar al público que pudiera verse afectado cuando se realizaran trabajos con el uso de explosivos.		
53	Observe limits in blasting schedules that exclude weekends, and are after 1800 hours and before 0600 hours.	P. 36	PS-4.4
	Observar las limitaciones en los programas con el uso de explosivos, el cual excluye fines de semana, y son después de las 1800 horas y antes de las 0600 horas.		
54	Observe appropriate quality control measures when blasting.	P. 36	PS-2.16
	Observar las medidas de control de calidad durante los trabajos con explosivos.		
55	Review Blasting Plan to be developed and implemented by the Contractor, and which is to be subject to ACP approval.	P. 36	PS-2.16 PS-4.4
	Revisar el Plan con el Uso de Explosivos a ser desarrollado e implementado por el Contratista, el cual está sujeto a aprobación por parte de la ACP.		
56	Comply with requirements and regulations of competent authorities regarding the use of explosives.	P. 36	PS-2.16 PS-4.4
	Cumplir con los requisitos y reglamentos de las autoridades competentes en relación al uso de explosivos.		
57	Comply with the requirements, according to the type of explosive utilized, as related to the distance of the structures and population centers defined by their manufacturers and by competent authorities.	P. 36	PS-4.4
	Cumplir con los requisitos, de acuerdo al tipo de explosivo a ser utilizado, en relación a la distancia de las estructuras y centros poblacionales definidos por los fabricantes y las autoridades competentes.		

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58	Comply with the requirements provided by the manufacturer for the storage and handling of explosives and detonators.	P. 36	PS-2.16
	Cumplir con los requisitos proporcionados por el fabricante para el almacenamiento y manejo de explosivos y detonadores.		
59	The Blasting Plan which shall be developed and implemented by the Contractor, subject to ACP approval, will include at least the following details and specifications: 1. Description of all operations and blasts including their location. 2. The qualifications of blast Contractors, size (weight), and limits of the blast loads. 3. Number of blasts. 4. Hours of blasting. 5. Estimated quantity of rock to be fragmented 6. Alarm and notification measures. 7. Measures for ensuring safe transport and storage of explosives. 8. Use of blast covers. 9. A plan to videotape conditions prior to the blasts. 10. Inspection and improvement of neighboring buildings. 11. Coordination with local safety officials. 12. An assessment of the potential impacts of blasts on existing surface and underground structures such as, for example, pipelines. 13. The identification and assessment of reasonable mitigation measures with respect to blasting impacts, including the use of alternative technologies. 14. A plan to ensure compensation for damages that could occur as a consequence of the blasting.	P. 36	PS-2.16 PS-4.4
	El plan de usos de explosivos a ser desarrollado e implementado por el Contratista, sujeto a aprobación de la ACP, deberá incluir al menos los siguientes detalles y especificaciones: 1. Descripción de toda la operación con el uso de explosivos incluyendo los lugares. 2. Calificaciones del Contratista que realizará las explosiones, el tamaño (peso), y los límites de la carga de los explosivos. 3. Cantidad de explosiones. 4. Hora de las explosiones. 5. Estimado de la cantidad de roca a ser fragmentada. 6. Alarmas y medidas de notificación. 7. Las medidas a tomar para la transportación segura y almacenamiento de explosivos. 8. Utilizar mantas protectoras. 9. Desarrollar un plan para grabar en video las condiciones anteriores a las explosiones. 10. Inspeccionar los edificios aledaños. 11. Coordinar con los oficiales de seguridad local. 12. Evaluación del impacto potencial que pueda ocasionar las explosiones en la superficie existente y en la infraestructura, por ejemplo en las líneas subterráneas. 13. Identificar y evaluar las medidas de mitigación razonables con respecto al impacto de las explosiones, incluyendo el uso de alternativas tecnológicas. 14. Un plan para garantizar la indemnización por daños que podría ocurrir como consecuencia de la explosión.		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	Soil Protection		
	Protección del Suelo		
	Landslides		
	Deslizamientos		
60	Control blasting so that the stability of slopes is not affected.	P. 42	PS-4.8-9
	Controlar las explosiones para que la estabilidad de las pendientes no se vea afectada.		
61	Construct terracing to interrupt flow of surface water thereby limiting erosion and instability especially in areas of "La Boca" formation.	P. 42	PS-4.8-9
	Construir terraplenes para interrumpir la escorrentía superficial para así limitar la erosión e inestabilidad del terreno, en especial en el área de la formación "La Boca".		
62	Develop spatial analysis of project area vulnerability to landslides based on rainfall amounts and intensity and other factors to guide project area landslide monitoring program.	P. 43	PS-4.8-9
	Desarrollar un análisis de las áreas vulnerables del proyecto propensas a deslizamientos basado en la cantidad de lluvia y en otros factores, que luego sirvan como guía en el programa de monitoreo de las áreas propensas a deslizamientos.		
63	Monitor rainfall and rainfall forecasting over weekly, biweekly, and monthly time periods to identify conditions that may trigger landslides.	P. 43.	PS-4.8-9
	Monitorear la lluvia y el pronóstico de lluvia durante periodos de tiempo semanal, bisemanal y mensual para identificar las condiciones que puedan desencadenar deslizamientos de tierra.		
64	Design and control project area slope according to geological zoning and landslide vulnerability, staying within the Safety Factor limit of 1.00 or its equivalent.	P. 43	PS-4.8-9
	Diseñar y controlar las áreas pendientes del proyecto de acuerdo a la zonificación geológica y la vulnerabilidad a derrumbes del área, manteniéndose dentro del límite de un factor de seguridad de 1.00 o su equivalente.		
65	Identify slopes with historical landslide recurrences and reduce their potential for landslides by excavating above-water slope heads prior to dredging underwater slope tails.	P. 43	PS-4.8-9
	Identificar las pendientes con deslizamientos históricos recurrentes y reducir su potencial a derrumbes por medio de excavaciones superficiales de las cabezas de las pendientes antes del dragado de las colas de las pendientes subacuáticas.		
66	Reduce loads without increasing slope infiltrations and, if necessary, waterproof the slope surfaces to reduce the infiltration of water into the slope after excavation. According to the ACP Geotechnical Section (2002), it was estimated that "for each meter required to be excavated deeper than 34 feet PLD, the excavation of an additional 4- 5 million cubic meters will be required in the existing slopes."	P. 43	PS-4.8-9
	Reducir las cargas sin aumentar la infiltración en la pendiente, y de ser necesario, impermeabilizar la pendiente superficial para reducir la infiltración de agua en la pendiente luego de la excavación. De acuerdo con la Sección Geotécnica de la ACP (2002), se estimó "que por cada metro requerido para ser excavado con una profundidad mayor de 34 pies PLD, una excavación adicional de entre 4 a 5 millones de metros cúbicos serán requeridos en la pendiente existente".		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
67	Lower the descending grade of the most unstable slopes, incorporating into the applicable designs a slope ratio that guarantees its stability.	P. 43	PS-4.8-9
	Reducir el grado de descenso de las pendientes más inestables, incorporando a los diseños aplicables un radio de pendiente que garantice su estabilidad.		
68	Systematically install horizontal or inclined drainage on unstable slopes at intervals appropriate the local hydrological conditions at each sites, and down to the depth of faults, which will be identified at each site.	P. 43	PS-4.8-9
	Instalar sistemáticamente un drenaje horizontal o inclinado en las pendientes inestables en intervalos apropiados a las condiciones hidrológicas locales de cada lugar y bajar la profundidad de las fallas, las cuales serán identificadas en cada lugar.		
	Soil Conservation		
	Conservación del Terreno		
69	To the extent possible, major earth moving efforts should be carried out during the dry season, establishing as a priority for dry-season work those higher slope and erosion prone areas such as the Gaillard Cut Sector and the Pacific Locks.	P. 45	PS-4.8-9
	Extender en la medida posible, los esfuerzos de los trabajos mayores de movimiento de tierra realizados durante la época seca, estableciendo como prioridad para la época seca los trabajos de pendiente mayor y áreas propensas a erosión como el Sector Corte Gaillard y las Exclusas del Pacífico.		
70	During the rainy season, protect exposed ground surfaces with stabilizing materials such as screen and straw, and planting the areas subject to erosion as promptly as possible with fast-growing and high density root grasses adapted to the prevailing soil and subsoil conditions at each site.	P. 45	PS-4.8-9
	Durante la época de lluvias, proteger las superficies de tierra expuestas con materiales de estabilización como malla y pacas de heno y sembrar en las áreas sujetas a la erosión tan pronto sea posible, con gramas de crecimiento rápido y de raíces de alta densidad que se adapte al suelo prevaleciente y a las condiciones de subsuelo de cada lugar.		
71	When required, install water flow retention structures and surfaces such as rip-rap and stone paving at drainage intakes and outlets.	P. 45	PS-4.8-9
	Cuando sea necesario, instalar estructuras de retención de escorrentías y superficies tales como “rip-rap” y camas de piedras en las entradas y salidas de los drenajes.		
72	Place sediment traps inside the excavation sites to catch eroding soil.	P. 45	PS-4.8-9
	Colocar trapas de sedimentos dentro de los sitios de excavación para capturar la erosión del suelo.		
	Slope Stabilization		
	Estabilización de las Pendientes		
73	Slopes with cuts of up to 5 m in height shall be terraced to maintain slope inclinations between 1:3 and 3:1.	P. 45	PS-4.8-9
	Pendientes con cortes de hasta 5 metros de altura deberán ser escalonadas para mantener pendientes con una inclinación de entre 1:3 y 3:1.		

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74	Stabilize the exposed side of slopes utilizing stabilizing materials such as biodegradable mats; or establish fast-growing, high-density root grasses adapted to the exposed soil and subsoil conditions.	P. 45	PS-4.8-9
	Estabilizar los lados expuestos de las pendientes utilizando materiales estabilizadores, tales como: mantas biodegradables, o sembrar gramas de rápido crecimiento, y de raíces de alta densidad que se adapten al suelo expuesto y a las condiciones de subsuelo.		
75	Install underground drainage on saturated slopes, and reduce surface infiltration with longitudinal sub-drainages at slope toes to avoid saturation of the soil profile.	P. 46	PS-4.8-9
	Instalar drenaje subterráneo en las pendientes saturadas y reducir la infiltración superficial con sub-drenajes longitudinales al comienzo de las pendientes para evitar la saturación del perfil del suelo.		
76	When making soil cuts for access roads for new construction sites, care should be taken to stabilize areas that are prone to slope wash, sinking, landslides and other massive movements.	P. 46	PS-4.8-9
	Cuando se realicen cortes para accesar los nuevos sitios de construcción, se deberá tener cuidado para estabilizar las área propensas a lavado, hundimiento, deslizamiento de tierra y otros movimientos masivos.		
77	Stabilize cuts for new access roads in Project construction areas using appropriate retention structures, such as concrete walls and gabions at those critical points that require it.	P. 46	PS-4.8-9
	Estabilizar los cortes de las nuevas rutas de acceso del proyecto de construcción utilizando estructuras de retención apropiadas, tales como: muros de cemento y gavión, en los puntos más críticos que así lo requiera.		
	Soil Compaction		
	Compactación del Suelo		
78	Perform the majority of earth moving during the dry season to avoid compaction, which is more prevalent when the soil is wet.	P. 47	PS-4.8-9
	Realizar la mayor cantidad de movimiento de tierra durante la época seca para evitar la compactación, la cual es más prevalente cuando el suelo está húmedo.		
79	Scarify topsoil in sites that lack vegetation, to facilitate the natural vegetation growth and regeneration.	P. 47	PS-4.8-9
	Esparcir suelo fértil (topsoil) en los lugares que carecen de vegetación, para así facilitar el crecimiento de vegetación natural y regeneración.		
80	Control the slope surface of the deposits to facilitate water drainage.	P. 48	PS-4.8-9
	Controlar la superficie de la pendiente de los depósitos para facilitar el drenaje de agua.		
	Soil Contamination		
	Contaminación del Suelo		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
81	All rolling equipment, including tractors, tanks, earth moving equipment and vehicles for the maintenance and transportation of fuel and personnel shall be controlled by way of a detailed register that guarantees compliance with the specifications established by the manufacturers regarding the type and frequency of maintenance for each piece of equipment, to assure operating efficiency of motors. Additionally, greasing, supplying, and transferring of fuels and lubricants in the field shall be performed by trained personnel and shall only be done over surfaces specially prepared watertight surfaces that allow for the containment and collection of accidental spills. Contractors shall prepare such areas and their design shall be approved by the ACP. Collect and recycle lubricants and greases during and after maintenance activities on wheeled equipment. When work is complete, these areas will be tested and remediated in the case that they are found to contain hydrocarbon residues or other contaminants.	P. 49	PS-3.3 PS-4.9
	Todo equipo de rodaje, incluyendo tractores, tanques, equipo de movimiento de tierra y vehículos para el mantenimiento y transporte de combustible y personal, deberá controlarse por medio de un registro detallado que garantice el cumplimiento de las especificaciones establecidas por los fabricantes sobre el tipo y frecuencia de mantenimiento de cada pieza del equipo, para asegurar la eficiencia de operación de los motores. Además, engrase, suministro y transferencia de combustibles y lubricantes en el campo deberán ser realizados por personal adiestrado y sólo se deberán realizar sobre superficies herméticas preparadas especialmente para ello que permitan la contención y la colección de derrames accidentales. Los contratistas deberán preparar estas áreas y sus diseños deberán ser aprobados por la ACP. Recolectar y reciclar lubricantes y grasas durante y después de las actividades de mantenimiento del equipo de ruedas. Cuando el trabajo sea completado, estas áreas deberán ser probadas y remediadas en el caso de que se encuentren residuos de hidrocarburos o de otros contaminantes.		
82	Mechanics and operational personnel who transport materials and fuel shall have specific training and updated knowledge on risks associated with spills and accidents in transport and use of hydrocarbons and other potential contaminants. Training shall include modules on use and maintenance of equipment, dispensers and containers for storage and transport as well accident prevention and response.	P. 49	PS-3.3 PS-4.9
	Los mecánicos y el personal operacional que transporta materiales y combustible deberán tener adiestramiento específico y actualización de sus conocimientos en relación a los riesgos asociados a derrames y accidentes en el transporte y el uso de hidrocarburos y otros contaminantes potenciales. El adiestramiento deberá incluir los módulos sobre el uso y mantenimiento de equipo, dispensadores y contenedores para el almacenamiento y transporte, así como prevención de accidentes y respuesta.		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
83	The collection and deposit of wastes from temporary installations, equipment yards, asphalt or concrete batching and mixing plants will be accomplished in a manner that will prevent the burning or scattering of waste in these areas. In the case of accidental spills, depending on their magnitude, the affected soils shall immediately be removed and deposited in tanks for subsequent processing as contaminated material. If justified by the magnitude of the spill or accident, the Contingency Plan shall be activated.	P. 49	PS-3.3 PS-4.9
	La recolección y depósitos de desechos procedentes de las instalaciones temporeras, equipos de patio, procesamiento de asfalto y cemento y hormigoneras se realizarán de manera que prevengan la dispersión de residuos en estas áreas. En el caso de derrames accidentales, dependiendo de su magnitud, los suelos afectados deberán ser removidos inmediatamente y depositados en contenedores para su posterior procesamiento como material contaminado. Si por la magnitud del derrame o accidente se justifica, el Plan de Continencia deberá ser activado.		
84	When blasting is required, it shall be executed with adequate control, placing special canvases over rocks before blasting, and disposing of blast residues in authorized dump sites.	P. 50	PS-2.6 PS-4.9
	Cuando se realicen explosiones, éstas deberán ejecutarse con el adecuado control, instalando cobertores especiales sobre las rocas a ser explotadas, y depositar los residuos de las explosiones en lugares de depósitos autorizados.		
	Water Quality		
	Calidad de Agua		
	Dredging		
	Dragado		
85	When hopper-suction dredges are used, the following mitigation measures will be employed: 1. Optimize velocity, mouth suction, and deposit pumping. 2. Limit spillovers and/or chute load. 3. Reduce water intake. 4. Utilize return flow. 5. Reduce air content in spillover mix.	P. 56	PS-3.3 PS-4.9
	Cuando sea utilizado para dragar un sistema a base de aspiración (Hopper-Suction), se implementarán las siguientes medidas de mitigación: 1. Optimizar la velocidad, la aspiración de la boca y el bombeo de depósito. 2. Limitar los derrames o la carga de la escotilla. 3. Reducir el consumo de agua. 4. Utilizar devolución de flujo. 5. Reducir el contenido de aire en la mezcla del derrame.		
86	When cutter-suction dredgers are used, the following mitigation measures will be employed: 1. Optimize velocity of suction cut, balancing and discharge. 2. Protect cutting or suction head. 3. Optimize the cutting head design.	P. 56	PS-3.3 PS-4.9

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	Cuando sea utilizado para dragar un sistema a base de corte-aspiración, las siguientes medidas de mitigación se implementarán: 1. Optimizar la velocidad de succión del corte, balance y descarga. 2. Proteger la cabeza del corte o succión. 3. Optimizar el diseño de la cabeza de corte.		
87	When a deep dredger is used, the following mitigation measures will be employed: 1. Utilize visor over bucket. 2. Utilize a screen or curtain.	P. 56	PS-3.3 PS-4.9
	Cuando sea utilizado para dragar un sistema de profundidad, las siguientes medidas de mitigación se implementarán: 1. Utilizar visera sobre el cubo. 2. Utilizar rejilla o cortina.		
	Deposit of Dredged Spoil in Water Body		
	Depósitos de Material Dragado en el Cuerpo de Agua		
88	Use discharge design that supports the density flow at pipe exit.	P. 59	PS-3.3 PS-4.9
	Utilizar un diseño de descarga que sostenga la densidad de flujo de la salida del conducto.		
89	Employ sediment control curtains in sensitive areas.	P. 59	PS-3.3 PS-4.9
	Emplear cortinas de control de sedimento en las áreas sensitivas.		
90	Place final covering on deposit sites, using rocky material, once sites reach their maximum capacity.	P. 59	PS-3.3 PS-4.9
	Colocar la cobertura final en los lugares de depósitos, utilizando material rocoso, una vez estos lugares alcancen su capacidad máxima.		
91	To the extent possible, prioritize thick dredged material deposits (gravel and rock fragments) for aquatic deposits, and fine material deposits that can be transported and discharged through piping in land deposits.	P. 59	PS-3.3 PS-4.9
	En la medida que sea posible, darle prioridad a los depósitos de material dragado (roca y fragmentos de roca) para depósitos acuáticos y depósitos de material fino que puedan ser transportados o descargados a través de tubería en los depósitos de tierra.		
92	Continuous coordination of dredging and deposit activities, to prevent the discharge of fine dredged materials during adverse weather and when water currents occur.	P. 59	PS-3.3 PS-4.9
	Mantener una coordinación continúa de las actividades de dragado y depósito, para prevenir la descarga de material de dragado fino durante condiciones de tiempo adversas o cuando ocurran corrientes de agua.		
	Deposit of Dredged Spoil on Land		
	Depósitos de Material Dragado en la Tierra		
93	Use sediment control weirs.	P. 60	PS-3.3 PS-4.9
	Utilizar presas de control de sedimento.		
94	Fill spoil sites to a secure level only, keeping spoil within the containment.	P. 60	PS-3.3 PS-4.9

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	Rellenar los lugares de depósito solo a un nivel se seguridad, manteniendo los mismo dentro de la contención.		
95	Use sedimentation ditches.	P. 60	PS-3.3 PS-4.9
	Utilizar diques de sedimentación.		
96	Use transverse intermediate walls.	P. 60	PS-3.3 PS-4.9
	Utilizar paredes transversales intermedias.		
	Contamination		
	Contaminación		
97	All equipment, including boats, dredges, tractors, tanks, earth-moving equipment, maintenance vehicles and vehicles for transporting fuel and personnel, shall be subject to inspection with reporting to ensure compliance with specifications established by the manufacturers as to the type and frequency of maintenance of each unit to guarantee efficient engine operation. This will limit emissions, thereby reducing water contamination. In addition, lubrication as well as the supply and transfer of fuels and lubricants in the field shall be performed by trained personnel, and shall only be executed over impermeable surfaces that are designed for such use.	P. 60	PS-3.3 PS-4.9
	Todo equipo, incluyendo botes, dragado, tractores, tanques, equipo de movimiento de tierra, vehículos de mantenimiento y vehículos de transporte de combustible y personal, deberán estar sujetos a una inspección en donde se documente el cumplimiento de las especificaciones establecidas por el fabricante sobre el tipo y frecuencia de mantenimiento de cada unidad para garantizar la operación eficaz del motor. Esto limitará las emisiones, lo cual reducirá la contaminación del agua. Además, la lubricación como el suministro y transferencia de combustibles y lubricantes en el campo deberán ser realizados por personal adiestrado, y sólo deberán ser ejecutados sobre superficies impermeables que están diseñadas para dicho uso.		
98	Mechanic and operator personnel involved in the transport of materials and fuels shall have received specific training and updated knowledge on issues related to risks associated with spills and accidents during the transportation and dispensing of hydrocarbons and other hazardous substances. Training programs shall include modules on proper use and maintenance of equipment used to store, transport and dispense petroleum products, and prevention and management of spills and accidents.	P. 60	PS-3.3 PS-4.9
	Los mecánicos y el personal operacional que transporta materiales y combustible deberán tener adiestramiento específico y actualización de sus conocimientos en relación a los riesgos asociados a derrames y accidentes en el transporte y el uso de hidrocarburos y otros contaminantes potenciales. El adiestramiento deberá incluir los módulos sobre el uso apropiado de mantenimiento de equipo, dispensadores y contenedores para el almacenamiento y transporte, así como prevención de accidentes y respuesta.		
99	Temporarily stored soil will be compacted as well as having installed drainage channels and sediment traps to limit erosion.	P. 60	PS-3.3 PS-4.9
	Suelo almacenado temporalmente deberá ser compactado, como también la instalación de canales de drenaje y trampas de sedimentación para limitar la erosión.		
	River-Diversion Channels		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	Canales Rio-Diversion		
100	New channels shall be constructed so as to resist maximum water velocities avoiding collapse and the consequent transport of solids towards the Canal, which would contribute to its silting and to the deterioration of its water quality.	P. 63	PS-3.3 PS-4.9
	Los nuevos canales deberán ser construidos resistentes a las velocidades máximas del agua, evitando que colapsen y el subsiguiente transporte de sólidos através del Canal, el cual podrían contribuir con el deterioro de su calidad de agua.		
	Temporary Construction Facilities		
	Construcción de Facilidades Temporeras		
101	Appropriately manage waste water, including sewage and grey water generated in field installations and on work fronts.	P. 64	PS-3.3 PS-4.9
	Manejar apropiadamente las aguas residuales, incluyendo las alcantarillas y aguas grises generadas en las instalaciones de campo y frentes de trabajo.		
102	Prevent and appropriately treat hydrocarbon spills in workshops and in any other areas where equipment maintenance and machine construction occurs. (Use oil/water separator if applicable.)	P. 64	PS-3.3 PS-4.9
	Prevenir y tratar apropiadamente derrames de hidrocarburos en los talleres de trabajo y en cualquier otra área donde se provea mantenimiento al equipo y maquinaria de construcción. (Utilizar separadores de aceite/agua donde sea necesario)		
103	Construct sediment traps on aggregate exploitation sites and rehabilitate those sites after use is complete.	P. 64	PS-3.3 PS-4.9
	Construir trampas de sedimentos en los lugares donde se extraiga agregados y rehabilitar estos sitios luego de completado los trabajos.		
104	Retain fine sediments generated during rock crushing through sedimentation and wash-water cleaning basins, if applicable.	P. 64	PS-3.3 PS-4.9
	Retener los agregados finos generados durante el trituramiento de roca através de la sedimentación y lavado en las cuencas de limpieza, si aplica.		
105	Retain sediments from effluents generated by cleaning of concrete plants.	P. 64	PS-3.3 PS-4.9
	Retener los sedimentos generados por efluentes producto de la limpieza de la hormigonera.		
	Temporary Soil Deposits		
	Depósitos de Tierra Temporeros		
107	New drainage patterns are to be planned and controlled.	P. 68	PS-3.3 PS-4.9
	Nuevos patrones de drenaje deben ser planificados y controlados.		
108	Runoff is to be channeled through new drains.	P. 68	PS-3.3 PS-4.9
	La escorrentía debe ser canalizada através de drenajes nuevos.		
109	Techniques should include retention dikes, cross walls and other applicable techniques.	P. 68	PS-3.3 PS-4.9
	Las técnicas deben incluir diques de retención, paredes transversales y otras técnicas aplicables.		
110	Drainage systems shall be subject to frequent inspection and maintenance.	P. 68	PS-3.3 PS-4.9
	Los sistemas de drenaje estarán sujetos a inspección y mantenimiento frecuente.		
	Maintaining Vegetation Cover		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	Mantener la Cubierta Vegetal		
111	Limits of work areas are to be clearly marked with stakes and flagging.	P. 73	PS-6.6
	Los límites de las áreas de trabajo tienen que estar claramente identificadas y marcadas con estacas y cinta.		
112	Ecological indemnification will be in accordance with Resolution AG-0235/ANAM.	P. 73	PS-6.6
	Indemnización ecológica estará en conformidad con la resolución AG-0235/ANAM.		
113	Construction equipment will be operated with care and in such a way as to cause minimum deterioration to vegetation and their supporting soils.	P. 73	PS-6.6
	El equipo de construcción operará con cuidado y de manera que ocasione mínimo deterioro a la vegetación y en los suelos de apoyo.		
114	Machine operators will be trained on proper procedures for clearing vegetation in work areas.	P. 73	PS-6.6
	A los operadores de la maquinaria se les proporcionará adiestramiento con los procedimientos correctos para la limpieza de áreas con vegetación.		
115	Vegetation will not be disposed of in drainage channels where they may obstruct water flow. In some cases, however, vegetation will be utilized as a barrier to control erosion.	P. 73	PS-3.3 PS-4.9
	La vegetación no se podrá disponer en los canales de drenaje, el cual podría ocasionar obstrucción al flujo de agua. En muchos de los casos, sin embargo, la vegetación será utilizada como una barrera para controlar la erosión.		
116	Whenever required, tree pruning shall be performed by trained personnel.	P. 73	PS-6.6
	Siempre que sea necesario, la eliminación o poda de árboles deberá realizarse por personal capacitado.		
117	Tree trunks and stakes will be used for energy dispersion to reduce the effects of hydria erosion.	P. 73	PS-6.6
	Los troncos de árboles y ramificaciones se utilizarán para la dispersión de energía para así reducir los efectos de la erosión de hydria.		
	Reforestation and Forest Preservation		
	Preservación de los Bosques y Reforestación		
118	To compensate for the loss of vegetation cover, a **Reforestation Plan** will be developed and executed by which native species shall be planted at a density of 1,110 saplings per hectare with a mix of no fewer than 50 species	P. 73	PS-6.6
	Para compensar la pérdida de la cubierta vegetal, un **Plan de Reforestación** se desarrollará y se ejecutará por lo que las especies nativas deberán plantarse en una densidad de 1,110 ejemplares por hectárea con una mezcla no menos de 50 especies.		
119	Mark trail areas before tree cutting, thus guaranteeing that area to be cut is no more than needed to perform the proposed works.	P. 78	PS-6.6
	Marcar los caminos de las áreas en donde se cortarán árboles, para garantizar que no se corten áreas que no sean parte de los trabajos propuestos.		
120	Include the planting of native species in the Reforestation Plan.	P. 79	PS-6.6
	Incluir la plantación de las especies nativas en el Plan de Reforestación.		
121	Explore reuse of felled native forest tree species, and or donate to a social welfare organization.	P. 79	PS-6.6

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	Explorar el reuso de las especies nativas de árboles forestales, y/o donar a una organización de bienestar social.		
122	Direct tree falls towards the direct impact area to avoid damage to trees in adjacent areas where vegetation is to be preserved.	P. 80	PS-6.6
	Dirigir la caída de árboles a áreas de impacto directo, para así evitar el daño a los árboles de áreas adyacentes en donde la vegetación se va a preservar.		
	Fauna		
	Fauna		
123	Avoid unnecessary noise generated by whistles, horns, sirens, pipes, and running engines, among others.	P. 81	PS-6.6
	Evitar el ruido innecesario generado por silbidos, bocinas, sirenas, tuberías y motores, entre otros.		
124	Install and maintain noise mufflers on motorized equipment (vehicles, equipment and machinery) in good conditions.	P. 82	PS-6.6
	Instalar y mantener silenciadores de ruido en equipo motorizados (vehículos, equipo y maquinaria) en buenas condiciones.		
125	Coordinate the rescue of animals that enter the work areas.	P. 82	PS-6.6
	Coordinar el rescate de animales que entren a las áreas de trabajo.		
126	Train construction personnel on wildlife protection and poaching prevention procedures.	P. 82	PS-6.6
	Capacitar al personal de construcción en la protección de la vida silvestre y en los procedimientos de prevención.		
127	Direct lighting towards specific work sites, avoiding animal habitat areas.	P. 82	PS-6.6
	Dirigir la iluminación hacia áreas específicas de trabajo, evitando las áreas de refugio de los animales.		
128	Speed limits will be strictly observed by project vehicles to avoid collisions with wildlife.	P. 82	PS-6.6
	Se deberán observar los límites de velocidad para evitar que los vehículos del proyecto impacten la vida silvestre.		
129	To maintain visibility for vehicles, vegetation will be trimmed along roadways.	P. 83	PS-6.6
	Para mantener la visibilidad de los vehículos, se deberá mantener recortada la vegetación a lo largo de la vía de rodaje.		
130	Warning signs will be posted in areas where animals are likely to cross project roads.	P. 83	PS-6.6
	Se instalarán señales de advertencia en las áreas en donde los animales probablemente crucen la vía de rodaje.		
131	Workers will be prohibited from any type of hunting and fishing in the project area.	P. 83	PS-6.6
	Los empleados no podrán realizar ningún tipo de caza o pesca dentro de las áreas de proyecto.		
132	Prohibit or regulate the use of firearms within the Project Area.	P. 83	PS-6.6
	Prohibir y regular el uso de armas de fuego en las mediaciones del proyecto.		
133	Project will comply with wildlife protection laws and regulations of ANAM (Panama's National Environmental Authority)	P. 83	PS-6.6
	El proyecto debe cumplir con las leyes y regulaciones de la ANAM (Autoridad Nacional del Ambiente de Panamá) para la protección de la vida silvestre.		
134	Post project area with "No Hunting" signs.	P. 83	PS-6.6
	Instalar señales de "Prohibida la Caza" en la zona del proyecto.		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
135	Implement an environmental training program for project workers.	P. 83	PS-6.6
	Implementar un programa de adiestramiento ambiental para los trabajadores del proyecto.		
	Solid Waste		
	Desperdicios Sólidos		
136	Train workforce with regard to solid waste regulations.	P. 90	PS-3.3 PS-4.9
	Capacitar a la fuerza trabajadora con respecto a las regulaciones de desperdicios sólidos.		
137	Prohibit the burning of solid waste.	P. 90	PS-2.16 PS-3.3 ?
	Prohibir la quema de desperdicios sólidos.		
138	Establish proper locations for and labeling of solid waste containers.	P. 90	PS-3.3 PS-4.9
	Establecer lugares apropiados para ubicar y rotular los contenedores de desperdicios sólidos.		
139	Minimize the production of solid waste.	P. 90	PS-3.3 PS-4.9
	Minimizar la producción de desperdicios sólidos.		
140	Maximize recycling and reuse of potential solid waste.	P. 90	PS-3.3 PS-4.9
	Maximizar el reciclaje y reutilización de residuos sólidos potenciales.		
141	Properly dispose of waste.	P. 90	PS-3.3 PS-4.9
	Disponer correctamente los desperdicios.		
142	Solid waste containers for non-biodegradable waste must be located at the worksites and at operation centers to encourage their use for proper garbage disposal and to discourage littering.	P. 91	PS-3.3 PS-4.9
	Contenedores de desperdicios sólidos para material no-biodegradable deberá localizarse en las áreas de trabajo y en los centros de operación, para así enfatizar el uso correcto de disposición de basura y evitar los desórdenes.		
143	Solid waste containers shall be lined with plastic bags and placed at any worker service areas (kitchens and lunch areas), as well as work sites. These containers must be labeled to show that they are intended for disposal of non-biodegradable materials. Plastic bags shall be available at all work sites.	P. 91	PS-3.3 PS-4.9
	Los contenedores de desperdicios sólidos deberán tener funda plástica y se colocarán en las áreas de servicio para los trabajadores (cocinas y comedores), como en las áreas de trabajo. Estos contenedores deberán estar rotulados con la intención de que su uso es exclusivo para desperdicios no-biodegradables. Fundas plásticas estarán disponibles en todos los lugares de trabajo.		
144	Indoor and outdoor organic (bio-degradable) waste containers with covers shall be provided. In the case of inert waste (non-biodegradable), and depending on the size, proper action shall be taken to prevent them from flooding during rainy season.	P. 91	PS-3.5 PS-4.9
	Se deberán proveer contenedores con tapa para desperdicios orgánicos interiores y exteriores (biodegradables). En caso de desperdicios inertes (no-biodegradables), y dependiendo del tamaño, se tomarán medidas adecuadas para evitar la dispersión de los mismos cuando surjan inundaciones durante la temporada de lluvias.		

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145	Biodegradable and non-biodegradable waste containers shall be moved along with project equipment or machinery, this is, as work advances, and will not be left behind in areas where work has been completed.	P. 92	PS-3.5 PS-4.9
	Contenedores de desperdicios biodegradables y no-biodegradables deberán ser transportados por equipo o maquinaria especializada para este tipo de trabajo y no podrán ser dejados en áreas donde se hayan completado los trabajos.		
146	Purchase products with a minimum quantity of wrapping (examples: food and paper).	P. 92	PS-3.5 PS-4.9
	Comprar productos con una mínima cantidad de envoltura (por ejemplo: comida y papel).		
147	Use longer lived products that can be repaired (examples: durable work tools and appliances).	P. 92	PS-3.5 PS-4.9
	Utilizar productos de larga vida y que se puedan reparar. (Por ejemplo: herramientas de trabajo duraderas y aparatos).		
148	Substitute single use disposable items with reusable ones (examples: bottles instead of cans).	P. 92	PS-3.5 PS-4.9
	Sustituir objetos de un solo uso con aquellos que son reusable. (por ejemplo: utilizar botellas en lugar de latas).		
149	Use fewer resources (example: print and photocopy double-sided documents).	P. 92	PS-3.5 PS-4.9
	Minimizar el uso de recursos. (Por ejemplo: imprimir y fotocopiar los documentos por ambos lados).		
150	Increase the recycling of products and materials, (i.e. find items that are easily accepted by local recycling centers). Waste materials that can be recycled include used asphalt, used concrete, leftover paint, construction lumber, brush clearing debris such as stumps and branches, used pallets, waste metals, and other materials.	P. 92	PS-3.5 PS-4.9
	Incrementar el reciclaje de productos y materiales (i.e. encontrar objetos que sean fácilmente aceptados por los centros de reciclaje). Materiales que pueden ser reciclados incluyen el uso de sobrantes de asfalto, cemento y de pintura, madera de construcción, brochas, paletas, desperdicios de metales, y otros materiales.		
151	Drivers of vehicles carrying solid waste shall avoid making unauthorized and unwarranted stops along their routes. Vehicles transporting solid waste shall: 1. Have a cover, such as a tarp or net, to prevent spilling along the route. 2. Be able to operate continuously in severe weather conditions. 3. Shall be cleaned frequently and never be overloaded.	P. 93	PS-3.5 PS-4.9
	Los conductores de vehículos cargando desperdicios sólidos deberán evitar realizar paradas no autorizadas e injustificadas a lo largo de sus rutas. Vehículos transportando desperdicios sólidos deberán: 1. Tener una cubierta, como toldo o malla, para prevenir el derrame de desperdicios a lo largo de la ruta. 2. Ser capaces de funcionar continuamente en condiciones meteorológicas severas. 3. Deberán limpiarse con frecuencia y nunca se deben sobrecargar.		

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152	The Contractor shall follow all the required procedures for final disposal of the waste generated during Project construction. It shall also certify, in writing, that all waste management activities have been performed in an acceptable technical, legal, sanitary and environmentally safe manner. The Contractor shall be responsible for any claim resulting from an inadequate management of solid waste. Whenever it becomes necessary to establish a temporary disposal site due to the logistical requirements of the operations, the Contractor shall submit a request to the Panama Canal Authority for approval. Pacific Area waste shell be disposed of at the Patacon Sanitary Landfill, and Atlantic Areas waste shall be disposed of at the Mount Hope Sanitary Landfill.	P. 95	PS-3.5 PS-4.9
	El Contratista deberá seguir todos los procedimientos requeridos para la disposición final de todos los desperdicios generados durante la construcción del proyecto. Además, deberá certificar, por escrito, que todas las actividades de manejo de desperdicios sólidos serán realizadas en una forma técnicamente aceptable, legal, y de manera sanitaria y ambiental seguras. El Contratista será responsable de cualquier reclamación que resulte de un manejo incorrecto de desperdicios sólidos. Siempre que resulte necesario establecer un sitio de disposición temporal logístico de acuerdo a las necesidades de las operaciones, el Contratista presentará una solicitud para su aprobación a la Autoridad del Canal de Panamá. Los desperdicios del Área Pacífico deberán disponerse en el Vertedero Sanitario Patacón y los desperdicios del Área Atlántico en el Vertedero Sanitario Monte Esperanza.		
153	At short-term work sites, portable field toilets shall be provided on contract by a specialized firm that will also perform the cleanup of their content as frequently as required, in order to keep them in acceptable sanitary condition. These facilitate shall be installed at a rate of one per each 20 workers. The firm selected for this work shall comply with the regulations established by the Panama Canal Authority for the treatment and final disposal of the effluents and sludge accumulate.	P. 95	PS-3.5 PS-4.9
	En los lugares de trabajo a corto plazo, se proveerán servicios de baños portátiles instalados por una compañía especializada en ello, que realice actividades de limpieza frecuentes, según sea necesario, en orden de mantener los mismos siempre en condiciones sanitarias aceptables. Se proveerá una facilidad sanitaria por cada 20 empleados. La firma seleccionada para realizar este trabajo deberá cumplir con las reglamentaciones establecidas por la Autoridad del Canal de Panamá para el tratamiento y disposición final de efluentes y residuos (lodos) acumulados.		
154	In areas of prolonged work, sewage water treatment plant shall be built and operated. The quality of sewage waters for disposal after treatment shall comply with the requirements of Technical Regulation DGNTI-COPIANT 35-2000, if the effluent must be discharged into surface ponds. If sanitary sewers are available, the water quality shall comply with the requirements of Technical Regulation DGNTI-COPANIT 35-20.	P. 96	PS-3.5 PS-4.9

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	En áreas de trabajo a largo plazo, se deberá instalar y operar una planta de tratamiento de aguas residuales. La calidad de las aguas residuales a disponer luego de tratamiento deberá cumplir con los requerimientos de la Regulación Técnica DGNTI-COPIANT 35-2000, si el efluente va descargar en la superficie de los tanques. De haber disponible un sistema sanitario, la calidad del agua deberá cumplir con los parámetros de la Regulación Técnica DGNTI-COPANIT 35-20.		
	Hazardous Waste		
	Residuos Peligrosos		
155	Substitution of materials will occur whenever it is possible to substitute biodegradable or environmentally harmless materials for hazardous materials.	P. 97	PS-3.5
	Sustitución de materiales se producirá siempre que sea posible para sustituir materiales peligrosos por materiales biodegradables o ambientalmente inofensivos.		
156	Project material inventories will be managed in order to minimize materials kept on hand and to encourage efficient use of materials.	P. 97	PS-3.5
	Los inventarios de Materiales del Proyecto se utilizarán en orden de minimizar los materiales que se mantiene en mano y fomentar el uso eficiente de materiales.		
157	Seek opportunities to return unused hazardous materials to the suppliers.	P. 97	PS-3.5
	Explorar las oportunidades de devolver a los suplidores materiales peligrosos sin usar.		
158	If return is not possible, make sure all efforts are made to use excess stock of hazardous materials.	P. 97	PS-3.5
	Si la devolución no es posible, asegurarse que todos los esfuerzos se realicen en términos del uso mínimo de materiales peligrosos.		
159	Explore possibilities of use of excess hazardous materials through exchange with other parts of the project.	P. 97	PS-3.5
	Explorar la posibilidad de intercambiar materiales peligrosos con otros frentes de trabajo del proyecto.		
160	When exchange is not feasible, then seek recycling opportunities.	P. 98	PS-3.5
	Cuando el intercambio no sea viable, buscar oportunidades de reciclaje.		
161	If recycling is not feasible, then resale of excess hazardous materials should be considered. Disposal shall be considered only after consideration of all other alternatives.	P. 98	PS-3.5
	Si el reciclaje no es viable, entonces el vender el exceso de material peligroso debe ser considerado. La disposición deberá ser considerada sólo después de examinar y/o considerar las alternativas anteriores.		
162	Hazardous waste materials shall be separated (e.g. solvents, acids, and caustic materials) to prevent reactions and other problems that may occur due to materials incompatibility. Materials to be separated according to these criteria are: used oil and other petroleum products, gas cylinders, refrigeration equipment, batteries, oil filters, solvents, paint, and contaminated rags.	P. 98	PS-3.5

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	Materiales de residuos peligrosos estarán separados (por ejemplo: disolventes, ácidos y materiales de lejía) para prevenir reacciones u otros problemas que pueden producirse debido a la incompatibilidad de materiales. Materiales a ser separados de acuerdo a este criterio son los siguientes: aceites usados y otros derivados del petróleo, cilindros de gas, equipo de refrigeración, baterías, filtros de aceite, solventes, pinturas, y paños contaminados.		
163	An appropriate contractor shall build a hazardous waste storage area following the ACP's 2005 Manual on Materials and Waste Management. Also Contractor shall establish related procedures for its workers to follow regarding hazardous waste, including: storage location, temporary storage location and proper containers.	P. 100	PS-3.5
	Un Contratista apropiado deberá construir un área de almacenaje de desperdicios peligrosos siguiendo el Manual de Materiales y Manejo de Desperdicios del 2005 de la ACP. También, el Contratista establecerá para sus trabajadores los procedimientos relacionados a seguir sobre residuos peligrosos, incluyendo: ubicación de almacenamiento, ubicación de almacenamiento temporal y contenedores apropiados.		
164	Hazardous waste storage areas will be inspected to identify and correct deficiencies such as leaks, drips, and/or deterioration of containers.	P 102.	PS-3.5
	Se inspeccionará las áreas de almacenamiento de residuos peligrosos para identificar y corregir las deficiencias, tales como: fugas o liqueos, goteos y deterioro de los contenedores.		
165	Contractor shall, when transporting hazardous material, use appropriate drums and containers that are in good condition and have had all prior labeling removed. Containers may not be filled to the top. A 10 cm minimum clearance must be left at the top.	P. 103	PS-3.5
	El Contratista, cuando transporte material peligroso, utilizará contenedores apropiados y envases que se encuentren en buenas condiciones y que tengan toda etiqueta previa removida. Los contenedores no se rellenarán hasta el tope. Un claro mínimo de 10 cm debe dejarse en la parte superior.		
166	The Contractor shall establish a training and information program for workers that may be exposed to operations with hazardous waste, to advise them about the level and degree of exposure they could face. Their training program shall include all the proper elements for each assigned position. No unsupervised work may be performed by workers prior to completing their training on the management of hazardous waste. Such training shall be provided prior to starting the work with refresher courses every year thereafter. A record shall be kept of the training, as well as of the training materials used.	P. 104	PS-3.5

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	El Contratista deberá establecer un programa de adiestramiento e información para los trabajadores que puedan estar expuestos a las operaciones con desperdicios peligrosos, para aconsejarles sobre el nivel y grado de exposición a que se enfrentan. Su programa de adiestramiento incluirá todos los elementos adecuados para cada posición asignada. Los empleados no podrán realizar ningún tipo de trabajo sin supervisión antes de completar su adiestramiento sobre el manejo de desperdicios peligrosos. Dichos adiestramientos deberán proporcionarse antes de comenzar los trabajos con actualizaciones de los mismos todos los años subsiguientes. Se llevará un registro de los adiestramientos, así como de los materiales de formación utilizados.		
167	Workers shall be provided with Materials Safety Data Sheets (MSDS) in Spanish, and a copy kept with the chemical inventory. The MSDS shall contain the information established in the Panama Canal Authority standard on Hazardous Materials 2600 ESS-201.	P. 105	PS-3.4
	Se les proporcionará a los trabajadores una copia en español de las hojas de datos de seguridad de los materiales (MSDS, por sus siglas en inglés) y mantendrá una copia con el inventario de productos químicos. Los MSDS deberán contener la información establecida por los estándares de Materiales Peligrosos 2600ESS-201 de la Autoridad del Canal de Panamá.		
168	Each Contractor will establish a Materials Management Program in order to minimize any adverse impact on worker health and safety that may arise from hazardous materials used by the Project. Each Contractor shall delegate the responsibility for this Program to its Environmental Protection Supervisor in the field and, through its chain of command, to his or her assistants, who must be adequately trained to inspect, supervise, and keep records of materials management practice.	P. 107	PS-3.4
	Cada contratista establecerá un programa de Manejo de Materiales en orden de minimizar cualquier impacto adverso sobre la salud y seguridad del empleado que pueda derivarse de materiales peligrosos utilizados por el proyecto. Cada contratista deberá delegar la responsabilidad de este programa a su supervisor de protección ambiental en el campo y, a través de su cadena de mando, a su o sus asistentes, que deben ser adecuadamente entrenados para inspeccionar, supervisar y mantener una buena practica en la documentación de registros de materiales.		
	Load Transport		
	Transporte de carga		
169	The movement of materials more than four meters long shall be made by groups of workers, posting one employee at every four meters.	P. 108	PS-3.4
	La circulación de materiales a más de cuatro metros de largo se realizara con unos grupos de trabajadores, localizando un empleado cada cuatro metros.		
170	Drums of up to 55 gallon may be loaded manually, but drums with a larger storage capacity shall be moved with wheelbarrows or other machinery.	P. 108	PS-3.4
	Se pueden cargar manualmente contenedores de hasta 55 galones, pero se deberá emplear otro tipo de maquinaria para mover contenedores con mayor capacidad de almacenamiento.		

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171	The maximum load a worker may move manually may not exceed 50 pounds. Mechanical handling equipment shall be used for loads exceeding the allowed weight limits.	P. 108	PS-3.4
	La carga máxima que un empleado puede mover manualmente es de 50 libras. Equipo mecánico deberá ser utilizado para manejar cargas que excedan los límites de peso permitidos.		
172	Employees shall use the necessary protection equipment for the work they perform, especially when such work involves the movement of objects with sharp edges, slivers, nails, or other hazardous features.	P. 108	PS-3.4
	Los empleados deberán utilizar el equipo de protección apropiado para la labor que se encuentren realizando, en especial para aquellos trabajos que envuelvan el movimiento de objetos punzantes, bastones, clavos u otros con características peligrosas.		
173	When using wheelbarrows, employees shall ensure that: the wheelbarrow is moved over a flat surface; when unloading into an enclosed area, chocks are placed in the unloading area; and that an operator never turns their back towards a load.	P. 108	PS-3.4
	Cuando se emplee el uso de carretillas, los empleados velarán por que: la carretilla se mueva por una superficie plana, cuando se descargue en un área cerrada, se colocan calzos en la zona de descarga; y que un operador nunca da su espalda hacia una carga.		
	Materials Management Program		
	Programa de Manejo de Materiales		
174	Contractors shall develop materials management program applicable to hazardous materials and non-hazardous materials.	P. 109	PS-3.4
	Los contratistas deberán desarrollar un programa de manejo de materiales aplicable a materiales peligrosos y no-peligrosos.		
175	Hazardous materials component of the program will apply to explosives, fuel, oils, toxic and flammable gasses, and any other type of material involving a chemical hazard.	P. 109	PS-3.4
	El componente del programa de materiales peligrosos aplicará a explosivos, combustible, aceites, gases tóxicos e inflamables y cualquier otro tipo de material que implican un riesgo químico.		
176	Explosives part of program will apply to transport, storage, and use of such materials and will involve applicable ACP safety standards for explosives and munitions (2600ESS-108). [A detailed list of specific applicable guidance is found in text beginning at cited page of EIS.]	P. 110	PS-3.4
	Parte del programa de explosivos debe incluir el transporte, almacenamiento y uso de dichos materiales, y envolverá normas de seguridad de la ACP aplicables para explosivos y municiones (2600ESS-108). [Una lista detallada de directrices específicas aplicables se encuentra en el texto que empieza en página citada del Estudio de Impacto Ambiental.]		
177	Flammable liquids, solvents and fuels portion of program will be based on the following standards: Resolution No. CDZ-003/99 of February 11, 1999, and the ACP standards for the handling and storage of flammable liquids, solvents, and fuels (2600ESS-128). [A detailed list of specific applicable guidance is found in text beginning at cited page of EIS.]	P. 112	PS-3.4

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	Una porción del programa de líquidos flamables, solventes y combustibles deberá estar basado siguiendo los estándares de la Resolución No. CDZ-003/99 del 11 de febrero de 1999, y por las guías sobre el manejo y almacenamiento de líquidos flamables, solventes y combustibles de la ACP (2600ESS-128) [Una lista detallada de directrices específicas aplicables se encuentra en el texto que empieza en página citada del Estudio de Impacto Ambiental.]		
178	The part of the program related to compressed gas cylinders will be derived from 2600ESS-116 and 2600ESS-201 established by the ACP. [A detailed list of specific applicable guidance is found in text beginning at cited page of EIS.]	P. 114	PS-3.4
	Parte del programa relacionado a los cilindros de gas comprimido deberá estar basado en las regulaciones 2600ESS-116 y 2600ESS-201 establecidas por la ACP. [Una lista detallada de directrices específicas aplicables se encuentra en el texto que empieza en página citada del Estudio de Impacto Ambiental.]		
179	The part of the program related to construction materials is derived from ACP materials management standard 2600ESS-110, including but not limited to the following: 1. Keep storage site dry and free from obstructions. Also, a peripheral barrier is recommended to keep materials from coming in contact with any runoff. 2. When storing materials on shelves, their size shall be taken into account to prevent materials from protruding and causing accidents and/or obstructions in aisles. Likewise, it is of vital importance to ensure that the shelving is stable and has the necessary capacity for the use it is being given. 3. Light sources, vents, electrical installations, fire extinguishers, water or air intakes shall be kept free from obstructions during the distribution and storage of materials. 4. When stacking or piling up pallets, bags and/or containers, their shape and height must be taken into account in order to prevent them from collapsing or sliding. 4. Whenever the use of pallets is required, they must be inspected to ensure that they are in good condition and free of exposed nails. 5. Storage personnel shall be trained in methods for lifting, carrying, placing, unloading, and storing different types of materials.	P. 116	PS-3.4

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	La parte del programa relacionada con materiales de construcción derivada del manejo estándar de materiales de la ACP (2600ESS-110), incluye pero no limita a lo siguiente: 1. Mantener las áreas de almacenaje secas y libres de obstrucciones. Además, es recomendable instalar una barrera periferal para limitar que de los materiales entren en contacto con las escorrentías. 2. Al almacenar los materiales en estantes, su tamaño deberá tenerse en cuenta para evitar que los materiales sobresalgan causando accidentes o obstrucciones en los pasillos. Del mismo modo, es de vital importancia garantizar que el estante es estable y tiene la capacidad necesaria para el uso que se le está dando. 3. Las fuentes de luz, respiraderos, las instalaciones eléctricas, extinguidores de incendios, tomas de agua o aire se mantendrán libre de obstáculos durante la distribución y almacenamiento de materiales. 4. Cuando se apilen las paletas, bolsas y/o contenedores, la forma y el alto de las mismas deben tenerse en cuenta para evitar que estas cedan o se deslicen. 5. Siempre que se requiere el uso de paletas, estas deben ser inspeccionadas para garantizar que se encuentren en buen estado y libre de clavos expuestos. 6. El personal a cargo de almacenaje deberá ser capacitado en métodos para levantar, llevar, descargar y almacenar diferentes tipos de materiales.		

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180	The part of the program related to food handling is derived from ACP materials management standard 2600ESS-285, including but not limited to the following: 1. Refrigerators for food storage at work sites my not be used to store non-food items. 2. Periodic maintenance shall be provided for refrigeration equipment to ensure its proper operation. 3. Foods that do not require refrigeration shall be stored in areas designated exclusively for this purpose. 4. All food containers shall have proper covers to prevent contamination by insects, rodents, or other disease vectors. 5. Appliances for food storage shall be kept at an acceptable temperature and humidity to preserve their contents. 6. Storage areas shall be inspected periodically to ensure that they are kept clean and in a condition that is appropriate for storage.	P. 117	PS-2.16

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	La parte del programa relacionada con el manejo de los alimentos se deriva del estándar de manejo de materiales 2600ESS-285 de la ACP, incluyendo, pero no limitándose a lo siguiente: 1. Refrigeradores para almacenamiento de alimentos en sitios de trabajo no pueden ser usados para almacenar artículos no alimentarios. 2. Se proveerá mantenimiento periódico a equipos de refrigeración para asegurar una operación apropiada. 3. Alimentos que no requieren refrigeración deberán ser almacenados en áreas designadas exclusivamente para este propósito. 4. Todos los contenedores de alimentos tendrán tapas adecuadas para prevenir la contaminación por insectos, roedores, y otros diversos vectores de enfermedades. 5. Los equipos para almacenamiento de alimentos deberán ser mantenidos a temperatura y humedad aceptables para preservar su contenido. 6. Las áreas de almacenamiento deberán ser inspeccionadas periódicamente para asegurar que sean mantenidas limpias y en condiciones apropiadas para el almacenamiento.		
181	The project must follow the Labor Code of Panama in its requirement that an employer provide a safe place to store worker belongings that must be kept at the work place for work related reasons.	P. 118	PS-2
	El proyecto debe cumplir con el Código del Trabajo de Panamá en su requerimiento de que un empleador proveerá un lugar seguro para almacenar las pertenencias del trabajador que deban ser mantenidas en el lugar de trabajo por razones relacionadas al trabajo.		
182	Materials storage areas shall be inspected on a monthly basis to ensure the proper storage of all materials, their inventory, and that the aisles between the stored materials are kept free from obstruction to allow access to them. **These inspections shall be recorded and included in quarterly operation reports.** Likewise, inspections shall be conducted at fuel storage areas at least weekly by recording the condition of the tanks, containment dikes, sumps, and all related equipment. These documents, along with the daily inspection documents and fuel transfer logs, shall be attached to the quarterly operation reports. Inspections of the personal use storage areas shall be conducted weekly for the purpose of ensuring their cleanliness, and their inspection documents shall be attached to the quarterly operation reports.	P. 119	PS-4.7

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	Las áreas de almacenamiento de materiales serán inspeccionadas mensualmente para asegurar el almacenaje apropiado de todos los materiales, su inventario, y que los pasillos entre los materiales almacenados se mantengan libres de obstrucciones para permitir el acceso a ellos. **Estas inspecciones serán documentadas e incluidas en informes de operación trimestrales.** Igualmente, las inspecciones deberán realizarse en áreas de almacenamiento de combustible a lo menos semanalmente, registrando las condiciones de los tanques, diques de contención, pozos, y todo equipamiento relacionado. Estos documentos, junto con los de inspección diaria y bitácora de transferencia de combustibles, serán adjuntos a los informes de operación trimestrales. Las inspecciones de las áreas de almacenamiento de uso personal deberá ser realizada semanalmente con el propósito de asegurar su limpieza, y los documentos de inspección deberán adjuntarse a los informes de operación trimestrales.		
	Socioeconomics and Cultural Resources		
	Recursos Cultural y Socioeconómicos		
183	To enhance the national economic impacts of the project the ACP will: 1. Continue with the process of informing local enterprises about the characteristics and requirements for each phase of construction to allow them the opportunity to position themselves for the associated business opportunities. 2. Contractors shall relay this same information to medium-sized and small businesses which may be in a position to participate along with larger businesses in providing services to ACP.		PS-1
	Para realzar los impactos económicos nacionales del proyecto, la ACP: 1. Continuará con el proceso de informar a las empresas locales acerca de las características y requerimientos de cada fase de la construcción para permitirles la oportunidad de posicionarse ellos mismos en las oportunidades de negocio asociadas. 2. Los contratistas deberán transmitir esta misma información a negocios de pequeño y mediano tamaño que pudiesen estar en posición para participar junto con negocios e mayor envergadura para proveer servicios a la ACP.		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
184	To promote enhanced employment in its area of influence the ACP will: 1. Promote the hiring of local manual labor according to recruitment requirements and general policies regarding the work and employment conditions, on the basis of the Equator Principles and the IFC Social and Environmental Performance Standards (PS-2). 2. Include in any bid specifications the dissemination of employment opportunities to the Republic of Panama's population through the mass media, as appropriate.	P. 122	PS-2
	Para promover el aumento de empleo en su área de influencia, la ACP procederá a: 1. Promover la contratación de mano de obra local, de acuerdo a los requerimientos de reclutamiento y políticas generales de trabajo y sus condiciones de empleo, basados en los Principios Ecuatoriales y los Estándares Sociales y de Desempeño Ambiental del IFC (PS-2). 2. Incluir en cualquier especificación de licitaciones, la diseminación de oportunidades de empleo para la población de la República de Panamá a través de los medios masivos, según sea apropiado.		
185	As a measure to mitigate possible increase in population and migration flow, the ACP will coordinate as necessary with the National Police, and with the Municipalities of Arraijan, Colon, and Panama to prevent squatters potentially attracted by the project from engaging in unauthorized settlement in the area.	P. 123	PS-4.4
	Como medida de mitigación de posibles incrementos de población y flujo de migración, la ACP coordinará, según sea necesario, con la Policía Nacional y el Municipio de Arraijan, Colón y Panamá, para prevenir que allegados, u ocupantes ilegales potencialmente atraídos por el proyecto, realicen asentamientos no autorizados en el área.		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
186	To mitigate the impact on levels of vehicular traffic in the project's area of influence the ACP has adopted the following Project policies: 1. Transportation of materials and machinery shall be accomplished preferably by water or railroad. 2. Once in the Project Area, heavy equipment and transportation vehicles shall keep to the ACP's internal road structure. 3. In specific situations, when the use of the public road infrastructure is required, the pertinent actions shall be coordinated with the Panama Traffic and Land Transportation Authority (ATT for its name in Spanish) in compliance with that agency's traffic regulations. 4. Any plan for the transportation of employees and materials to and from the work areas must be approved by the ACP. 5. Alternative measures shall be established for the communities of Costa Abajo de Colon in those cases when it becomes necessary to limit the use of the land access over Gatun Locks.	P. 125	PS-4.4
	Para mitigar los impactos en niveles de tráfico vehicular en el área de influencia del proyecto, la ACP adoptará las siguientes políticas para el Proyecto: 1. El transporte de materiales y maquinaria deberá ser realizado por vía acuática o sobre rieles. 2. Una vez en el Área del Proyecto, los equipos pesados y vehículos de transporte deberán mantenerse dentro de la estructura vial de ACP. 3. En situaciones específicas, cuando se requiera el uso de infraestructura vial pública, las acciones pertinentes deberán coordinarse con la Autoridad de Tránsito y Transporte Terrestre (ATT), cumpliendo con los reglamentos de tránsito de la agencia. 4. Cualquier plan para el transporte de empleados y materiales, desde y a las áreas de trabajo, deber ser aprobado por la ACP. 5. Medidas alternativas deberán ser establecidas para las comunidades de Costa Debajo de Colón en los casos que se haga necesario limitar el uso del acceso terrestre por las Esclusas Gatun.		
187	Build new electrical transmission towers prior to the start of the construction phase to replace those that will be affected by the Project.	P. 127	PS-4.4

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	Construir nuevas torres de transmisión eléctrica antes de inicio de la fase de construcción, para reemplazar aquellas que serán afectadas por el Proyecto.		
188	Take the necessary precautions to ensure that public infrastructure is modified in such a way that service is not affected.	P. 127	PS-4.4
	Tomar las precauciones necesarias para asegurar que la infraestructura pública sea modificada a modo de no afectar a ese servicio.		
189	Identify the infrastructure that will be affected by the rise in the maximum operating water level of Gatun Lake	P. 128	PS4.8-9
	Identificar la infraestructura que será afectada por el aumento del nivel máximo de operación del lago Gatun.		
190	Relocate the users of the affected structures in coordination with the corresponding organizations or agencies, according to the legal parameters of each case following the Resettlement Plan referenced in Commitment 217.	P. 128	PS-5
	Reubicar a los usuarios de las estructuras afectadas en coordinación con las organizaciones o agencias, de acuerdo a los parámetros legales de cada caso, cumpliendo con el Plan de Reasentamiento referenciado en el Compromiso 217.		
191	Prepare and implement a long-term **Socioenvironmental Management Plan** for the banks of Lake Gatun. This plan shall determine, in detail, the structures (89 PLD) that will require compensation for their occupants or owners; conduct surveys and appraise the structures located on land managed exclusively by the ACP, as the starting point for any Pertinent actions and to assist in meeting the objective of the Expansion Project of preventing any socioenvironmental impact and achieving a sustainable management of resources.	128	PS-5 PS-4
	Preparar e implementar un **Plan de Manejo Socio-Ambiental** de largo plazo para los bancos del Lago Gatun. Este Plan deberá determinar, en detalle, las estructuras (89 PLD), que requerirán compensación para sus ocupantes o propietarios; realizar encuestas y evaluar las estructuras ubicadas sobre terrenos manejados exclusivamente por la ACP, como punto de partida de cualquier acción Pertinente, y asistir en cumplir con el objetivo del Proyecto de Expansión de prevenir cualquier impacto socio-ambiental y conseguir un manejo sustentable de los recursos.		
	Hazard Prevention		
	Prevención de Riesgos		
192	Implement the Solid Waste management Program of the ACP for the identification of problems with improper handling of solid waste, and the design of solutions using the proper technology for the local environment and the specific wastes concerned.	P. 129	PS-3.5
	Implementar el Programa de la ACP de manejo de Desechos Sólidos para la identificación de problemas de manejo inapropiado de desechos sólidos, y para el diseño de soluciones utilizando las tecnologías apropiadas para el medio ambiente local y los desechos específicos que preocupan.		
193	Strengthen the disease vector control Program of the Panama Canal Authority (ACP for its name in Spanish) and the Panama Ministry of Health (MINSA). The aim of this program is to reduce the morbidity associated with vectors, such as those of leishmaniasis, malaria, chagas, and dengue fever.	P. 129	PS-4.10-11

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	Reforzar el Programa de la Autoridad del Canal de Panamá de control de vectores de enfermedad y del Ministerio de Salud (MINSA). El propósito de este programa es reducir la morbidez asociada a estos vectores, como son la leishmaniasis, malaria, chagas y fiebre de dengue.		
194	Keep health centers in the surrounding areas informed about the progress of the Project and the number of active personnel involved, so they may be prepared to provide emergency treatment if necessary.	P. 129	PS-4.12
	Mantener informados a los centros de salud en las cercanías sobre el avance del Proyecto, y el número de personal activo involucrado, de manera que estén preparados para proveed tratamientos de emergencia si fuese necesario.		
195	Apply a strict policy to work safety education and information for Contractor and Subcontractor Personnel	P. 130	PS-1.3
	Aplicar una política estricta de educación e información de seguridad en el trabajo para el Personal de Contratistas y Subcontratistas.		
196	Provide all workers with Personal Protective Equipment (PPE) according to ACP standards, and enforce their use at work sites.	P. 130	PS-1.3 PS-2.16
	Proveer a todos los trabajadores con Equipo de Protección Personal (EPP), de acuerdo a estándares de la ACP, y fiscalizar su uso en los sitios de trabajo.		
197	Install appropriate safety signage at work sites.	P. 130	PS-1.3 PS-2.16
	Instalar la señalización de riesgo apropiada en los sitios de trabajo.		
198	Implement preventive maintenance programs for machinery and equipment.	P. 130	PS-2.16
	Implementar un programa de mantenimiento preventivo para máquinas y equipos.		
	Working Conditions (IFC/Equator Principles – PS-2)		
	Condiciones de Trabajo (IFC/Principios Ecuador-PS-2)		
199	The Project shall provide workers with a safe and healthy work environment, considering the hazards inherent in their particular area and the specific hazards at their workplace, including physical, chemical, biological, and radiological hazards.	P. 130	PS-2
	El proyecto deberá proveer un ambiente seguro y saludable a los trabajadores, considerando los peligros inherentes a su área particular y a los peligros de su lugar de trabajo, incluyendo los peligros específicos de su lugar de trabajo, incluyendo peligros físicos, químicos, biológicos, y radiológicos.		
200	The Project will take measures to prevent accidents, injuries, and illnesses that may arise, are associated with, or occur during the course of work, to minimize the cause of hazards to the extent practicable.	P. 131	PS-1.3 PS-2.16
	El Proyecto tomará medidas para prevenir accidentes, lesiones, y enfermedades que pudiesen aparecer, estar asociadas con, u ocurrir durante el curso del trabajo, para minimizar la causa del peligro hasta donde sea practicable.		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
201	Consistent with good international industrial practice, the Project shall survey the various areas to identify possible hazards to workers, especially those that may pose a threat to their life, and establish prevention and protection measures including the modification, substitution, or elimination of hazardous conditions or substances; worker training; recording and submission of accident, illness, and occupational incident reports; and arrangements for emergency prevention, preparation, and response actions.	P. 131	PS-1.3 PS-2.16
	Consistentemente con las buenas prácticas industriales, el Proyecto inspeccionará las diversas áreas para identificar posibles peligros para los trabajadores, especialmente aquellos que pudiesen presentar una amenaza a su vida, y establecer medidas de prevención y protección, incluyendo modificación, sustitución, o eliminación de condiciones peligrosas; entrenamiento de los trabajadores; registrando y sometiendo informes de accidentes, enfermedad, e incidentes ocupacionales; y arreglos para la prevención, preparación y respuesta ante emergencias.		
	Crime		
	Delincuencia		
202	Disseminate and enforce Project Code of Conduct	P. 132	PS-1.3
	Diseminar y fiscalizar el Código de Conducta del Proyecto.		
203	Promote initiatives by organizations that could effectively conduct preventive programs to address unsafe conditions in association with vulnerable populations on the peripheries of urban and suburban areas which may attract the poorest migrant populations from outside of Panama or from other parts of the metropolitan region.	P. 132	PS-4.5
	Promover iniciativas de las organizaciones que puedan realizar efectivamente programas para manejar condiciones inseguras asociadas a poblaciones vulnerables en las periferias de áreas urbanas o suburbanas, que puedan atraer a las poblaciones inmigrantes más pobres desde fuera de Panamá o desde otras partes de la región metropolitana.		
204	Obtain co-sponsorships from several sectors (e.g. Offices of Population Education and Integral Prevention of the Ministry of Education, the Ministry of Health Promotion Directorate, the National Police of the Ministry of Government and Justice, and the Youth Section of the Office of Social Development) and local governments of selected districts, for an integrated program to prevent violence, and crime, to be planned and supervised in coordination with the mentioned agencies.	P. 132	PS-4.5
	Obtener co-auspicio de diversos sectores (por ejemplo: Oficinas de Educación de la Población y Prevención Integral del Ministerio de Educación, la Dirección de Promoción del Ministerio de Salud, la Policía Nacional del Ministerio de Gobierno y Justicia, y de la Sección Juventud de la Oficina de Desarrollo Social), y de gobiernos locales de distritos selectos, para un programa integrado de prevención de violencia y crimen, a ser planificado y supervisado en coordinación con las mencionadas agencias.		
	Infrastructure		
	Infraestructura		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
205	Provide advance information to business and organizations regarding the features of the Project and their duration, so they may include and expansion of their operations in their planning, according to the needs generated by construction phase activities.	P. 133	PS-1.3
	Proveer información de avance a negocios y organizaciones con respecto a las características destacables del Proyecto y su duración, a modo de que puedan incluir y expandir sus operaciones en su planificación, de acuerdo a las necesidades generadas por las actividades de la fase de construcción.		
206	When possible, use private services that complement services provided by Government agencies, as in the cases of solid waste management, security, and surveillance services.	P. 133	PS-4.4, 4.13
	Cuando sea posible, utilizar servicios privados que complementen los servicios provistos por las agencias de Gobierno, como en el caso del manejo de desechos sólidos, seguridad, y vigilancia.		
	Waste Generation		
	Generación de Residuos		
207	Require that Contractors disseminate and enforce compliance of their employees with the requirements established by ACP in its Materials and Waste Management Manual.	P. 134	PS-1.3 PS-2.5
	Exigir que los Contratistas diseminen y fiscalicen el cumplimiento de sus empleados con los requerimientos establecidos por la ACP en su Manual de Manejo de Materiales y Desechos.		
208	Establish well defined areas to supply and consume foods and beverages, in order to prevent littering in other parts of the Project Area.	P. 134	PS-1.3 PS-2.5
	Establecer áreas bien definidas para la provisión y consumo de alimentos y bebidas, a modo de prevenir dispersión de basura en otras partes del Área del Proyecto.		
209	Install trash cans in areas with greater worker and visitor density.	P. 134	PS-2.5
	Instalar botes de basura en áreas de mayor densidad de trabajadores y visitantes.		
	Tourism, Scenic Landscapes and Archaeological Resources		
	Turismo, paisajes turísticos y recursos arqueológicos		
210	Plan and implement most appropriate measures to maximize the project's positive affects on the flow of tourists to the project area.	P. 135	PS-8.11
	Planificar e implementar las medidas más apropiadas para maximizar los efectos positivos del Proyecto en el flujo de turistas al área del Proyecto.		
211	Implement effective control of dust and gas emissions to prevent the rising of gas clouds and/or particulate materials from chimney exhaust, as generated by activities such as excavation and blasting.	P. 137	PS-4.9
	Implementar un control efectivo de polvos y emisiones gaseosas para prevenir la generación de nubes de gases y/o material particulado del escape de las chimeneas, generado por actividades tales como excavación y detonación.		
212	Disseminate literature about the ongoing work at lookouts set up by the ACP.	P. 138	PS-1.3
	Diseminar literatura, sobre el avance de los trabajos, en miradores instalados por la ACP.		
213	Minimize the time of visitor exposure to the excavation, reshaping and alignment of slopes and fill areas as soon as possible.	P. 138	PS-1.3

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
	Minimizar el tiempo de exposición de visitantes a la excavación, reformando y alineando las pendientes y áreas de relleno tan pronto sea posible.		
214	Improve the visual aspect of excavation slopes and fill areas with replanted vegetation.	P. 138	PS-8.11
	Mejorar los aspectos visuales de las pendientes de excavación y áreas de relleno replantando vegetación.		
215	Employ the following measures to protect and minimize impacts to known archaeological sites in coordination with the National Directorate of Historic Patrimony (DNPH-INAC): 1. Hire a professional archaeologist for the implementation of an Archaeological Rescue and Salvage Plan. 2. Conduct archaeological rescue and salvage, if applicable, under a plan that includes various office and field activities. 3. Conduct a constant monitoring of earth movement for the purposes of detecting associated unreported archaeological sites.	P. 139	PS-8.7, 8.9
	Emplear las siguientes medidas para minimizar impactos a sitios arqueológicos conocidos, en coordinación con la Dirección Nacional de Patrimonio Histórico (DNPH-INAC): 7. Contratar a arqueólogos profesionales para la implementación de un Plan de Rescate y Salvataje Arqueológico. 8. Realizar un rescate y salvataje de arqueológico, si fuese aplicable, bajo un plan que incluya a varias oficinas y actividades de campo. 9. Realizar un monitoreo constante del movimiento de tierra con le propósito de detectar sitios arqueológicos asociados no reportados.		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
216	Employ the following measures to protect and minimize impacts to unidentified archaeological and paleontological sites: 1. When archaeological sites are discovered cease construction activity in the vicinity of the site (at least within 50 m). 2. Contact a professional archaeologist or paleontologist as appropriate, and notify competent national authority, i.e. National Historic Patrimony Directorate DNPH-INAC. 3. The professional archaeologist or paleontologist shall take the pertinent actions to record the removed substrata and assess the undisturbed context adequately but rapidly so as to not unduly delay Project work, but also taking adequate time so as not to detract from the quality of a detailed professional recording and evaluation of the information from the newly discovered resources. 4. ACP shall take action to preserve these resources found following the technical guidance of competent authorities	P. 140	PS-8.7, 8.9
	Utilizar las siguientes medidas para proteger y minimizar los impactos a sitios arqueológicos y paleontológicos no identificados: 3. Cuando se descubra un sitio arqueológico, detener las actividades de construcción en las cercanías del sitio (a lo menos dentro de 50 m). 4. Contactar a un arqueólogo o paleontólogo profesionales según sea apropiado, y notificar a la autoridad nacional competente, como la Dirección Nacional de Patrimonio Histórico DNPH-INAC. 5. El arqueólogo o paleontólogo profesionales deberán realizar las acciones pertinentes para registrar el sustrato removido y evaluar el contexto no alterado adecuadamente pero lo suficientemente rápido como para no demorar innecesariamente la obra del Proyecto, y también tomando un tiempo adecuado como para no desmerecer la calidad de un registro y evaluación profesionalmente detallados de la información de los recursos recién descubiertos. 6. La ACP actuará para preservar estos recursos encontrados, siguiendo la conducción técnica de autoridades competentes.		
	Mitigation Plans		
	Planes de Mitigación		

ID	Commitment/Action	Page Ref. (Class III EsIA Ch. 8)	Equator Principle or IFC-PS Reference
217	Project shall implement the following management plans, the detailed requirements of each as described in Chapter 8 of the EIS forming the basis of any audit of such plans: 1. Gatun Lake Socioenvironmental Plan. 2. Resettlement (Relocation Plan). 3. Monitoring and Follow up Plan.	P. 141	EP-4 PS-1.3
	El Proyecto deberá implementar los siguientes planes de gestión, cuyos requerimientos detallados están descritos en el Capítulo 8 del EIS, formando la base para cualquier auditoria de tales planes: 10. Plan Socio-Ambiental del Lago Gatun. 11. Reasentamiento (Plan de Reubicación). 12.		
	Additional Environmental and Social Plans		
	Esp.		
218	Monitoring and Follow-up Plan	P. 142	EP-4 PS-1.3
	Plan de Monitoreo y Seguimiento		
219	Implementation Schedule	P. 174	EP-4 PS-1.3
220	Citizen Participation Plan	P. 177	EP-4 PS-1.3
221	Risk Prevention Plan	P. 255	EP-4 PS-1.3
222	Wildlife Rescue and Resettlement Plan	P. 286	EP-4 PS-1.3
223	Environmental Education Plan	P. 291	EP-4 PS-1.3
224	Contingency Plan	P. 294	EP-4 PS-1.3
225	Post-Operation Environmental Recovery Plan	P. 320	EP-4 PS-1.3
226	Abandonment Plan	P. 322	EP-4 PS-1.3

Appendix E

Telephone Calls Log

Autoridad del Canal de Panamá
Ingeniería y Administración de Programas Ampliación del Canal
Comunicación y Documentación - Informe de Gestiones
Diciembre 2008

1. Introducción

La Sección de Comunicación y Documentación del Proyecto de Ampliación del Canal, es responsable de la **documentación** técnica e histórica del avance del proyecto de Ampliación y de la construcción del TJE, para su ordenada preservación y de la coordinación del proceso de **Comunicación** del proyecto a nivel nacional en coordinación con la Oficina de Comunicación Corporativa y las otras entidades de la ACP.

Este reporte mensual detalla el desarrollo de nuestras actividades mensuales dirigidas al cumplimiento de las metas corporativas y objetivos departamentales que nos competen.

2. Actividades Mensuales

En el marco del cumplimiento de nuestras funciones desglosamos nuestras actividades como siguen:

a. Llamadas Telefónicas

Solicitante	Entidad	Consulta	Teléfono	Absuelta por
Leon Guerrero Panameño 56 años	Personal	Teléfono del Señor Carlos Ernesto González de la Lastra	263-2005	Le di la información requerida.
Francisco Mateo Goodin Panameño 42 años	Personal	Teléfono del CVM Saber año en que termina la ampliación	6747-6494	Le brindé el teléfono e indiqué que el proyecto culmina en el año 2014.
Maristel Mallabis Batisa Panameña 25 años	Personal	Teléfono del CVM	997-6255	Le ofrecí la información requerida.
Roberto Castro Cubano 42 años	Personal	Teléfono del CVM	279-0241	Le di la información solicitada.
Ayereem Sánchez Cebamanos Panameña 37 años	Personal	Teléfono del CVM	315-0696	Le ofrecí el número requerido.
Radares Antonio Vásquez Guillén Panameña	Personal	Información de empleo – Conductor de	6642-0226	Le hablé del SASE.

34 años		equipo pesado		
Amalia Aguilar Panameña 19 años	Personal	Deseaba conocer el nombre del jefe de recursos humanos.	237-6443	Le di la información requerida.
Jessica Fletcher Rivas Panameña 34 años	Personal	Desea conocer el teléfono de la colaboradora Michele Reece	225-1589 266-5453	Luego de hablarle del teléfono de la ampliación y el correo electrónico le di el dato requerido.
Grecia González Panameña 30 años	Personal		6779-7971	Le informé respecto a la línea y correo de la ampliación para posteriormente ofrecerle la información requerida.
Sofía Mendieta Panameña 18 años	Personal	Deseaba conocer el teléfono del Señor Miguel Mas	6567-5432 3036763	Luego de hablarle de la línea de la ampliación y correo de la ampliación le di la información requerida.
Señor Ford No quiso dejar datos	Personal	Desea el teléfono del CVM		El Señor Holder conversó con él.
Eliza Marciana Panameña 20 años	Personal	Conocer ubicación de la Sección de Prácticos	399-9184	Le di la dirección requerida.
Raúl Rodríguez Panameña 31 años	Personal	Conocer sistema de contratación de personal en la ACP	292-8198 295-0592	Le di la información requerida.
Mireily Rodríguez Panameña 20 años	Personal	Conocer el teléfono de un colaborador de la ACP	216-7994	Le dirigí al 276-3149 de la Sección de Operaciones de Tránsito
Yadira Ariano Panameña	Personal	Conocer el teléfono de un	65611433	Le di la información

43 años		colaborador de la ACP		requerida.
Lady Jaramillo Panameña 30 años	Personal	Conocer el teléfono de la Sección de Gamboa	6650-8498	Le hablé del correo y línea de la ampliación, y le di el teléfono de de la operadora de ACP
Angie Guzman Panameña 26 años	Personal	Número telefónico de Asesoría Jurídica	277-7775	Le di la información requerida
Roger Bravo Panameña 48 años	Personal	Número de teléfono de CVM	68018312	Le di la información requerida
Lilia González Panameña 30 años	Ingeniería 2L	Precalificar para los trabajos de ampliación	233-1730 233-2034	Se le referió a la Sra. Tere Abadía.
Odilia Ortiz Panameña 48 años	Personal	Teléfono del CVM	233-5191	Se le dio la información requerida.
Siras Boda Panameña 28 años	Personal	Teléfono del GYM	221-6633	Se le dio la información requerida
José Morán Panameña 31 años	Personal	Teléfono del CVM	6649-5106	Se le dio la información requerida.
Marcos Sepúlveda Venezolano 25 años	Personal	Horarios del CVM	6570-0263	Se le refirió al CVM
Cesar Monterrey Panameño 23 años	Personal	Número de la central	234-1801	Se le refirió el número
Rodolfo Outten Panameña 29 años	Personal	Número de la central	6487-2618	Se le refirió.

b. Correo Electrónico

Durante el mes de diciembre se recibió al correo electrónico de la ampliación ampliación@pancanal.com las siguientes consultas

Solicitante	Entidad	Consulta	Absuelta por
Tom Meree	Personal	What is the maximum height from the waterline to the coping at the top of the locks?	V. Castrellón



Autoridad del Canal de Panamá
Ingeniería y Administración de Programas Ampliación del Canal
Comunicación y Documentación - Informe de Gestiones
Enero 2009

1. Introducción

La Sección de Comunicación y Documentación del Proyecto de Ampliación del Canal, es responsable de la **documentación** técnica e histórica del avance del proyecto de Ampliación y de la construcción del TJE, para su ordenada preservación y de la coordinación del proceso de **Comunicación** del proyecto a nivel nacional en coordinación con la Oficina de Comunicación Corporativa y las otras entidades de la ACP.

Este reporte mensual detalla el desarrollo de nuestras actividades mensuales dirigidas al cumplimiento de las metas corporativas y objetivos departamentales que nos competen.

2. Actividades Mensuales

En el marco del cumplimiento de nuestras funciones desglosamos nuestras actividades como siguen:

a. Llamadas Telefónicas

Solicitante	Entidad	Consulta	Teléfono	Absuelta por
Ruperto Pimentel Panameña 27 años	Personal	Información de empleo	6614-3494	Le di la información requerida.
Eva de Nieto Panameña 63 años	Personal	Teléfono del CVM	226-8110	Le ofrecí la información requerida y le hablé del número de la ampliación.
Paola Crespo Calero Colombiana 30 años	Personal	Información del CVM	229-0294	Le di la información requerida.
Nami Bak Venezolana 30 años	Personal	Consulta sobre una licitación	6852-3452	Le informe que debía acceder al SLI.
Renato Bryant Panameña 34 años	Agencias Barwil	Pregunta sobre la ampliación de un cliente Vulica Shipping	263-7755	Le hablé del correo de la ampliación y nuestro protocolo de atención al cliente.
Isol Barrios	Personal	Información de	6719-8046	Le ofrecí la

Panameña 26 años		empleo		información para acceder al SASE y le hablé de la ampliación
Raúl Gómez Panameña 43 años	Personal	Número telefónico de la Planta de Agua	6461-8664	Le di la información requerida.
Francisco Soriano Panameña 59 años	Personal	Número teléfono de la capitanía puerto	263-3504	Le di la información requerida.
Mirla Rodríguez Panameña 25 años	Personal	Teléfono del CVM	6520-4481	Le di la información requerida
Viodelda Martínez Panameña 45 años	Personal	Dejar su Hoja de Vida	230-4958	Le informé como acceder al SASE.
Linda Assis Israelí 41 años	Personal	Información del CVM	215-1900	Le di la información requerida.
Aida Velasco Panameña 31 años	Personal	Teléfono del CVM	790-7127	Le di la información requerida
Eugenio Castillo Panameña 27 años	Personal	Presentar su hoja de vida	295-9938	Le informé cómo ingresar al SASE.
Omar De Hoyos Panameña 40 años	Personal	Conocer el teléfono del Centro Sidmar	442-5059	Le informé el teléfono.
Kilmara Mendizábal Panameña 54 años	Personal	Presentar una denuncia respecto a uno empleados de la ACP	442-8903	Transferí la llamada a la oficina del fiscalizador general
Carmen Solano Panameña 43 años	Personal	Información del CVM	262-7827	Le di la información requerida
Ricardo Barranco Panameña 34 años	personal	Información del CVM	317-1260	Le di la información requerida.
Jose Miranda Panameña 34 años	INAC	Conocer el teléfono de Museo Interoceánico	501-4909	Le di la información requerida
Gabiel lee Panameña 32	Personal	Teléfono de Recursos Humanos	6498-1721	Le di la información solicitada
Nestor Flores Panameña	Personal	Teléfono del CVM	6675-2433	Le di la información

36 años				requerida.

Llamadas: 20

b. Correo Electrónico

Durante el mes de diciembre se recibió al correo electrónico de la ampliación ampliación@pancanal.com las siguientes consultas

Solicitante	Entidad	Consulta	Absuelta por
Guadith Quiroz Villazon [guquiviz@gmail.com]	Personal	Información de empleo	Icenit Melgar
Martin Zimmermann [majozi@gmx.de]	Personal	Existen estudios actualizados que tratan de las nuevas circunstancias (crisis financiera, económica etc.) y sus efectos a la Ampliación? En los estudios de Indesa (http://www.pancanal.com/esp/plan/estudios/0281.pdf) veo los flujos de caja estimados para el proyecto. Me puede mandar los flujos reales del año fiscal 2008 para poder compararlos con los estimados? Ya existen estadísticas sobre el tráfico de buques en el año fiscal 2008 (por cantidad y tipo de buque)? Además me podría informar cuándo la ACP publicará el informe Anual del año fiscal 2008?	V. Castrellón
Leon Rozo	Personal	Dirigir su hoja de vida	Icenit melgar
Jeffrey Pardus	Personal	Sugerencia – Uso de Hidro turbina	Jovanka Guardia
Noelia di Gangi	Personal	Análisis financiero económico del proyecto	V. CAstrellón
Martin Zimerman	Personal	Preguntas sobre el financiamiento de la obra	EAHolder

Autoridad del Canal de Panamá
Ingeniería y Administración de Programas Ampliación del Canal
Comunicación y Documentación - Informe de Gestiones
Febrero 2009

1. Introducción

La Sección de Comunicación y Documentación del Proyecto de Ampliación del Canal, es responsable de la **documentación** técnica e histórica del avance del proyecto de Ampliación y de la construcción del TJE, para su ordenada preservación y de la coordinación del proceso de **Comunicación** del proyecto a nivel nacional en coordinación con la Oficina de Comunicación Corporativa y las otras entidades de la ACP.

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2. Actividades Mensuales

En el marco del cumplimiento de nuestras funciones desglosamos nuestras actividades como siguen:

a. Llamadas Telefónicas

Solicitante	Entidad	Consulta	Teléfono	Absuelta por
Israel Bribraghel Limpo Panameña 33 años 221-6022	Personal	Tiempo de duración de la ampliación Pasarán barcos más grandes que los Panamax Por qué se llama tercer juego de esclusas	221-6022	Le remití a la pág. Web Contesté sus interrogantes.
Yadira Centeno	Personal	Información para visitar el CVM	6167-2754	Le di la información requerida y le hablé del número de la ampliación
María Fábrega Panameña 20 años	Personal	Deseaba conocer requisitos para grabar en las instalaciones del CANAL	6678-4534	Le tome los datos, los pase al Sr. Holder. Le indiqué a la solicitante que debía suministrar

				mayor información.
Itza Luna Panameña 29 años	Personal	Información para acceder al SAES	6014-5004	Le di la información requerida
Patricia Paredes Panameña 27 años	Personal	Horario de la biblioteca	253-7204	Le ofrecí el teléfono 272-8928
Alexis López Panameña 29 años	Personal	Manga de los buques Post-Panamax	6613-6124 345-0933	Pase la pregunta a J. Guardia
Jorge Meneses Panameña 28 años	Personal	Información de empleo	237-6992	Le di la información requerida.
Milka Ruíz Panameña 57 años	Personal	Información para visitar el CVM	275-9936	Le di la información requerida
Octavio Abdiel Martínez Cumberbatch Panameña 28 años	Personal	Información de empleo	393-8185	Le di la información requerida.
David Rodríguez Panameña 25 años	Personal	Ubicación del Museo Interoceánico	6652-4372	Le di la información requerida y le hablé de la línea de la ampliación.
Abdiel Prado Panameño 18 años	Personal	Conocer los avances de la obra	No tiene	Le hable del correo electrónico y le informe que podría acceder a la página web para obtener información de los avances del proyecto.
Abdiel Prado Panameño 18 años	Personal	Información para empleo	No tiene	Le informé los pasos para presentar su hoja de vida a a través del SASE.
Janina de Palacios Panameña 44 años	Personal	Información para trabajar en la ACP.	442-4486	Le hablé del SASE
Rosa Rivera	Personal	Desea conocer	6522-5042	Le di la

Panameña 27 años		teléfono del CVM		información requerida.
Edis Guevara Panameña 43 años	Personal	Conocer el lugar donde esta el buzón	2534702	Le di la información requerida

Llamadas: 15

b. Correo Electrónico

Durante el mes de diciembre se recibió al correo electrónico de la ampliación ampliación@pancanal.com las siguientes consultas

Solicitante	Entidad	Consulta	Absuelta por
Jenny Berrocal – Costa Rica		Conocer si se contrataran maquinarias pesada	V. Castrellón
Antonio Sánchez Díaz - Argentina		Si dentro de los trabajos de ampliación del canal está revisto el cierre del tráfico marítimo	V. Castrellón
Renato Bryant	Barwil Agencies	Solicitud de reunión para conocer los avances de la obra	Ing. L. Ferreira
Paul Bieber		Información de los consorcios	J. Guardia
Ubaldino Solís		Conocer de los avances de la obra para trabajo de la Universidad	J. Guardia
Mr. Bgerhardt		Contactar a un colaborador de la ACP que trabaja en la Draga Cristensen	J. Guardia

Autoridad del Canal de Panamá
Ingeniería y Administración de Programas Ampliación del Canal
Comunicación y Documentación - Informe de Gestiones
Marzo 2009

1. Introducción

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a. Llamadas Telefónicas

Solicitante	Entidad	Consulta	Teléfono	Absuelta por
María Fernanda Ramírez Colombiana 30 años	Personal	Horario del CVM	265-7181	Le ofrecí la información requerida
Aminta Dutari Panameña 44 años	Personal	Teléfono de la secretaria del Sr. Administrador	6676-5391	Le hablé de la línea y correo de la ampliación
Rubén Martínez Panameña 44 años	Personal	Información para trabajar en la ampliación	292-1467 6803-5586	Le di la información requerida.
Lineth Villarreal Panameña 39 años	Personal	Quiere participar de una licitación pero no sabe cómo ubicar al agente de compras	263-1870	La dirigí al SLI
Nelly Quezada Panameña 59 años	Personal	Información de empleo	391-1297	Le di la información requerida
Ana Lorena de Valdeoliva Panameña 42 años	Personal	Teléfono CCAA	226-0493	Le di la información requerida
Natalie	Personal	Ubicación del	6010-4117	Le di la

Betancourt Panameña 45 años		CCAA		información requerida
Oscar Gutiérrez	OPACOMA	Reforestación con caña verde	6826-7825	Le di los datos al Señor Daniel Muschett.
Edilsa Ortega Panameña 43 años	Personal	Donde puede dejar su hoja de vida	253-4702	Le di la información requerida
Jose Ceferino Cárdenas Trejos Panameña 35 años	Personal	Información de empleo	6781-2291	Le di la información requerida
Eric Hansen Panameña 28 años	Personal	Teléfono de Operaciones marítimas	667-7839	Le di la información solicitada y le hablé de la línea de la ampliación
Erica Escudero Panameña 32 años	Personal	Venta de casas en Gamboa	6447-9830	Le hablé del Programa de Ampliación, no le pude ayudar con su consulta no tenía más información.
Yarenis Andrade Panameña 23 años	Personal	Programa de Asistencia Estudiantes	231-6944	Le di la información requerida
Giselle Vera de Méndez Panameña 34 años	Personal	Teléfono del CVM	64945480	Le di la información requerida.
Carlos Acosta Panameña 27 años	Personal	Teléfono del CVM	238-7246	Le di la información requerida
Berta Alicia Morán Panameña 40 años	Personal	Información del CVM	6682-9840	Le di la información requerida
Raúl Rodríguez Panameña 32 años	Personal	Información de empleo	282-8198	Le dirigí al SASE
Miriam Marín Panameña 48 años	Grupo Sarasi 8hong Kong)	Información sobre la licitación del Cap 4 y Cap 5.	65398574	V. Castrellón contestó la consulta.

b. Correo Electrónico

Durante el mes de diciembre se recibió al correo electrónico de la ampliación ampliación@pancanal.com las siguientes consultas

Solicitante	Entidad	Consulta	Absuelta por
Jonathan Robayo Montañez	Personal	Información de empleo	Icenit Melgar
Esperanza Paniza	Embajada de Japón	Nombre de la persona que dirigió el acto de recibimiento de las propuestas	Vianey Castrellón
Mossak & Fonseca		Presentación sobre la amplaiicón	EAH dio instrucciones para entregarles video.
Monica Ortega		Información sobre participación de empresas colombianas	V. Castrellón indicó que le preguntará donde salió publicado el anuncio a que hace referencia
hhbsa@ethis.com.co		Participar con sus productos	Vianey Castrellón mandó respuesta y yo la remití al solicitante.
Vanesa Moreira		Información sobre el aspecto laborals de la ampliación	Jovanka Guardia
Rogelio Mon		Información sobre modelo del tercer juego de esclusas	V. Castrellón
Chips Cole		Información para licitación	J. Guardia
Rodolfo de León			V. Castrellón indicó que es un tema de mercado Remití la sugerencia al Señor Holder
eproqmecanica@hotmail.com		Participar en las licitaciones	Icenit Melgar
mcalaminici@aluma.com		Información estructural del tercer juego de esclusas	Jovanka Guardia

Appendix F

Photo Log of ERM Visits

Photos PAC 1



Photo PAC-1-1. Storage Area at the PAC 1 main camp.



Photo PAC-1-2. Evidence of hydro-seeding in a slope of the newBorinquen road.

Photos PAC 1



Photo PAC-1-3. Erosion control of the slopes of a PAC 1 material disposal site..



Photo PAC-1-4. Lubricant oil storage area at PAC 1.

Photos PAC 1



Photo PAC-1-5. Fuel oil storage tanks area at PAC 1.



Photo PAC-2-1. ERM's visit to the PAC 2 administrative offices in April 2009.



Photo PAC-2-2. Evidence of signs in the PAC 2 access roads.

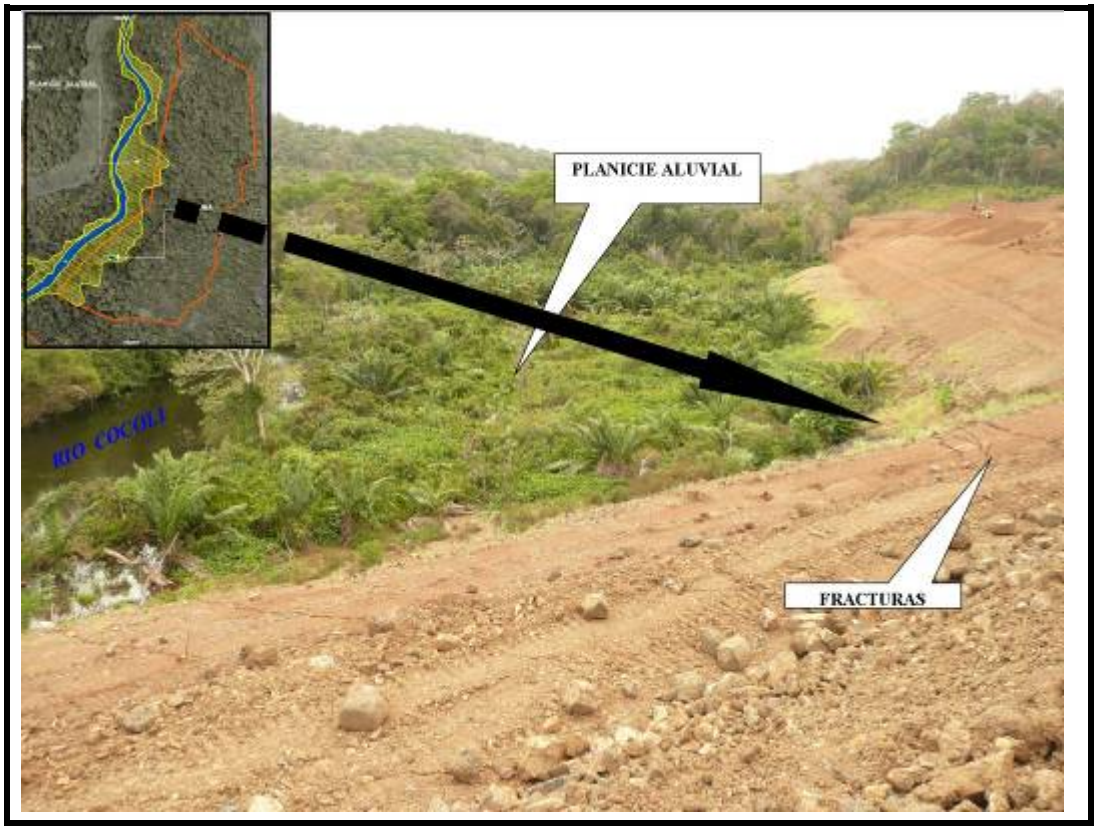


Photo PAC-2-3. Diagram showing the South 1 disposal site in relation to the Cocoli River river and the cracks.



Photo PAC-2-4. Machinery used to remove material from the South 1 disposal site nearby to the Cocoli River.



Photo PAC-2-5. Removed material from the South 1 disposal site in the boundaries with the Cocoli River.



Photo PAC-2-6. Fuel tank truck with secondary containment.



Photo PAC-2-7. Impermeable floor in the PAC 2 fuel tank truck parking area..



Photo PAC-2-8. Relocation of the Cocoli air monitoring station at PAC 2.

Photos PAC 3



Photo PAC-3-1. MECO perosnnel shows ERM representatives the temporary facilities and inicial activities at PAC 3.



Photo PAC 3-2. Visit to the PAC 3 temporary camp.



Photo PAC-3- 3. Photo of the water tanker truck used to spray water to the bare roads and areas of PAC 3.



Photo PAC-3-4. Joel Castillo, the PAC 3 social worker and specialist, explains ERM representatives the methodology being used to communicate blasting activities to the Paraíso community.



.Photo PAC-3-5. Rip rap at the drainage channel to prevent erosion from stormwater.



Photo PAC-3-6. Clearing of vegetation at PAC 3.



Photo PAC-3-7. Fauna rescue personnel explains ERM the methodology being used to rescue the animals from the Project area.



Photo PAC-3-8. Disposition of solid waste according to the environmental management plan.



Photo PAC-3-9. View of portable toilets at PAC 3.



Photo PAC-3-10. Lubricant oil and filter storage area at PAC 3.



Photo PAC-3-11. Drainage valve from the oil storage area secondary containment..



Photo PAC-3-12. Area under construction, where fuel tanks will be installed.



Photo PAC-3-13. Artifacts dated from the United States construction of the Panama Canal found in the PAC 3 project area during vegetation clearing activities.



Photo DI-1. Dredging activity with the Clamshell No.53 dredge.



Photo DI-2. Location of sub-aquatic blasting to be performed by the Yuan- Dong.



Photo DI-3. Solid waste management at the Clamshell No.53 dredge.



Photo DI-4. Solid waste management at DI main camp.



Photo DI-5. Lubricant storage area at DI main camp.



Photo DI-6. Fuel oil storage at the Clamshell No.53 dredge.



Photo DI-7. Diablo community where noise and blasting tests were conducted.



Photo G-1. Excavation of De Lesseps island.



Photo G-2. Road that connects DeLesseps with Orquidea.



Photo G-3. Photo that shows the connecting road that was built among De Lesseps and Orquidea islands.



Photo G-4. Fuel oil storage tanks at De Lesseps.



Photo G-5. Sediments leak in the Lake Gatún cut and suction dredge pipeline.



Photo G-6. Location of an archeological finding at the Juan Grande reach.

Appendix G

Blasting Operations Reports

Event Report

Date/Time Tran at 16:24:33 October 28, 2008
Trigger Source Geo: 0.0700 in/s
Range Geo :10.00 in/s
Record Time 4.0 sec at 1024 sps

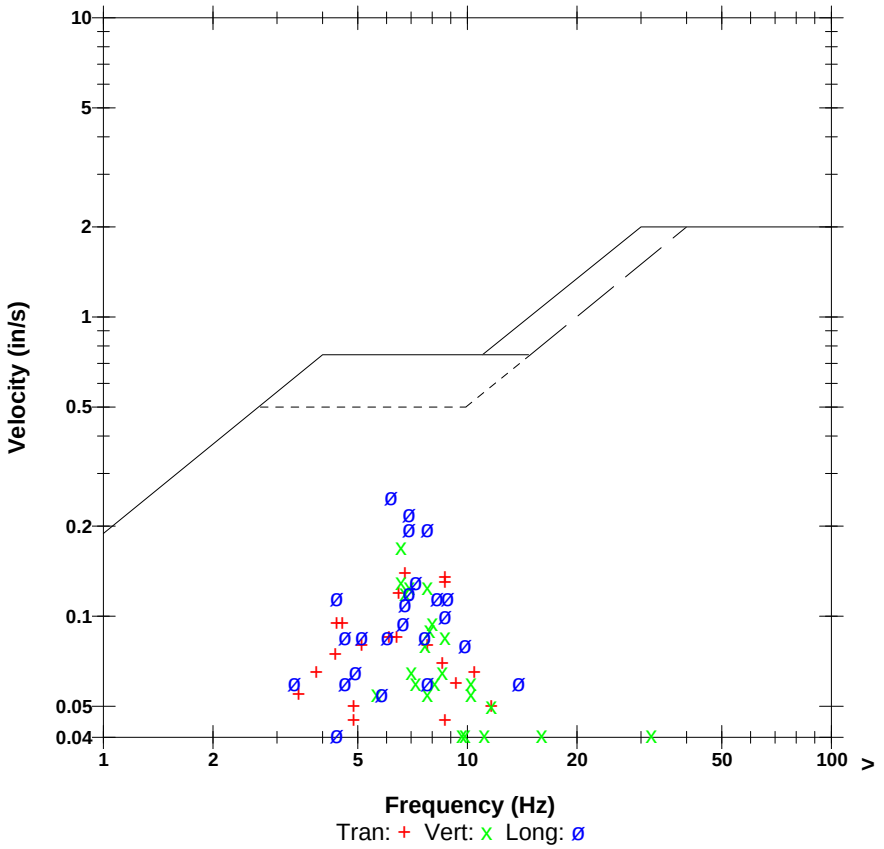
Serial Number 2787 V 5.52 BlastMate II/477
Battery Level 6.3 Volts
Calibration July 23, 2007 by Instantel Inc.
File Name D787CFO2.WX0
Scaled Distance 49.2 (919.9 ft., 350.3 lb.)

Notes
Location: Bordada Miraflores Cerro Miraflores
Client: Division de ProyctosIAP
User Name: Unidad de Geodesia
Converted: October 29, 2008 10:43:09 (V8.12)

Extended Notes
Volad.Terrestre #48 CAP2 Cilsa
Posicion De Voladura: E0653360 N0994914
Pos Sis:E653640 N0994900

Post Event Notes

USBM RI8507 And OSMRE

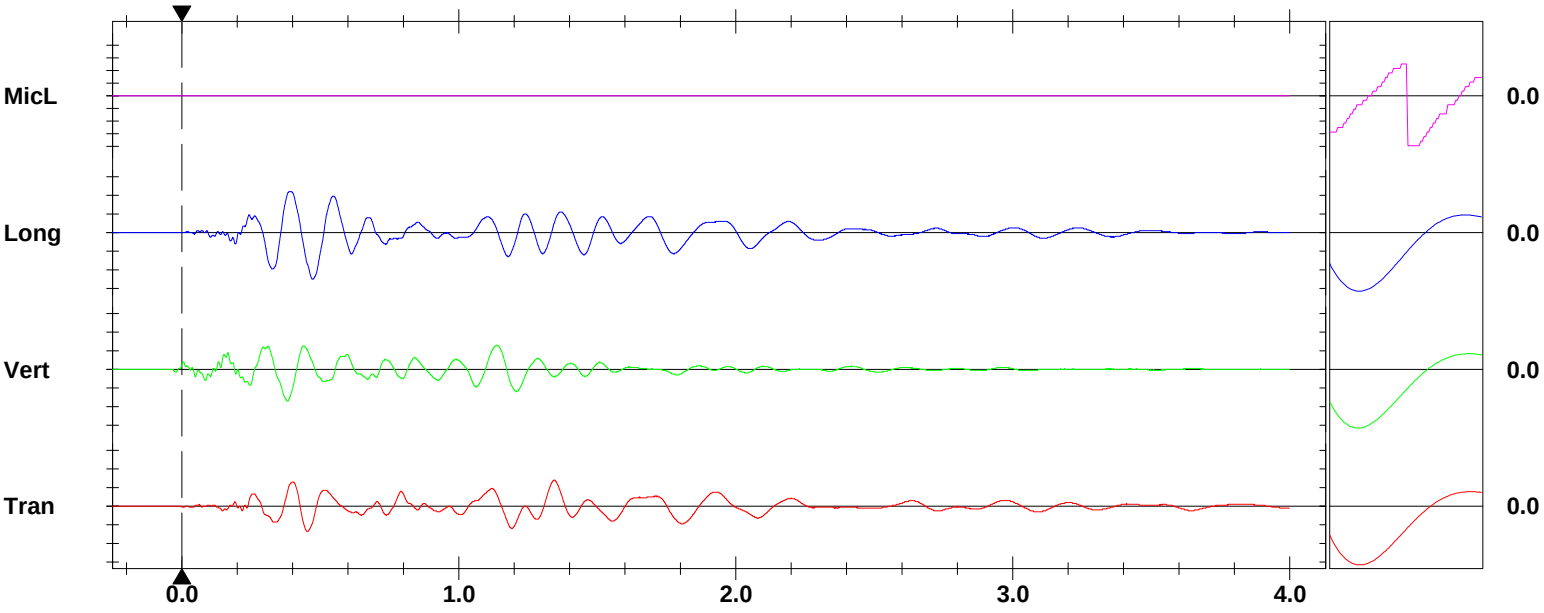


Microphone Linear Weighting
PSPL <.0000725 psi(L) at 0.002 sec
ZC Freq N/A
Channel Test Check (Freq = 0.0 Hz Amp = 12 mv)

	Tran	Vert	Long	
PPV	0.305	0.145	0.125	in/s
ZC Freq	14	15	17	Hz
Time (Rel. to Trig)	0.855	0.876	0.998	sec
Peak Acceleration	0.0928	0.0663	0.0530	g
Peak Displacement	0.00346	0.00142	0.00119	in
Sensorcheck	Passed	Passed	Passed	
Frequency	7.7	8.0	8.1	Hz
Overswing Ratio	3.9	3.5	3.2	

Peak Vector Sum 0.306 in/s at 0.855 sec

N/A: Not Applicable



Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00050 psi(L)/div Sensorcheck
Trigger =

Format Copyrighted 2006-2007 Instantel, a division of VeriChip Corporation

Event Report

Date/Time	Vert at 15:44:55 November 18, 2008
Trigger Source	Geo: 0.0200 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	1499 V 5.52 BlastMate II/477
Battery Level	6.3 Volts
Calibration	July 23, 2007 by Instantel Inc.
File Name	C499CGQX.2V0
Scaled Distance	107.4 (504.9 ft., 22.1 lb.)

Notes

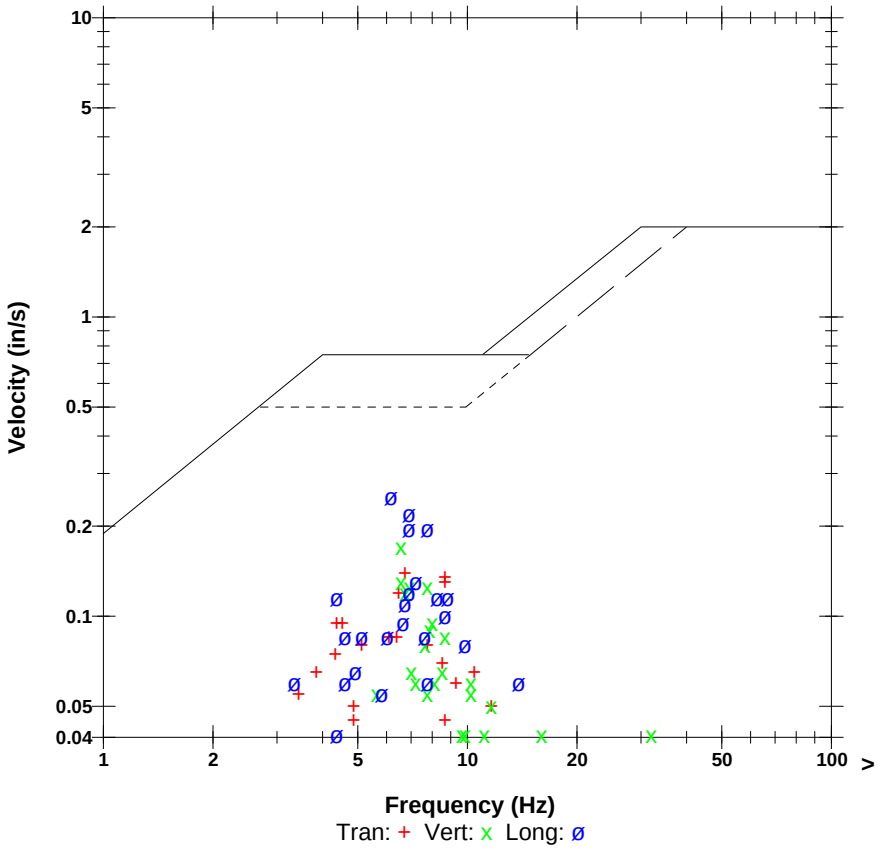
Location: Miraflores Lake Poblado de Cocoli
Client: Division de ProyectoCAP-2
User Name: Seccion de Topografia y Cartografia.
Converted: November 19, 2008 09:37:44 (V8.12)

Extended Notes

Volad.Terrestre # 07CAP-2,Desvio Rio Cocoli
Posicion de Voladura : E654772 N0992171
Posicion de Sismografo:E 654748 N0992019

Post Event Notes

USBM RI8507 And OSMRE

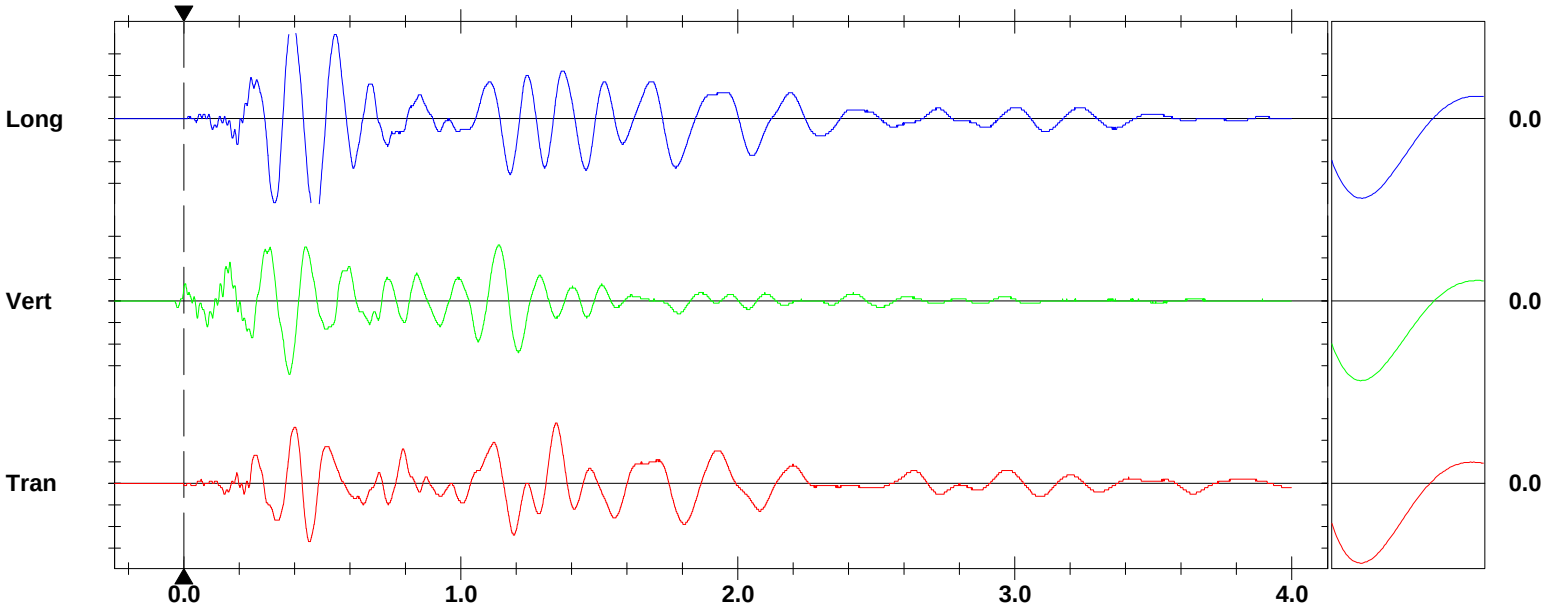


Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0850	0.180	0.0700	in/s
ZC Freq	>100	N/A	57	Hz
Time (Rel. to Trig)	0.607	0.775	0.811	sec
Peak Acceleration	0.186	0.318	0.0928	g
Peak Displacement	0.00014	0.00027	0.00019	in
Sensorcheck	Passed	Passed	Passed	
Frequency	8.0	7.6	7.7	Hz
Overswing Ratio	3.9	3.8	3.6	

Peak Vector Sum 0.188 in/s at 0.775 sec

N/A: Not Applicable



Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.0500 in/s/div Sensorcheck
Trigger =

Printed: November 19, 2008 (V 8.12 - 8.12) **Format Copyrighted 2006-2007 Instantel, a division of VeriChip Corporation**

Event Report

Date/Time Tran at 16:04:19 October 31, 2008
Trigger Source Geo: 0.0700 in/s
Range Geo :10.00 in/s
Record Time 4.0 sec at 1024 sps

Serial Number 2787 V 5.52 BlastMate II/477
Battery Level 6.2 Volts
Calibration July 23, 2007 by Instantel Inc.
File Name D787CFTL.Z70
Scaled Distance 49.2 (919.9 ft., 350.3 lb.)

Notes
Location: Bordada Miraflores Cerro Miraflores
Client: Division de ProyctosIAP
User Name: Unidad de Geodesia
Converted: November 1, 2008 12:46:44 (V8.12)

Extended Notes
Volad.Terrestre #50 CAP2 Cilsa
Posicion De Voladura: E0653360 N0994914
Pos Sis:E653640 N0994900

Post Event Notes

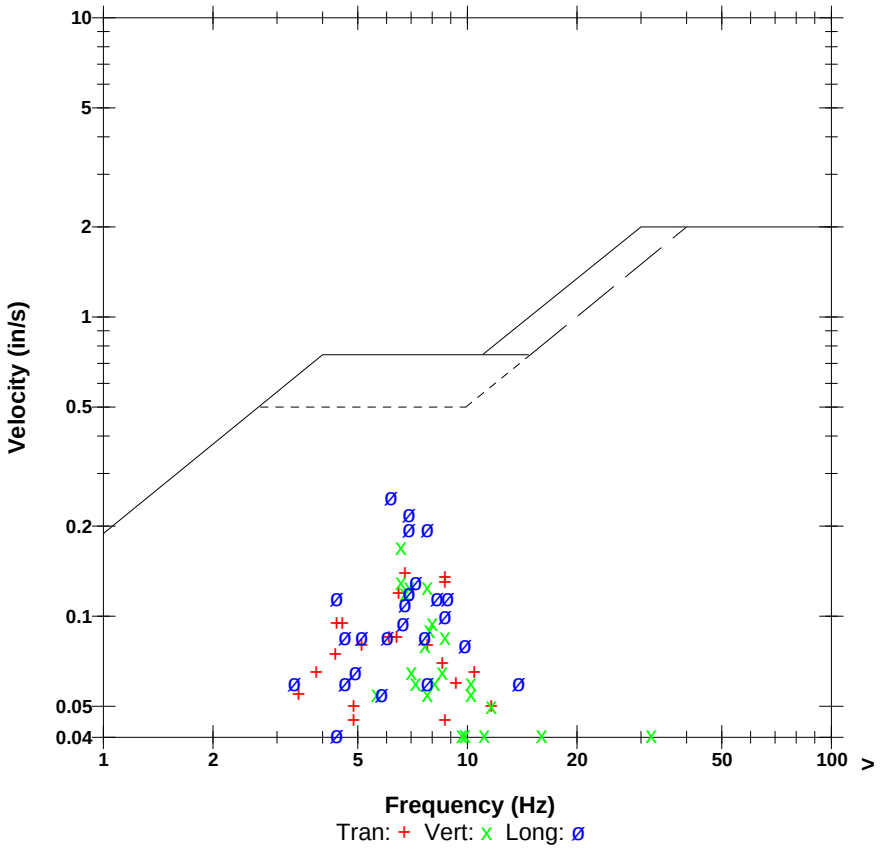
Microphone Linear Weighting
PSPL <.0000725 psi(L) at 0.002 sec
ZC Freq N/A
Channel Test Check (Freq = 0.0 Hz Amp = 14 mv)

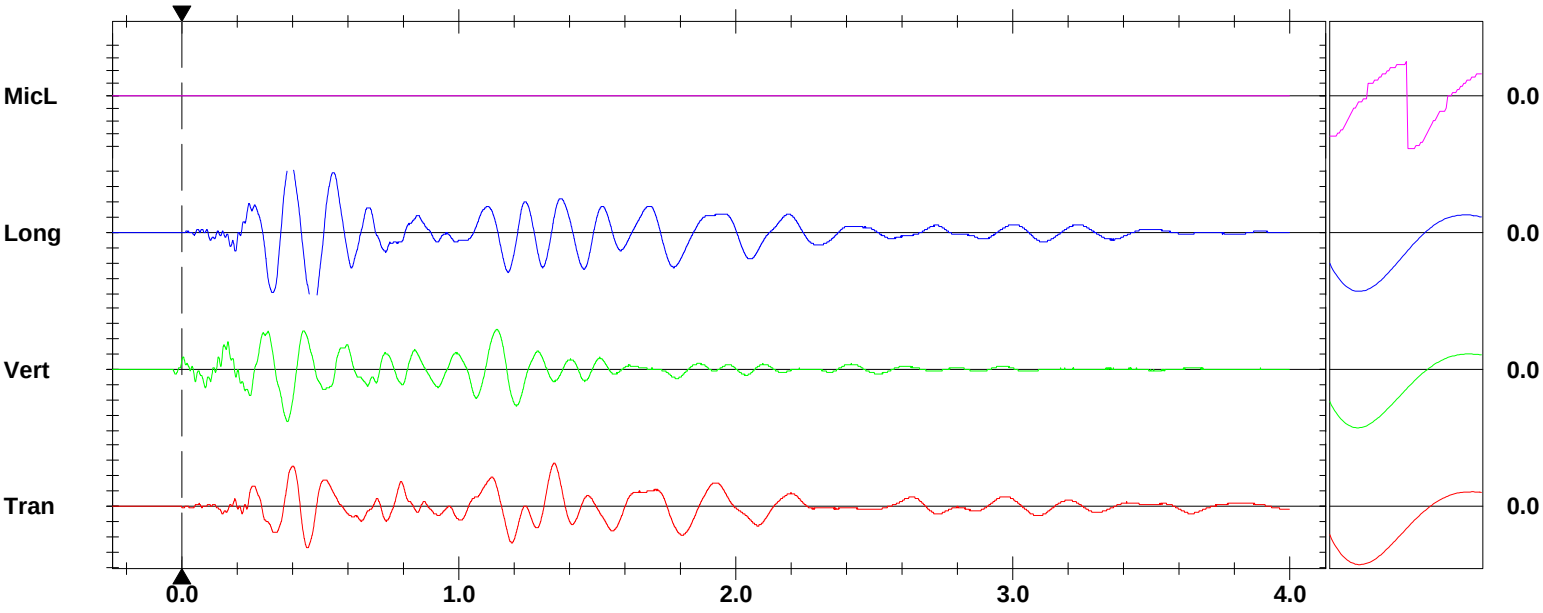
	Tran	Vert	Long	
PPV	0.185	0.0850	0.100	in/s
ZC Freq	13	17	19	Hz
Time (Rel. to Trig)	0.088	0.351	0.111	sec
Peak Acceleration	0.0663	0.0398	0.0530	g
Peak Displacement	0.00170	0.00075	0.00077	in
Sensorcheck	Passed	Passed	Passed	
Frequency	7.7	8.0	8.2	Hz
Overswing Ratio	3.9	3.7	3.2	

Peak Vector Sum 0.187 in/s at 0.088 sec

N/A: Not Applicable

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.0500 in/s/div Mic: 0.00050 psi(L)/div Sensorcheck
Trigger =

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Event Report

Date/Time Tran at 15:49:39 January 13, 2009
Trigger Source Geo: 0.0200 in/s
Range Geo :10.00 in/s
Record Time 4.0 sec at 1024 sps

Serial Number 1499 V 5.52 BlastMate II/477
Battery Level 6.5 Volts
Calibration July 23, 2007 by Instantel Inc.
File Name C499CJMM.MR0
Scaled Distance 145.5 (684.0 ft., 22.1 lb.)

Notes
Location: Miraflores Lake-Deposito del Tucan
Client: Division de ProyectoCAP-2
User Name: Seccion de Topografia y Cartografia.
Converted: January 14, 2009 14:25:02 (V8.12)

Extended Notes
Volad.Terrestre # 9 CAP-2, Desvio Rio Cocoli
Posicion de Voladura : E654775 N0992227
Posicion de Sismogr afo:E654748 N0992019

Post Event Notes

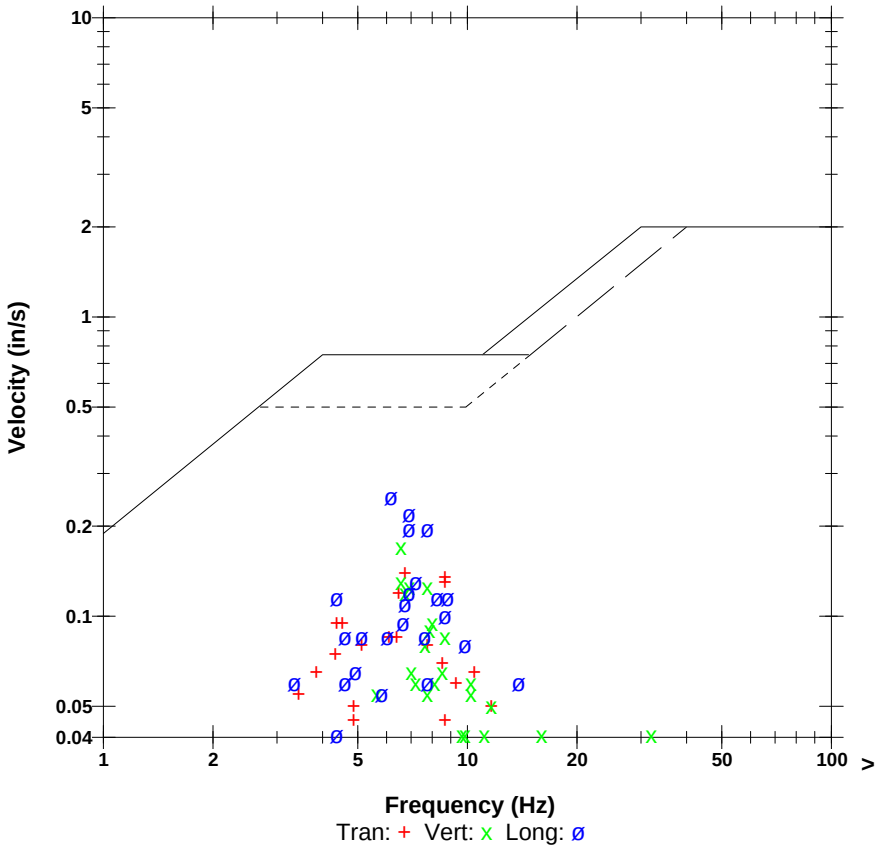
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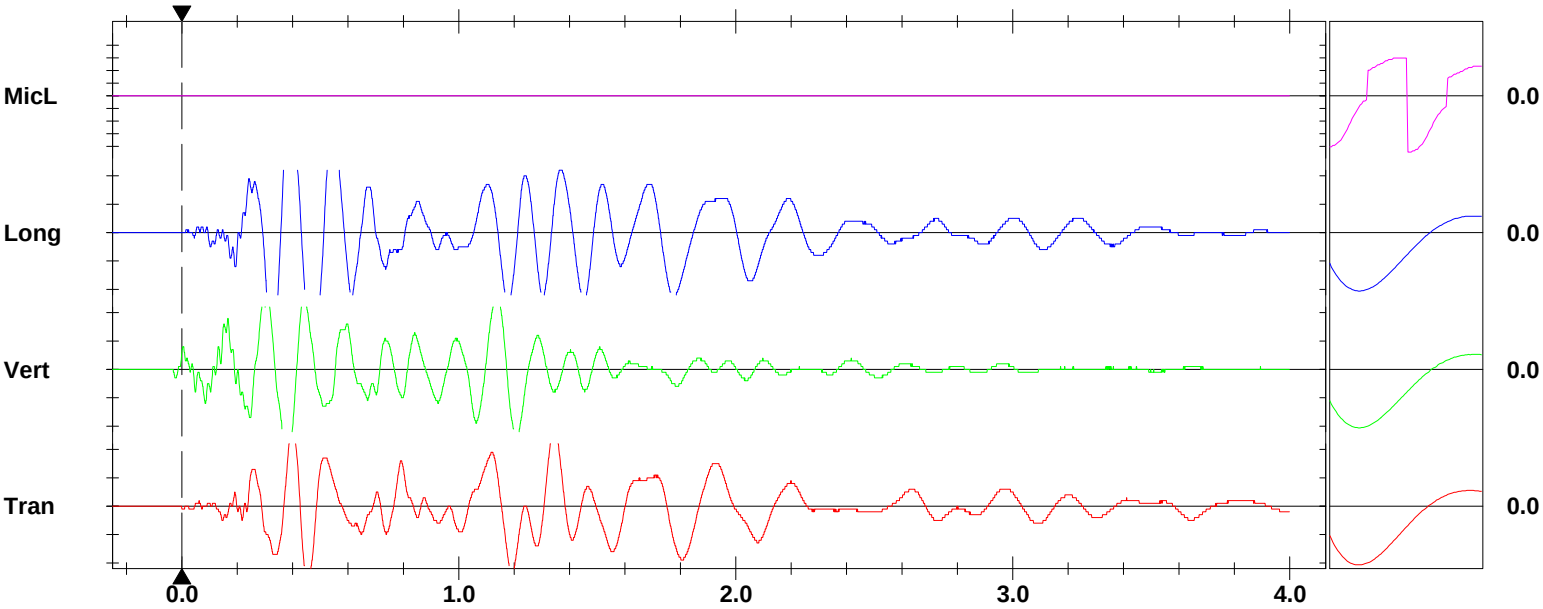
	Tran	Vert	Long	
PPV	0.100	0.0550	0.0800	in/s
ZC Freq	10	28	12	Hz
Time (Rel. to Trig)	0.027	0.039	0.116	sec
Peak Acceleration	0.0530	0.0530	0.0398	g
Peak Displacement	0.00090	0.00031	0.00096	in
Sensorcheck	Passed	Passed	Passed	
Frequency	8.0	7.7	7.7	Hz
Overswing Ratio	4.0	3.8	3.5	

Peak Vector Sum 0.112 in/s at 0.027 sec

N/A: Not Applicable

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.0500 in/s/div Mic: 0.00050 psi(L)/div Sensorcheck
Trigger =

Format Copyrighted 2006-2007 Instantel, a division of VeriChip Corporation

Appendix H

Report of the Stabilization of Sur 1 Disposal Site

SECCIÓN DE INGENIERÍA GEOTÉCNICA, DIVISIÓN DE INGENIERÍA

Reporte de Estabilización

FECHA: Abril 8, 2009

CONTESTAR A: Carlos Santamaría
Sección de Ingeniería Geotécnica, IAIG

ASUNTO: Reporte de Estabilización de áreas inestables en el sitio de disposición Sur-1 del Proyecto de Canal de Aproximación PAC-2

PARA: Ing. Jorge Fernández, ADP del Proyecto PAC-2
Ing. Daniel Muschett, Gerente de Manejo y Seguimiento Ambiental

POR INTERMEDIO DE: Gerente, Sección de Ingeniería Geotécnica

I. Introducción

El sitio de depósito Sur 1 está localizado adyacente al Río Cocolí y es utilizado por el proyecto PAC-2 para la disposición de material no clasificado y el almacenamiento de material arcilloso. Durante la operación de disposición de material excavado en el área de disposición Sur 1, ocurrieron problemas de estabilidad en el área donde se depositaba material no clasificado.

Se considera que la conjugación de 2 factores provocaron las fallas observadas en el área de disposición Sur1:

1. No se pudo realizar una caracterización completa de la huella del área de disposición Sur1 por lo siguiente:

a) Falta de acceso durante la etapa de diseño, la presencia de una vegetación boscosa densa y la necesidad de evitar alterar posibles sitios arqueológicos.

b) Incertidumbre por la posible presencia de municiones no-detonadas, debido a que había un letrero de advertencia en la carretera K-9.

c) Esto contribuyó a la no delimitación completa del área de inundación del Río Cocolí.

2. El contratista no siguió la configuración geométrica de los taludes indicados en los planos del sitio de disposición.

El presente informe resume el análisis geotécnico de las fallas, la propuesta de remediación, las alternativas para depósito de material del proyecto PAC-2, las recomendaciones y observaciones.

II. Descripción de los Deslizamientos Observados

Los problemas de estabilidad ocurrieron por primera vez en septiembre del 2008, en el extremo este del sitio de disposición Sur 1. Se habían acumulado aproximadamente unos 2 metros de relleno, cuando ocurrieron las primeras grietas. Debido estas deformaciones, se tomó la decisión de descontinuar la operación de disposición en esta área.

En otros sitios, donde no se había manifestado la inestabilidad, se continuó depositando material no clasificado pero en febrero del 2009, cuando el sitio alcanzó la máxima elevación de 43 m PLD, se presentaron grietas y desplazamientos.

a) Análisis de Estabilidad

a.1) Deslizamiento de septiembre 2008

Se realizó un análisis regresivo (retroanálisis), modelando la topografía del terreno al momento de la falla, para determinar la resistencia movilizada. Mediante el análisis se halló una superficie de deslizamiento, muy similar a la observada en el terreno, y se cuantificó que durante la falla se movilizó un esfuerzo cortante de 5kPa y un esfuerzo normal de 14 kPa. Las propiedades de resistencia del material donde ocurrió el deslizamiento corresponden a parámetros de cohesión y ángulo de fricción de 1 kPa y 16° respectivamente (figura 5).

a.2) Deslizamiento de febrero 2009

De igual forma como se procedió en el deslizamiento de septiembre del 2008, se realizó un retroanálisis, modelando la topografía del terreno al momento de la falla. Cabe señalar que la geometría del botadero era diferente a lo establecido en el diseño. Si se hubiera implementado la geometría del diseño el factor de seguridad hubiera tenido un valor mayor que la condición real en el orden del 5%. Es notable que para esta falla se habían alcanzado elevaciones de relleno muy superiores (43m PLD) en comparación con las alcanzadas al momento de la falla en septiembre. Por ende, se infiere que la falla de septiembre ocurrió en un suelo con menor capacidad portante que aquel donde ocurrió la falla en febrero, 2009. Mediante el análisis, se halló una superficie de deslizamiento muy similar a la observada en el terreno y se cuantificó que durante la falla, se movilizó un esfuerzo cortante de 34 kPa y un esfuerzo normal de 74 kPa. Las propiedades del material corresponden a parámetros de cohesión y ángulo de fricción del suelo al momento de la falla de 3 kPa y 23° respectivamente (figura 6).

III. Acciones de Remediación

a) Excavación del Área Inestable

Como medida de remediación, se propone la excavación del área donde ocurrieron las fallas. El criterio de diseño de la excavación es el de descargar el material del área que falló manteniendo una inclinación segura de los taludes. Esto último se logró al modelar la excavación aplicando los valores de resistencia obtenidos a partir de los retroanálisis.

El volumen de excavación de la solución propuesta es de aproximadamente 80,000 m3 y el mismo se calcula a partir del último levantamiento realizado en el sitio (marzo, 2009). Esta medida debe ser la primera en ser llevada a cabo ya que reduce el riesgo de que el material continúe desplazándose hacia el Río Cocolí. Las figuras 7 y 8 muestran el esquema de excavación propuesto.

b) Recuperación del Sitio

Una vez se haya finalizado con la excavación, se debe proceder con la construcción de una enrocado o escollera en el límite inferior del relleno que se tenía previsto en el diseño original. La construcción del enrocado, tiene como objetivo estabilizar la zona pantanosa y crear un soporte en la parte inferior para futuros rellenos que se lleven a cabo en esta zona. La Figura 9 muestra la localización y extensión de la escollera con respecto a los trabajos de excavación propuestos y la Figura 10 muestra una sección típica de la escollera. La cresta de la escollera se deberá llevar a elevación 22 m PLD a lo largo de la mayor parte de su extensión.

El diseño de la escollera, contempla la excavación de hasta 1.00 metro de profundidad del suelo en sitio bajo la huella de la escollera. El espacio resultante debe ser rellenado con el material rocoso de la escollera , lo cual, según los análisis es adecuado para aumentar la estabilidad rotacional del enrocado. Además, se propone el uso de una geomalla en la base del enrocado, entre el material rocoso y el suelo en sitio, con la finalidad de limitar los asentamientos diferenciales en la escollera.

c) Análisis de Estabilidad con Escollera

Se procedió a realizar un análisis de estabilidad de la excavación y escollera propuesta. Los parámetros de resistencia para el enrocado fueron cohesión con valor cero y ángulo de fricción de 34 grados, mientra que los parámetros del suelo de fundación fueron aquellos hallados en el retroanálisis de la falla de septiembre, 2008 (cohesión = 1 kPa y ángulo de fricción de 16 grados). La ilustración del análisis se muestra en la Figura 11. Por todo lo anterior se demuestra que el diseño de la escollera toma en cuenta todos los parámetros que garatizan su integridad y capacidad de soporte con el fin de evitar que se deslice nuevamente.

También se procedió a analizar la condición de aprovechamiento avanzado del sitio. Para este fin, se añadió una región de material rocoso que ascendía hasta elevación 27 m PLD partiendo desde la cresta de la escollera y proyectando una meseta hasta el terreno actual. Se añadió otra región de material rocoso hasta elevación 32 m PLD pero manteniendo un retiro mínimo horizontal desde la cresta de aproximadamente 33 metros con el fin de mantener la estructura estable. Este esquema permite crear una base estable para continuar depositando materiales excavados en este sitio. El análisis se ilustra en la Figura 12.

IV. Recomendaciones y Observaciones

En base a este estudio, se enumeran las siguientes observaciones y recomendaciones:

1. Se estima considera que los factores que incidieron en las fallas observadas son:

    a. La presencia parcial de un material suave y blando en el terreno de fundación del sitio de depósito.

    b. El Contratista no siguió lo establecido en los planos, particularmente en lo referente a la altura de los taludes, inclinación de los mismos y anchos de banquetas. En un perfil del terreno tomado en el lugar donde ocurrió la falla de Febrero, 2009 se puede constatar que el contratista levantó taludes con alturas mayores que los 5.00 y banquetas con ancho mucho menores que los 5.00 metros especificados en el diseño (figura 4). El factor de seguridad del diseño es mayor que aquel de la condición real del botadero al momento de la falla en el orden del 5%.

2. Generalmente, para la operación de los sitios de disposición no se especifica un grado de compactación ya que esto elevaría, considerablemente, los costos de los proyectos de excavación.

3. Cabe señalar que el atraso del Contratista en la actividad del Desvío del Río Cocolí ha afectado la operación de disposición de material, no solo en el sitio Sur-1 sino también en el Sur-2. La operación resultaría menos dificultosa y más efectiva si se hubiera completado el Desvío del Río Cocolí sin retrasos ya que los niveles de agua en los sitios de disposición hubieran sido abatidos considerablemente.

4. Como medida de remediación se recomienda la excavación de 80,000 m3 del material depositado sobre el área pantanosa y en áreas adyacentes. Esta medida debe ser la primera en ser llevada a cabo ya que se procede a descargar las áreas inestables.

5. Se recomienda la construcción de una escollera o enrocado en el límite inferior del botadero colindante con el Río Cocolí. La construcción del enrocado, tiene como objetivo estabilizar la zona pantanosa y crear un soporte en la parte inferior para futuros rellenos que se lleven a cabo en esta zona

6. Finalmente, debido a la merma en la capacidad del sitio de disposición Sur-1, por causa de los problemas de inestabilidad, se recomienda tomar en cuenta otras alternativas para la disposición de los materiales excavados. Aunque el área afectada debe ser recuperada con las medidas antes descritas, también se requiere dejar capacidad en el sitio para el Proyecto de Construcción de las Nuevas Esclusas del Pacífico. En el anexo 2 se describe como incrementar la capacidad de los sitios de depósito de esta área.

V. Anexos

Anexo 1: Figuras

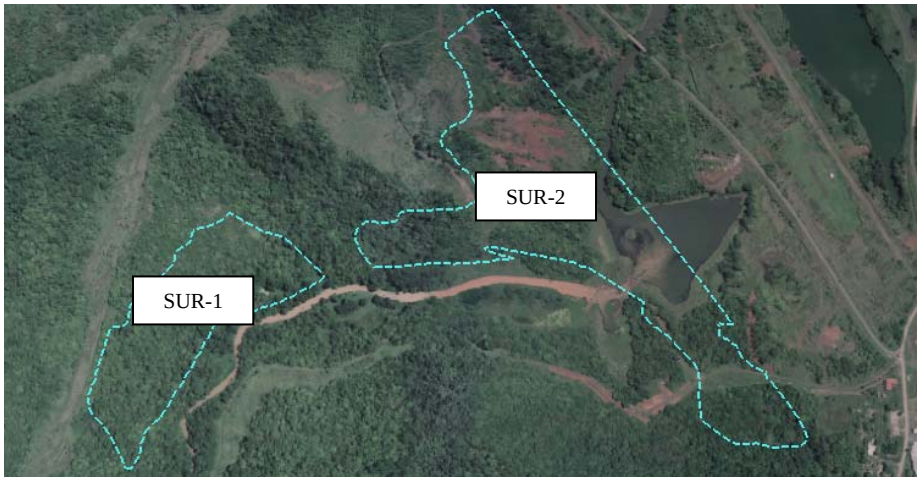


Figura 1. Vista en planta de los sitios de disposición del PAC-2 mostrando las condiciones antes de que iniciaran las labores de desbroce



Figura 2. Vista en planta del sitio de disposición SUR-1 indicando las áreas donde se depósito los dos tipos de material y la zona que ha presentado inestabilidad

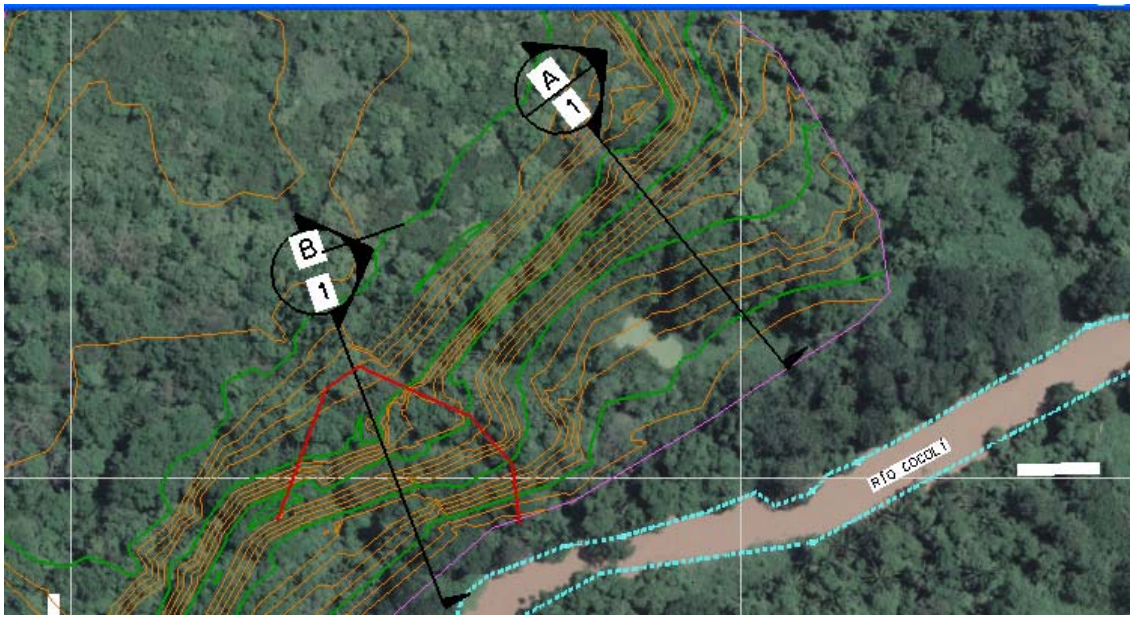


Figura 3. Vista en planta del sitio de disposición SUR-1 mostrando las secciones donde ocurrieron las fallas: Septiembre, 2008 (A-1) y Febrero, 2009 (B-1)

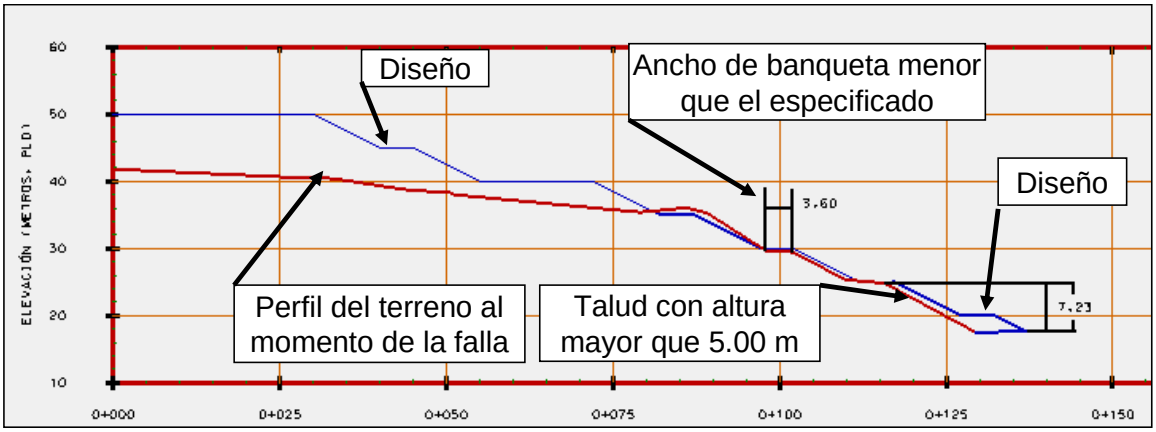
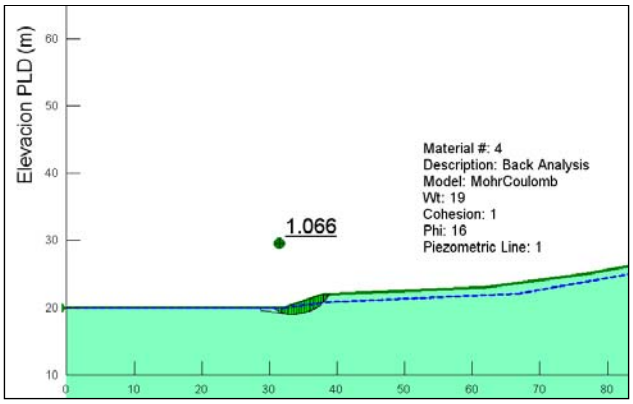
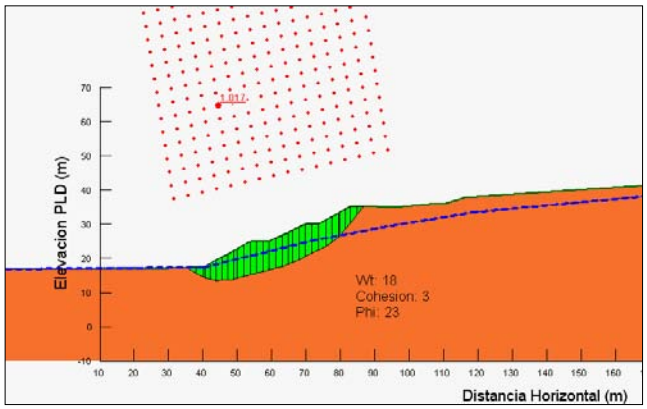


Figura 4. Perfil del sitio de disposición, al momento de la falla, a lo largo de la Sección (B-1) – Ver Figura



Retroanálisis				
φ	C	F.S.	Tanφ/F.S.	C/F.S.
12	2	1.037	0.20	1.93
13	1.66	1.034	0.22	1.61
14	1.33	1.013	0.25	1.31
15	1	1.008	0.27	0.99
16	0.66	1.000	0.29	0.66
17	0.33	0.953	0.32	0.35

Figura 5. Retroanálisis de la condición de falla (la falla ocurrió al elevar el relleno 2 metros sobre el terreno natural. (Sección A-1)



Retroanálisis				
ϕ	C	F.S.	Tanϕ/F.S:	C/F.S.
15	6	0.76	0.35	7.87
20	4	0.92	0.40	4.35
23	3	1.02	0.42	2.94
25	2	1.08	0.43	1.85
30	0	1.26	0.46	0

Figura 6. Retroanálisis de la condición de falla (la falla ocurrió al elevar el relleno hasta elevación 43m PLD. (Sección B-1)

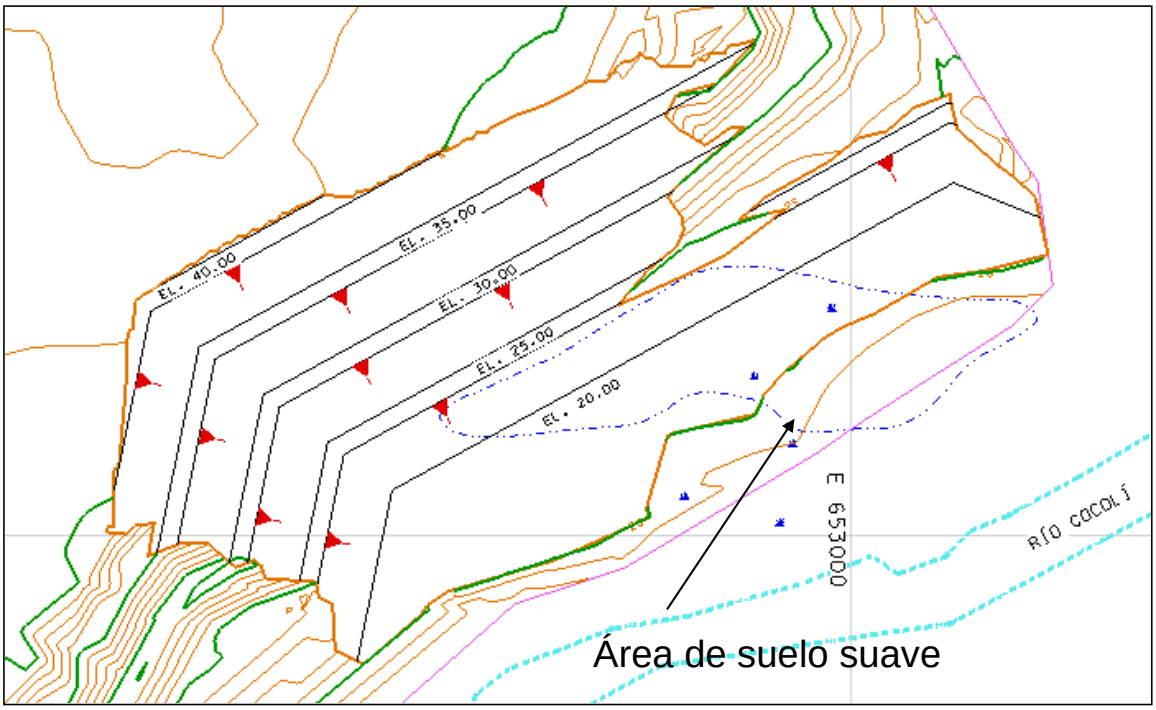


Figura 7. Vista en planta mostrando la excavación propuesta y los límites del área de suelo blando

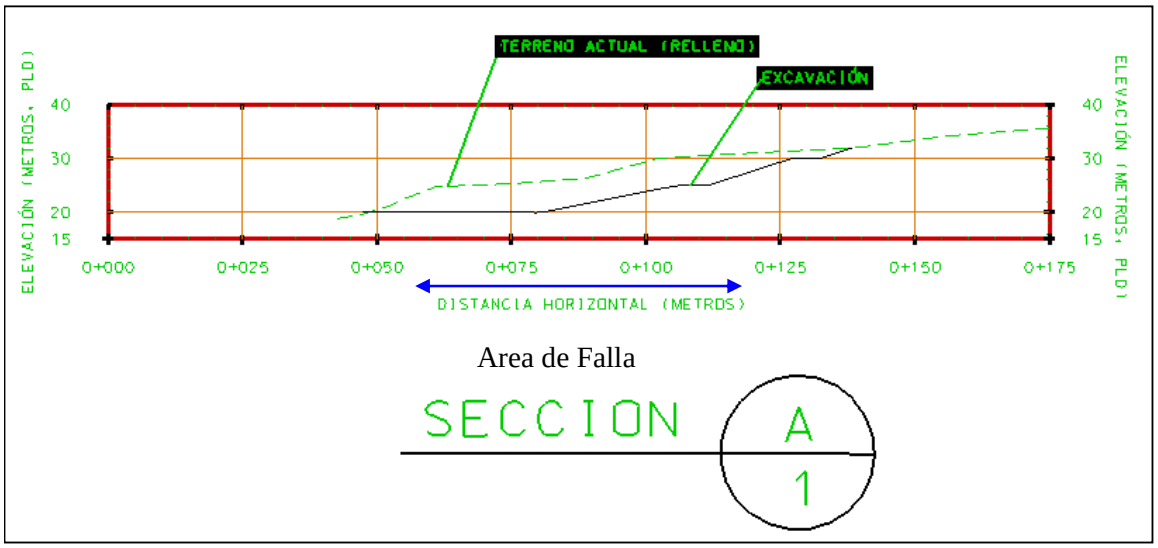


Figura 8. Sección transversal mostrando el terreno actual (relleno) y la excavación propuesta

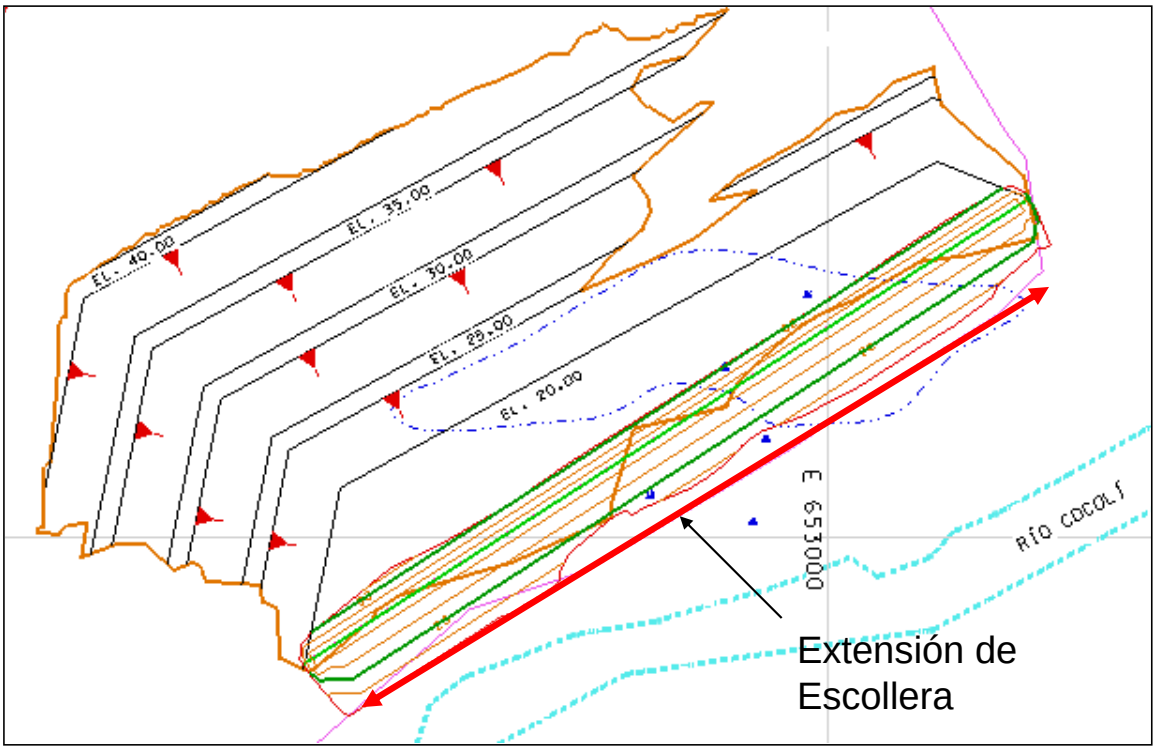


Figura 9. Vista en planta mostrando la ubicación y extensión de la escollera con respecto a la excavación propuesta.

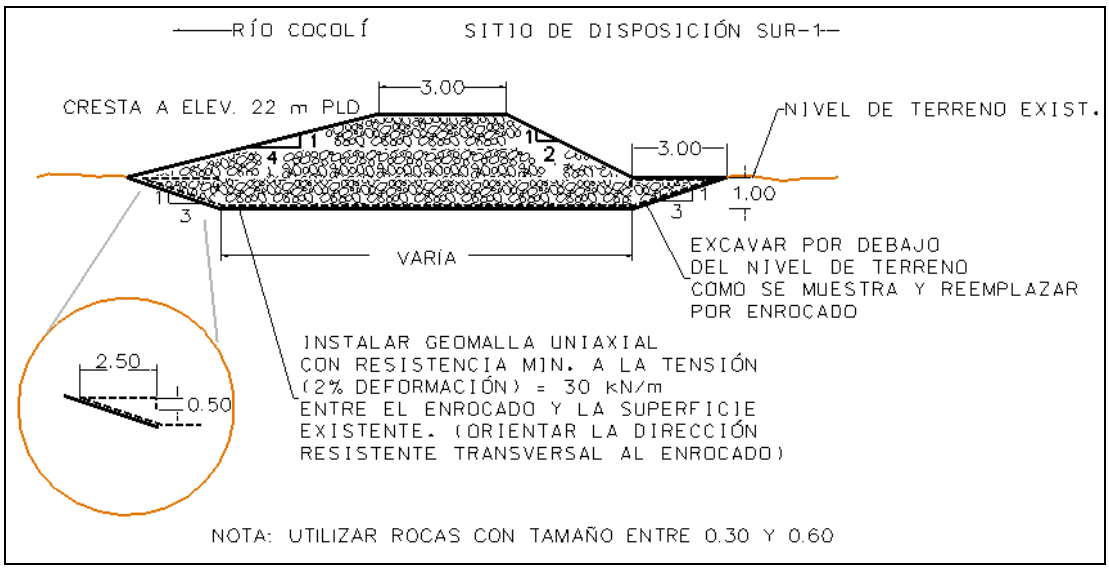


Figura 10. Sección típica de la escollera

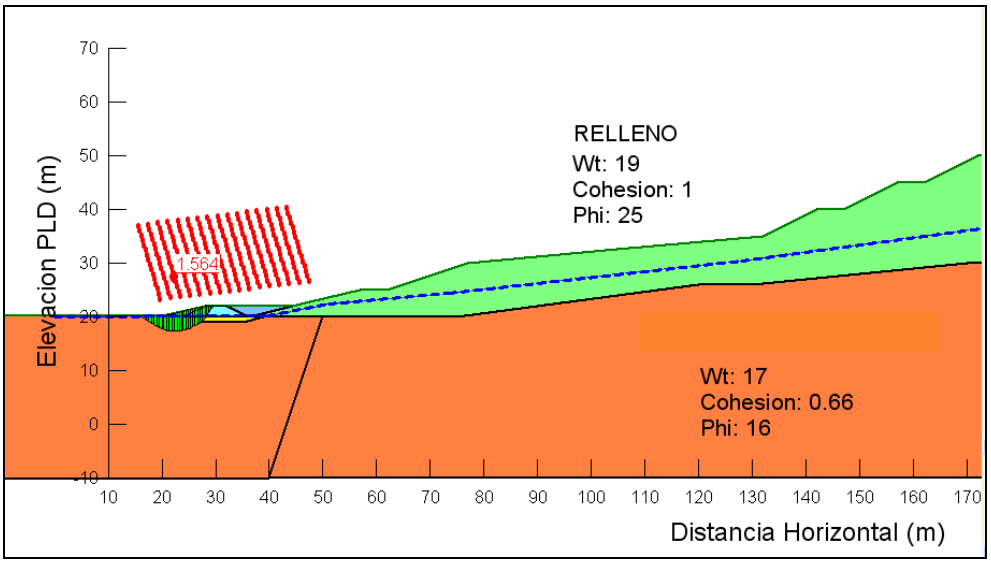


Figura 11. Análisis de estabilidad de la excavación y escollera propuesta

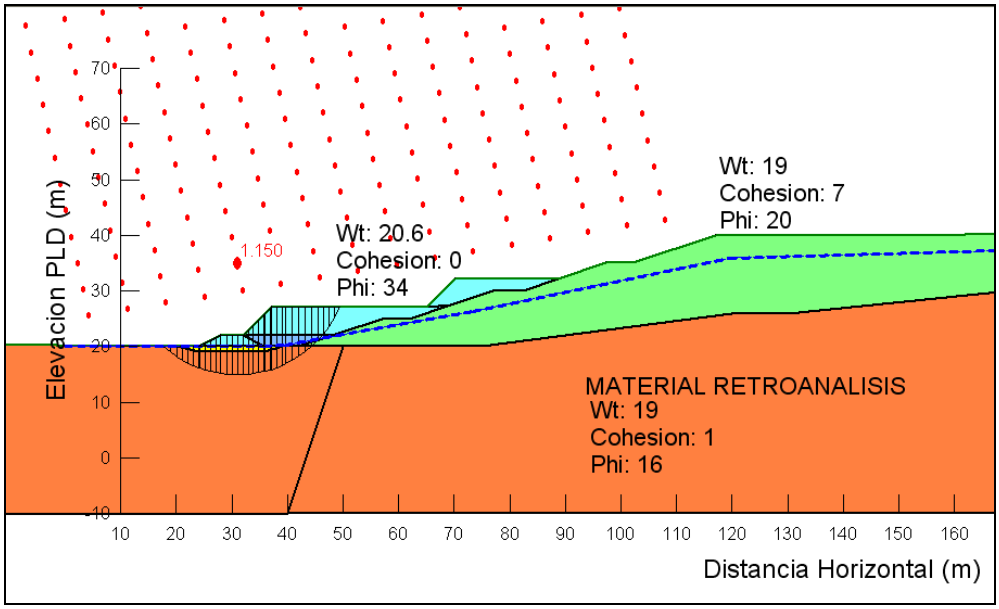


Figura 12. Análisis de estabilidad para la recuperación del sitio

Anexo 2: Opciones para Disposición de Materiales Excavados del Proyecto PAC-2

Debido a la merma en la capacidad del sitio de disposición Sur-1, por causa de los problemas de inestabilidad, es necesario tomar en cuenta otras alternativas para la disposición de material del proyecto PAC-2. Aunque el área afectada debe ser recuperada con las medidas antes descritas, también se requiere dejar capacidad en el sitio para el Proyecto de Construcción de las Nuevas Esclusas del Pacífico.

La capacidad que se tenía prevista inicialmente para la totalidad del sitio Sur-1 era de 2,200,000 m3. En febrero 2009, al momento de la falla, se habían depositado en el sitio aproximadamente 800,000 m3 de material no clasificado y un estimado de 615,000 m3 de arcilla. Aunque el área donde se deposita el material arcilloso prácticamente ha captado el volumen que se tenía previsto, todavía se requiere reubicar 470,000 m3 de material no clasificado (diferencia entre la previsión inicial y lo depositado actualmente). Además, a esta última cifra se le debe añadir los 80,000 m3 que se esperan excavar del sitio, siguiendo la medida de estabilización antes recomendada. Por ende, se requiere proveer de nuevas áreas de disposición para depositar un volumen aproximado de 550,000 m3.

Se han identificado 6 zonas adicionales donde se puede proceder a depositar material. Las mismas, se encuentran dentro de las zonas aprobadas para esta actividad y no alteran las zonas de depósito asignadas al Proyecto de las Nuevas Esclusas del Pacífico. Sin embargo, del conjunto, solamente se utilizarán 5 zonas para el proyecto PAC-2 ya que quedará excluido el uso de la Quebrada Fuente. Sin embargo, para referencia, se listan a continuación todas las 6 zonas y sus capacidades de captación:

Cuadro 1 Opciones para la disposición de materiales para el proyecto PAC-2

Sitio	Capacidad (m3)	Tipo de material	Máxima Elevación PLD
Extremo noroeste del Sur1	94,000	Arcilla	45.00
Extremo noreste del Sur1	120,000	No Clasificado	55.00
Quebrada ubicada entre Sur1 y Sur2	310,000	Roca	35.00
Ampliación de la pila de roca próxima al Cerro Sucre	250,000	Roca	45.00
Ampliación del sitio Sur-2 próximo al faro existente y la carretera K-9	250,000	No Clasificado	40.00
Quebrada Fuente	195,000	No Clasificado	45.00
TOTAL	**1,219,000**		

El uso de la Quebrada ubicada entre Sur1 y Sur2 como sitio de depósito está condicionado a que en la misma se debe depositar material rocoso lo cual permitiría el drenaje de las aguas que naturalmente fluyen a lo largo de la misma sin que esto signifique un aumento en la presión de poros y a la vez garantice la estabilidad del sitio de depósito.

En conclusión, las alternativas de disposición de material ofrecen una capacidad combinada de 1,219,000 m3 que sobrepasa el déficit de 550,000 m3 producido por las situaciones de inestabilidad registradas en el sitio Sur-1. La figura 13 muestra un plan de localización de todas las áreas antes mencionadas. Las figuras 14 a 18 muestran vistas en planta de cada una de las alternativas antes mencionadas.

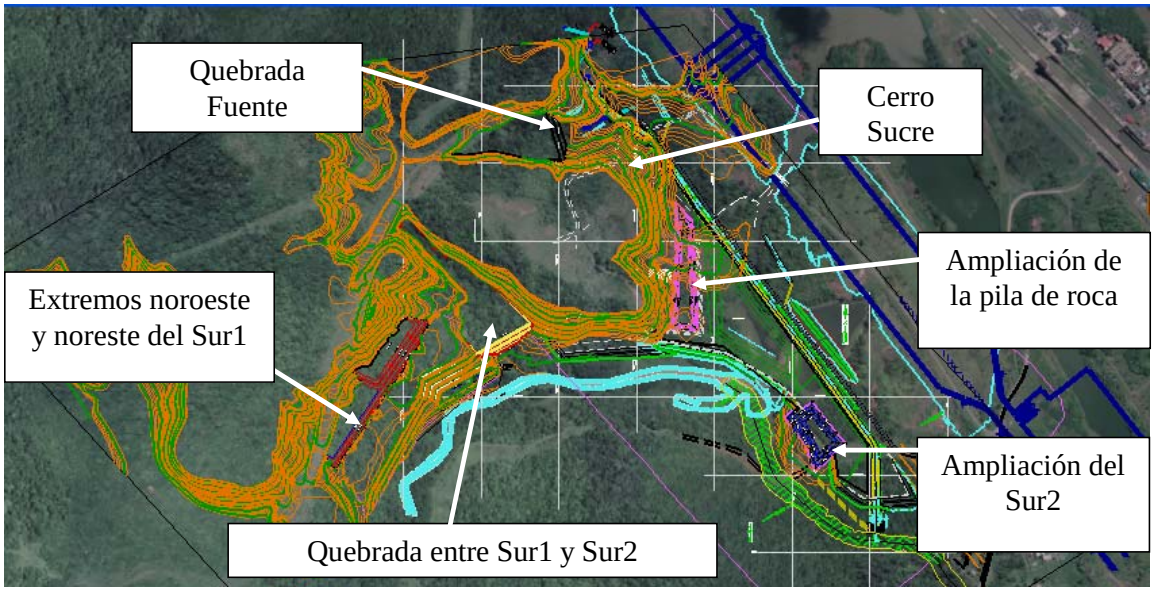


Figura 13. Localización de los sitios opcionales para depósito de materiales para el proyecto PAC-2

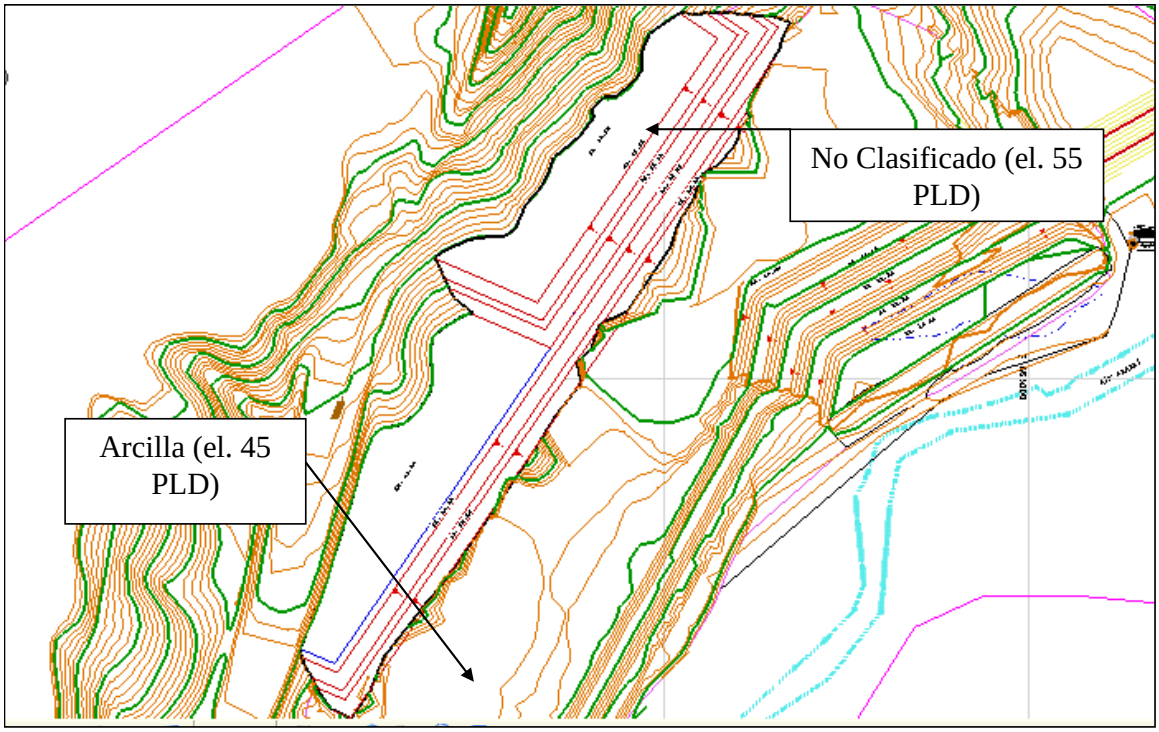


Figura 14. Depósito en el perímetro norte del sitio Sur-1.

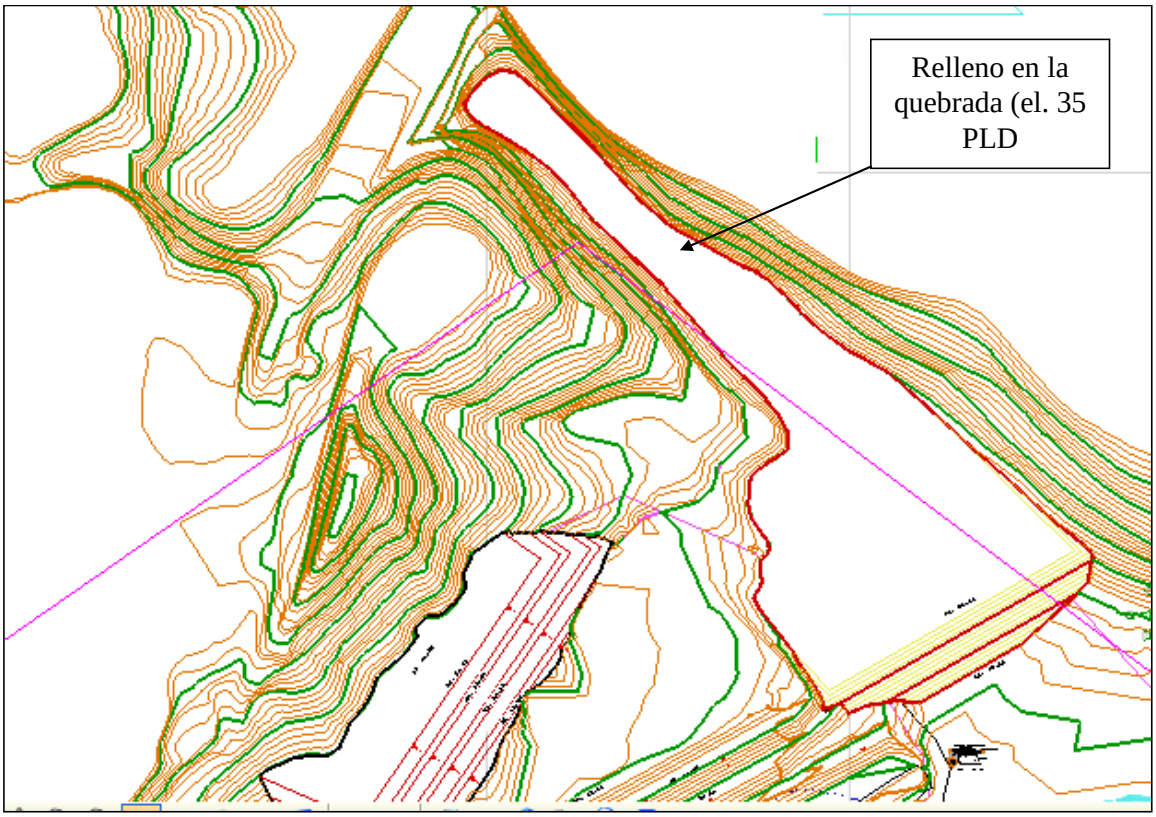


Figura 15. Depósito en la quebrada ubicada entre el sitio Sur-1 y Sur-2

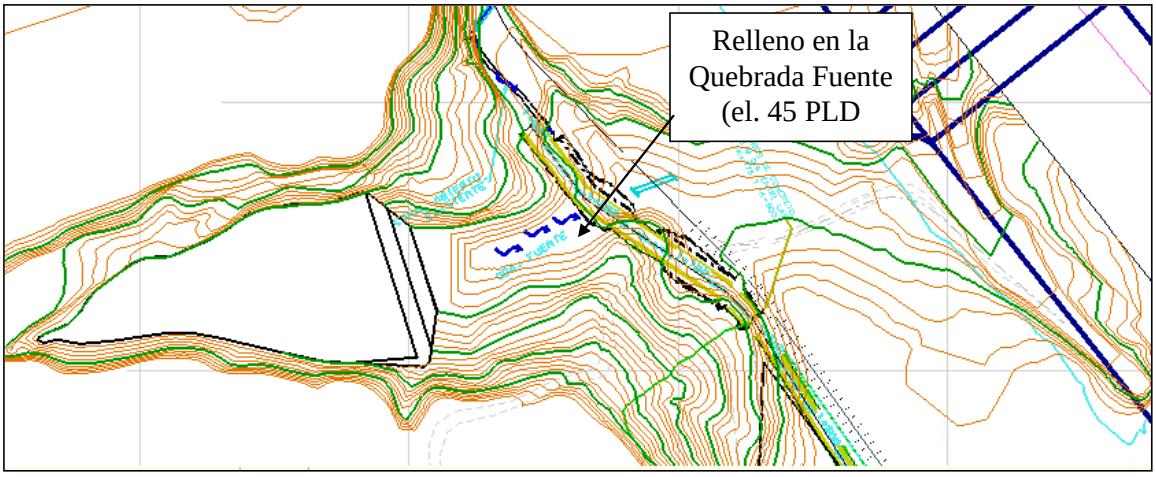


Figura 16. Depósito en la Quebrada Fuente

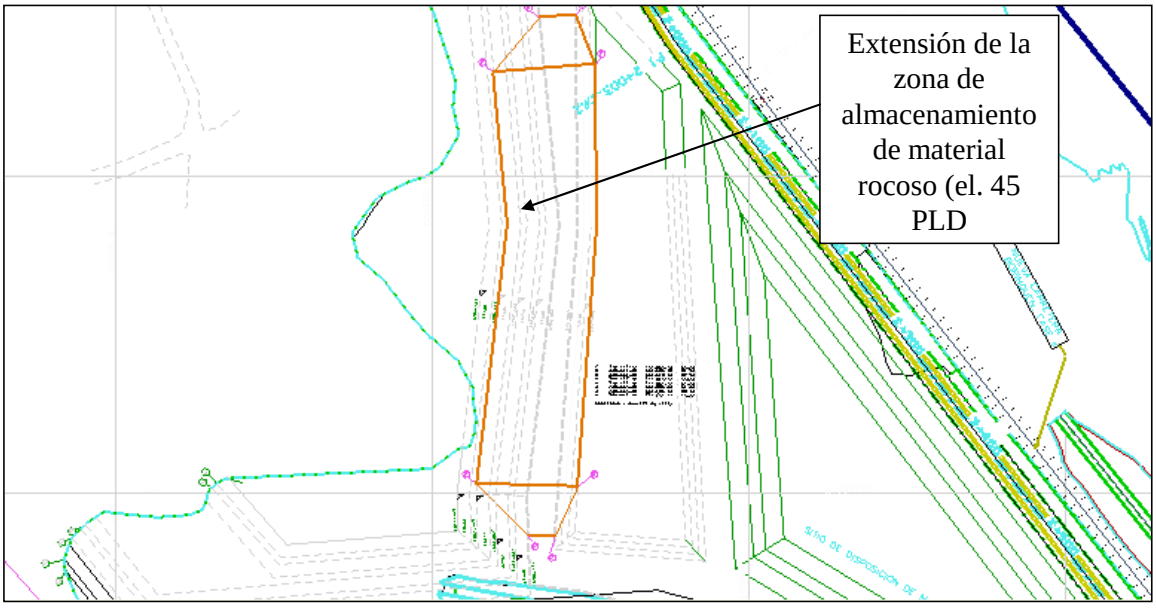


Figura 17. Extensión de la zona de almacenamiento de roca adyacente al Cerro Sucre

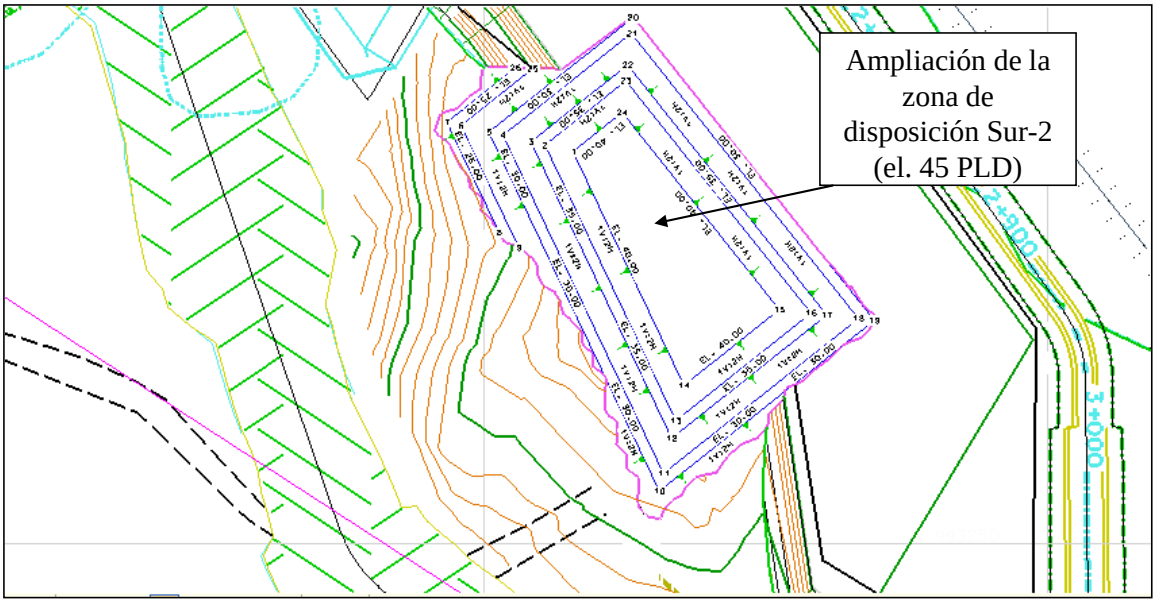


Figura 18. Ampliación de la zona de almacenamiento del sitio Sur-2

Appendix I

PAC 3 Wildlife Rescue Plan and Implementation Report

PLAN DE RESCATE Y REUBICACIÓN DE FAUNA

PROYECTO DE AMPLIACIÓN DEL CANAL:

CANAL DE APROXIMACION NORTE PACÍFICO CAP-3
PROYECTO No. CC-08-33

INFORME DE INSPECCIÓN

PREPARADO PARA:

CONSTRUCTORA MECO, S.A.

ELABORADO POR:

CODESA
CORPORACION DE DESARROLLO AMBIENTAL S.A.

FEBRERO DE 2009

Introducción

El presente documento responde a los resultados de la inspección realizada el día 28 de febrero del presente año a los previos del sitio denominado PAC-3, exactamente en el área de la excavación norte en donde se aplicará la agrimensura, con el propósito de identificar potenciales puntos de muestreo, reconociendo los rastros de animales que frecuentan el área y el cual nos llevarán a una mejor comprensión de su desplazamiento por el lugar, logrando así mejorar la eficiencia de captura a la hora de poner trampas.

Descripción del ambiente físico y biológico

a. Superficie

El sitio donde se propone ejecutar el plan de rescate de fauna comprende el Área de Impacto Directo (AID), el cual incluye la huella de las esclusas, los canales de aproximación al Norte y Sur de las nuevas esclusas, el canal de navegación y las áreas transitables por los camiones y buques en los sitios de depósito terrestres y acuáticos, abarcando una superficie de 254 hectáreas, aproximadamente.



Foto 1. Vista aérea de las áreas en donde se desarrollarán los trabajos

b. Clima

De acuerdo con el sistema de clasificación de Köppen, en el área del proyecto encontramos un ***Clima Húmedo Tropical***, caracterizado por tener una temperatura promedio anual que oscila entre los 27 y 28ºC, con una precipitación promedio anual alrededor de los 2000 mm y una humedad relativa promedio anual de un 80%.

c. Zona de vida

El área en la cual se planea llevar a cabo el Plan de Rescate y reubicación de fauna, presenta como zona de vida predominante al Bosque húmedo tropical (IGNTG 2007).

d. Cobertura Boscosa



De acuerdo al sistema de UNESCO, en la costa Pacifica podemos encontrar el bosque semicaducifolio tropical de tierras bajas. Este tipo de vegetación se observa en los sectores lago Gatún, Corte Culebra y la Costa Pacífica. Así como en la categoría anterior, se presentan variaciones en la vegetación introducidas por actividades humanas: Bosque semicaducifolio tropical de tierras bajas - bastante intervenido, Bosque semicaducifolio tropical de tierras bajas – poco intervenido, poblados, Sabanas arboladas de graminoides cortos inundables y Sistema productivo con vegetación leñosa natural o espontánea significativa (10–50 %). La mayoría de los árboles del dosel son caducifolios (+ 30 %), mezclados con árboles y arbustos perennifolios.



La vegetación predominante en el CAP-3, en general, son los matorrales, herbazales un parche asilado de bosque semideciduo tropical de tierras bajas (bosque secundario intermedio), los cuales ocupan un área total de 254 ha. Distribuidos de la siguiente forma: 70 ha de bosque y 184 ha de pajonal constituido principalmente por la Paja Canalera (*Saccharurm spontaneum)* la cual ocupa más del 70% del área.

Desarrollo de los trabajos

A las 10 a.m. se llego al sitio en cuestión empezando casi inmediatamente la inspección. Esta visita se realizó hasta donde era posible introducirse en el área, ya que lo denso de la vegetación, que en este caso es paja canalera (*Saccharurm spontaneum)*, hacia casi imposible el paso.

El recorrido final fue de 1.63 km en diferentes direcciones y se concluyo a la 1:30 p.m. Se encontraron huellas tanto de conejo poncho *(Hydrochaeris hydrochaeris)* como de venado cola blanca *(Odocoileus virginianus)* a unos 30 metros del punto de partida, donde se encuentran los talleres de Cardoze y Lindo cerca del PAC-1. Además de la considerable cantidad de rastros de huellas, que se les calculan no tener más de 7 días, se hallaron sitios de descanso o reposo de los animales grandes antes mencionados, trochas de paso de animales pequeños como ñeques (*Dasyprocta punctata)* y conejos pintados (*Cuniculus paca).* Se observaron heces que pertenecen a venado cola blanca *(Odocoileus virginianus),* ñeques (*Dasyprocta punctata)* y conejos pintados (*Cuniculus paca)*, igualmente se localizo un sitio de bebedero y la madriguera de probablemente iguana verde (*Iguana iguana*). Todo fue debidamente geoposicionado con GPS.[1]

[1] Referirse a las fotos en el anexo



Foto 2. Recorrido de la inspección

Anexo



Huella de de conejo poncho *(Hydrochaeris hydrochaeris)* (0650788 E; 0997543 N)



Huella de venado cola blanca *(Odocoileus virginianus)* (0650788 E; 0997543 N)



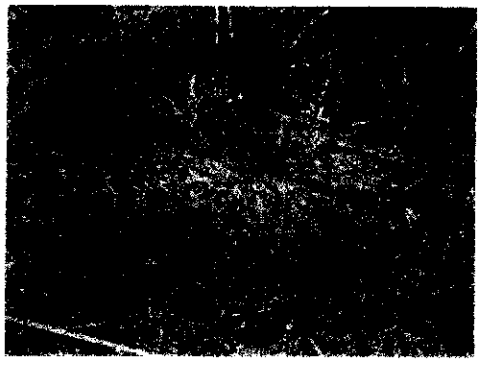
Bebedero (0650834 E; 0997608 N)



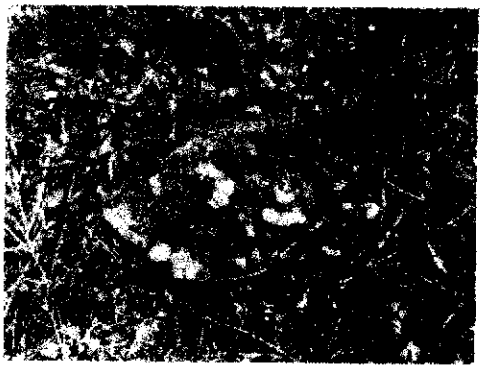
Sitio de descanso de mamíferos (0650859 E; 0997639 N)



Heces de conejo pintado (*Cuniculus paca).* (0650690 E; 0997583 N)



Sitio de descanso de mamíferos (0650698 E; 0997515 N)



Heces de venado cola blanca *(Odocoileus virginianus)* (0650902 E; 0997727 N)



Lugar de paso de mamíferos grandes (0650850 E; 0997622 N)



Lugar de paso de mamíferos pequeños (06506757 E; 0997546 N)



Madriguera de Iguana verde (*Iguana iguana)* (0650903 E; 0997697 N)

INFORMES DIARIOS DE RESCATE DE FAUNA.

CODESA	Contrato Nº CC-O8-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 04/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	04/03/2009	07:00	15:00	8	16
2	04/03/2009	15:00	21:00	8	16
-	-	21:00	03:00	-	-

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se estuvo trabajando con las cuadrillas de topografía y se hizo trampeo nocturno.

ACCIDENTES

Tipo de accidente	Hora	Lugar	Responsable	Observaciones

Leyson V. Guillén V.
Firma Autorizada
Corporación de Desarrollo Ambiental, S.A.

CODESA	Contrato Nº CC-O8-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 05/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	05/03/2009	07:00	15:00	8	16
2	05/03/2009	15:00	21:00	2	4
-	-	21:00	03:00	-	-

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

No se caprturo ningún animal. Se apoyo a Grabriel Hernandez en las tareas de fumigación de colmenas de avispas de agua. Se supervizo la habilitación del nuevo acceso hacia el PAC-3.

ACCIDENTES

Tipo de accidente	Hora	Lugar	Responsable	Observaciones

Leyson V. Guillén V.
Firma Autorizada
Corporación de Desarrollo Ambiental, S.A.

CODESA	Contrato Nº CC-O8-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 06/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
4	06/03/2009	07:00	18:30	11,5	46

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

No se capturo ningun vertebrado, se encontraron dos colmenas de avispas de aguas que se eliminaron.
Se procedio a poner trampas a partir de las 2:00 p.m. para ser recogidas a primera hora del día 7-3-2009.

ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones

Leyson V. Guillén V.
Firma Autorizada
Corporación de Desarrllo Ambiental, S.A.

CODESA	Contrato Nº CC-O8-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 07/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
4	07/03/2009	07:00	18:30	11,5	46

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se rescataron tres ratas de monte (hembras adultas)

ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo inicidentes, ni accidentes				

Leyson V. Guillén V.
Firma Autorizada
Corporación de Desarrllo Ambiental, S.A.

CODESA	Contrato Nº CC-O8-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 09/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacifico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
4	07/03/2009	07:00	18:30	11,5	46

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se rescataron dos pichones de gallinazos

ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo inicidentes, ni accidentes				

Leyson V. Guillén V.
Firma Autorizada
Corporación de Desarrllo Ambiental, S.A.

CODESA	Contrato Nº CC-O8-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 10/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	04/03/2009	07:00	17:00	20	40

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se rescato una rata de monte (Stenophrys spinnosus)

ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo ni incidentes y accidentes				

Firma Autorizada

Leyson V. Guillén V.

CODESA	Contrato Nº CC-08-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 11/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
4	11/03/2009	07:00	17:00	18,5	37

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se estuvo trabajando con las cuadrillas de topografía y se instalaron trampas.
Rescate por medio de las trampas de dos ratas de campo mocangué (*Proechimys semispinosus*) en el área de topografía, mientras que para el área de los MEC fue capturado un peresozo de dos dedos (Choloepus hoffmanni).
Todos liberados en el parque soberanía.

ACCIDENTES

Tipo de accidente	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato Nº CC-08-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 12/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
4	12/03/2009	07:00	17:00	20	40

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se estuvo trabajando con las cuadrillas de topografía.
Rescate en la áreas MEC de un pichón de Gallinazo (*Coragyps atratus*) y un conejo muleto juvenil (*Sylvilagus brasiliensis*).
Ambos reubicados en el Parque Nacional Metropolitano.

ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato Nº CC-08-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 13/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
4	13/03/2009	07:00	17:00	20	40

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

No hubo rescates.

ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato Nº CC-O8-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 14/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
4	14/03/2009	07:00	15:00	16	32

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se rescato en el area de agrimensura una rata de monte (*Sigmodon hispidus*), la cual fue reubicada en el Parque Nacional Soberania.



ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato N° CC-08-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 16/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico N° PAC-3

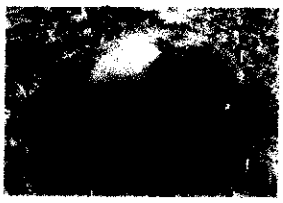
Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
4	16/03/2009	07:00	17:00	20	40

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se rescato una Jicotea (*Trachemys scripta*) de 24 cm. de longitud de caparazón de el área de uxo 3 y se instalarón camaras trampa para el área de topografia bajo el Puente Centenario.





ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato N° CC-08-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 17/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico N° PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
4	17/03/2009	07:00	18:30	18	36

* Total H.H = Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se Rescatarón 3 animales dentro de la áreas MEC, una serpiente equis (*Bothrops asper*) de 1.42 m;
un tapacara (Cyclopes didactylus) 12 cm BL, 33 TL y un camaleón (Corytophanes cristatus) 7cm BL, 25.5 TL.
Todos en buenas condiciones y reubicados en el Parque Nacional Soberania.
Ademas se instalarón nuevamente las camaras trampa, en esta ocación en el área de Cerro Goyo.







ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato N° CC-08-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 18/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico N° PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	18/03/2009	07:00	17:00	10	20

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se rescato un conejo muleto bb (*Sylvilagus brasiliensis*) dentro del área MEC-1 de unos 11 cm de longitud total y se reubico en el Parque Natural Metropolitano debido a su corta edad. Luego de salir del monitoreo de las áreas MEC se revisarón las trampas y se pudo capturar una sola foto que probablemente fue debido a que alguna hoja accionó el sistema. Esto sumado al recorrido que se efectuo por el área de Cerro Goyo el cual no arrojo ningun resultado de rastros frescos nos sugiere que la afluencia de los animales al sector se ha reducido considerablemente. Es preciso decir que las camaras fuero colocadas en lugares que presentaban evidentes pruebas de actividad animal.





ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato N° CC-08-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 19/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

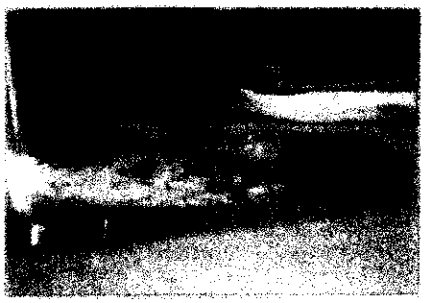
Proyecto Canal de Aproximación Norte Pacífico N° PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	19/03/2009	07:00	16:00	9	18

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se rescataron dos ratones arroceros (*Oligoryzomys fulvescens*), madre e hijo, dentro del área MEC-3. La madre media unos 14 cm de longitud total mientras que el hijo midio 7 cm de Longitud total, se encontraron en buen estado de salud.
Ambos se reubicaron en el Parque Nacional Metropolitano para su manejo.



ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato Nº CC-08-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 20/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	20/03/2009	07:00	16:00	9	18

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se rescato una jicotea o tortuga terrestre (Rhynoclemys sp.) dentro del área MEC-1. Midio 8.5 cm de longitud de caparazon.
Se reubicó en el Parque Nacional Metropolitano para su manejo ya que no se le observo una salud optima.







ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato Nº CC-O8-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 21/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

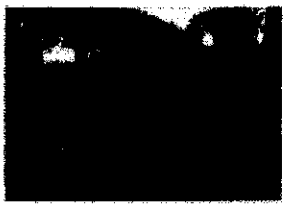
Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

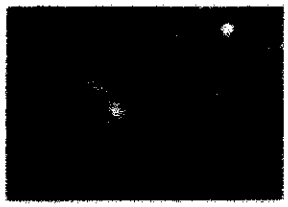
Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	21/03/2009	07:00	16:00	9	18

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se rescató un Anolis (*Dactyloa insignis*) con una longitud total de 19 cm, del área de MEC-1, la cual se reubicó en el Parque Nacional Metropolitano a pesar de su buena condición física, debido a que el Parque Soberanía tenía las oficinas cerradas.





ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato Nº CC-08-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 23/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

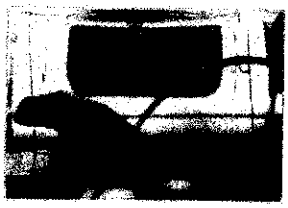
Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
3	23/03/2009	07:00	14:00	7	21

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se rescataron tres especies: un Oso hormiguero (Tamandua mexicana) 110 cm TL, Iguana verde (Iguana iguana) 65 cm TL y una Lagartija (Anolis biporcatus) 25 cm TL. La primera fue rescatada por las inmediaciones de la carretera de acceso al proyecto y las otras dos fueron rescates realizados en el MEC-3. Todas estaban en buenas condiciones y fueron reubicadas en el Parque Nacional Soberania.







ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato N° CC-08-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 25/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico N° PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	25/03/2009	07:00	19:00	12	24

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Se rescataron un total de 9 ejemplares pertenecientes a 4 especies: 5 Conejos muletos (Sylvilagus brasiliensis), dos adultos (40 cm y 38 cm TL), dos infantes (8 cm y 10 cm TL) y un juvenil (17 cm TL); 2 Sarigueya de cuatro ojos (Philander opossum) dos hembras en estado de gestación (32 cm TL c/u); un armadillo de nueve bandas (Dasypus novemcintus) hembra de 67 cm TL y un conejo pintado (Cunniculus paca) hembra de aproximadamente 42 cm TL. Todos los rescates se dieron dentro del área de MEC-2. Solo un conejo muleto fue reubicado en el Parque Nacional Soberania ya que los demas animales presentaban algun grado de herida o sobreestres que era mejor tratar en el refugio del Parque Nacional Metropolitano. Luego del monitoreo de la áreas MEC se procedio ha instalar trampas en la zona de la excavación norte, incorporando trampas de mayor envergadura para otro animal objetivo como lo son zainos, conejo pintados adultos, etc.



ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	26/03/2009	07:00	19:00	12	24

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Dentro del MEC-4 rescatarón un total de 2 ejemplares pertenecientes a 2 especies: Jicotea (Trachemys scripta) de aproximadamente 21 cm y una tortuga galapago (Kinosternon scorpioides) de aprox. 12 cm. Ambas fueron reubicadas en el sendero ecologico El Charco, perteneciente al Parque Nacional Soberania. Presentaban buenas condiciones.

Finalmente se colocaron trampas en el área de excavación Norte.







ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato N° CC-08-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 27/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico N° PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	27/03/2009	07:00	19:00	12	24

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

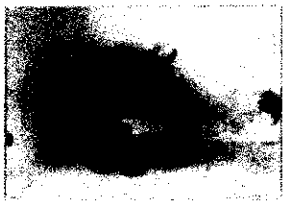
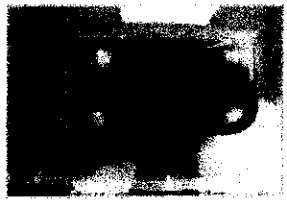
OBSERVACIONES

Dentro del Mec -2 se colectaron dos ejemplares procedentes a dos especies: un Mocangué (*Proechimys semispinosus*) de aprox. 37cm LT, que presentaba la separación total de la cola del cuerpo debido a un machetazo accidental. Esta a su vez presentaba un estado de gravidez de por lo menos tres crías. Al momento de la entrega la herida estaba coagulando satisfactoriamente y se le brindo un pedazo de manzana para tratar de bajar el estrés y a su vez hidratarla, no fue suficiente ya que mas o menos a la hora de estar en custodia comenzó a presentar signos de shock postraumático, agravados probablemente a su estado de gravidez y al final pereció.

El segundo ejemplar, una serpiente equis (*Bothrops asper*) de aprox. 145 cm hembra y en estado de gravidez, ya había fallecido al momento de la entrega debido a una fuerte contusión a nivel del cráneo causado de forma accidental.

Ambos cuerpos fueron donados al Parque Nacional Metropolitano para fines científicos.

Por ultimo, se continuo con el trampeo en el área de la excavación norte.

ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato Nº CC-08-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 28/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	28/03/2009	07:00	17:00	10	20

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

Dentro del Mec-4 se colectó un ejemplar de vibora equis (Bothrops asper), aprox. 125 cm hembra, la cual al momento de la entrega al personal de CODESA se encontraba muerta.

A la hora de llegar al Parque Natural Metropolitano sus instalaciones estaban cerradas asi que se procedio a conservar el animal hasta el lunes para su entrega. Despues del monitoreo a las áreas MEC´s se procedió a recoger las trampas las cuales se quedarón todo el día y se revisarón dos veces durante el dia, sin ninguna captura.





ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato Nº CC-O8-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 30/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	30/03/2009	07:00	18:00	11	22

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

A las siete de la mañana se le dio una charla de reforzamiento para rescate de fauna por parte de el personal de codesa a los miembros del equipo de Isthmian recalcando la definición de rescate y las condiciones necesarias para el mismo y dando un recorderissobre algunos aspectos de la biologia de las serpientes equis (*Bothrops asper*).

No se registrarón rescates hoy.

Al final del día se instalaron las camaras trampas en el área de homologación de la topografia de la zona de excavación norte.






ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

CODESA	Contrato Nº CC-O8-33	Contratista: CONSTRUCTORA MECO S.A	Fecha: 31/03/2009

REPORTES DIARIOS

Trabajos de Rescate y Reubicación de Fauna Silvestre, PAC-3

Proyecto Canal de Aproximación Norte Pacífico Nº PAC-3

Personal	Fecha	Entrada	Salida	Total Horas	Total H. H.*
2	31/03/2009	07:00	19:00	12	24

* Total H.H.= Total horas hombre, que sale de multiplicar el número de personal por las horas diarias.

OBSERVACIONES

No se registrarón rescates hoy.
Despues del monitoreo de la áreas MEC nos trasladamos al área de homologación en la zona de excavación de la fase norte y se instalaron 37 trampas.



ACCIDENTES

Tipo de	Hora	Lugar	Responsable	Observaciones
No hubo incidentes ni accidentes que reportar.				

Firma Autorizada
Lic. Irving Bethancourt

INFORME FINAL DE RESCATE DE FAUNA (FASE DE LEVANTAMIENTO TOPOGRÁFICO DE LA EXCAVACIÓN NORTE.

CODESA

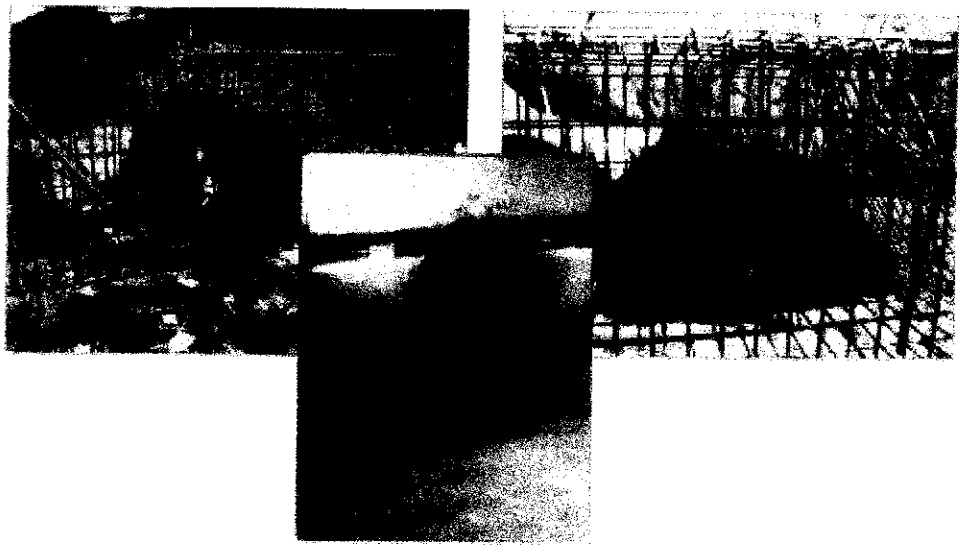
CORPORACION DE DESARROLLO AMBIENTAL, S.A.

Informe Final
CONTRATO CC-08-33-2009

Rescate y Reubicación de Fauna Silvestre para el proyecto:

AMPLIACIÓN DEL CANAL: CANAL DE APROXIMACIÓN NORTE PACÍFICO
PROYECTO No. PAC-3 Zona de Excavación Fase Norte, Topografía

Trabajos desarrollados del 4 de marzo de 2009 al 17 de marzo de 2009
AUTORIDAD DEL CANAL DE PANANÁ (A.C.P.)



Preparado para:
CONSTRUCTORA MECO S.A

ELABORADO POR:
Corporación de Desarrollo Ambiental

Marzo de 2009

Informe Final
CONTRATO CC-O8-33-2009

Rescate y Reubicación de Fauna Silvestre para el proyecto:

AMPLIACIÓN DEL CANAL: CANAL DE APROXIMACIÓN NORTE PACÍFICO
PROYECTO No. PAC-3 Zona de Excavación Fase Norte, Topografía

Trabajos desarrollados del 4 de marzo de 2009 al 17 de marzo de 2009
AUTORIDAD DEL CANAL DE PANANÁ (A.C.P.)

PREPARADO PARA:
CONSTRUCTORA MECO, S.A.

ELABORADO POR:
Roy Quintero (Director de Proyecto)

Irving Bethancourt (Coordinador de Campo)

Leyson V. Guillén V. (Control de Calidad de Productos y Procesos)

PERSONAL DE CAMPO:
Najaira Jiménez

Irak Barrera

Marcos Gonzales

Reyes Carranza

Ana Sofía Angulo (Veterinaria en Campo)

MARZO DE 2009

ÍNDICE

	Páginas
I. Introducción	4
II. Objetivos	5
III. Descripción del área de trabajo	5
IV. Mapa de localización	6
V. Metodología	7
VI. Plan de Educación Ambiental	11
VII. Resultados	12
VIII. Observaciones	13
IX. Bibliografía	13
X. Anexo fotográfico	14

I. INTRODUCCIÓN

El Actual Informe contiene los resultados de la primera fase de la ejecución del Plan de Rescate y Reubicación de Fauna Silvestre en las áreas a ser afectadas por los trabajos de Agrimensura de la Zona de Excavación, fase norte de la construcción del Canal de aproximación Norte (PAC-3), concretamente 32 hectáreas en la rivera izquierda del Canal del Panamá entre la zona comprendida del Puente Centenario y las esclusas de Pedro Miguel en el corregimiento y distrito de Arraiján, provincia de Panamá, obedeciendo a lo descrito en la **Resolución AG- 0292-2008** de la Autoridad Nacional del Ambiente (ANAM) por la cual se establecen los requisitos para dichos planes en todos los Estudios de Impacto Ambiental categoría II y III. En este caso se hace referencia al "Estudio de Impacto Ambiental Categoría III para el Proyecto de Ampliación del Canal – Tercer Juego de Esclusas" aprobado mediante resolución DIEORA IA-632-2007. Estos trabajos se desarrollaron del 4 al 17 de marzo de 2009.

Se revisaron múltiples estudios previos y publicaciones relacionadas con las características del área y con la fauna silvestre que habita en las áreas aledañas al Canal de Panamá, con la finalidad de llevar una ejecución del Plan de Rescate lo más apegado a las condiciones actuales de la región.

El siguiente informe presenta una caracterización de las condiciones ambientales del sitio donde se realizaron las capturas y los trabajos de rescate, la metodología aplicada para el análisis sanitario, traslado, movilización y reubicación de la fauna silvestre a las áreas silvestres protegidas seleccionadas.

Adicionalmente se presenta el cronograma de trabajos ejecutados y los resultados finales de los trabajos de rescate y reubicación de la fauna en tablas y gráficos.

Se utilizó como información base el Estudio de Impacto Ambiental Categoría III, Proyecto de Ampliación del Canal Tercer Juego de Esclusas, Aprobado el 9 de Noviembre de 2007 por Resolución DIEORA 632-2007 de la Autoridad Nacional del Ambiente, el Estudio de Impacto Ambiental Categoría I, Habilitación del Sitio T6 y el Informe Final: Trabajos de Rescate y Reubicación de Fauna Silvestre: Área de UXO y Borinquen, Programa de Ampliación del Canal, Tercer Juegos de Esclusas. 2007, Asociación Panamericana para la Conservación (APPC).

Adicional a la revisión de la bibliografía y los estudios previos, se desarrollaron giras de campo, observación de huellas y rastros de animales como heces, trochas de paso y sitios de reposo.

Los animales rescatados, luego de ser objeto de un análisis físico fueron trasladados y reubicados con éxito dentro de áreas protegidas previamente en estricta coordinación con la Autoridad Nacional del Ambiente (ANAM), las áreas seleccionadas incluyeron: El Parque Nacional Soberanía y el Refugio de vida silvestre del Parque Nacional Metropolitano.

II. OBJETIVOS

Protección, Conservación, Rescate y Reubicación de la fauna silvestre a ser afectada por los trabajos de tala, desmonte y movimiento de tierra; de tal manera que reduzca al máximo los impactos negativos causados a los ecosistemas existentes y a la fauna residente.

Capacitar a los trabajadores de campo en la importancia de la ejecución de este plan y en la conservación de la fauna silvestre presente en el área de influencia del proyecto.

III. DESCRIPCIÓN DEL ÁREA DE TRABAJO

El área donde se desarrolló el Rescate de Fauna es la Zona de Excavación de la Fase Norte. Está ubicada en la rivera izquierda del Canal del Panamá entre la zona comprendida del Puente Centenario y las esclusas de Pedro Miguel en el Corregimiento de Arraiján, Distrito de Arraiján, Provincia de Panamá.

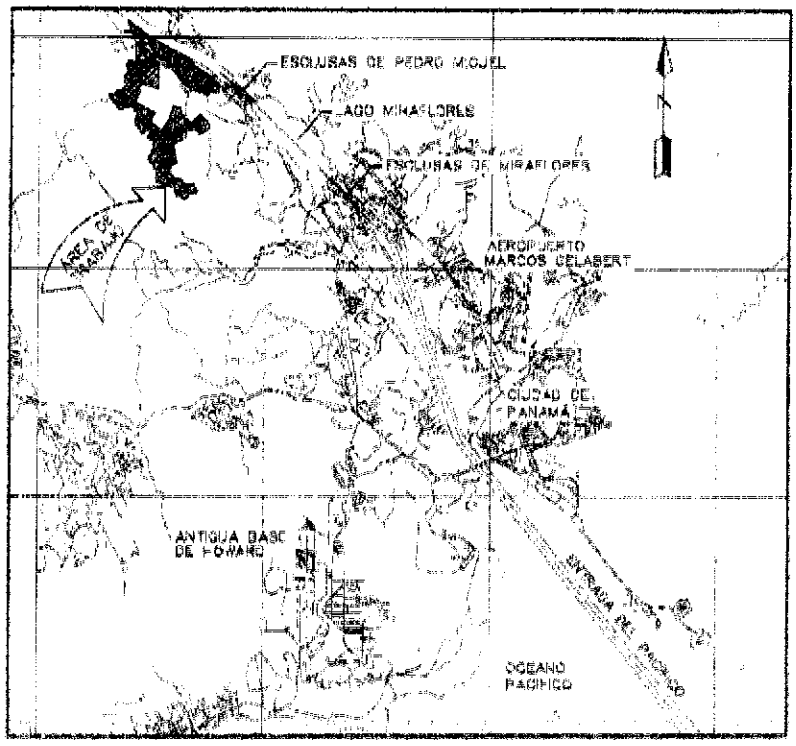


Figura 1. Mapa de Localización Regional

El sitio donde se ejecutó el plan de rescate de fauna comprende el Área de Impacto Directo (AID), el cual incluye parte de la huella de las esclusas, el canal de aproximación Norte, en la zona de

excavación que tiene como objetivo la nivelación del Cerro Goyo abarcando una superficie total de 32 hectáreas, aproximadamente.

De acuerdo con el sistema de clasificación de Köppen, en el área del proyecto encontramos un ***Clima Húmedo Tropical***, caracterizado por tener una temperatura promedio anual que oscila entre los 27 y 28ºC, con una precipitación promedio anual alrededor de los 2000 mm y una humedad relativa promedio anual de un 80%.

La vegetación predominante en el área de trabajo, en general, son los matorrales, herbazales un parche asilado de bosque semideciduo tropical de tierras bajas (bosque secundario intermedio) y pajonal constituido principalmente por la Paja Canalera (*Saccharurm spontaneum)* la cual ocupa más del 85% del área.

IV. MAPA DE LOCALIZACIÓN

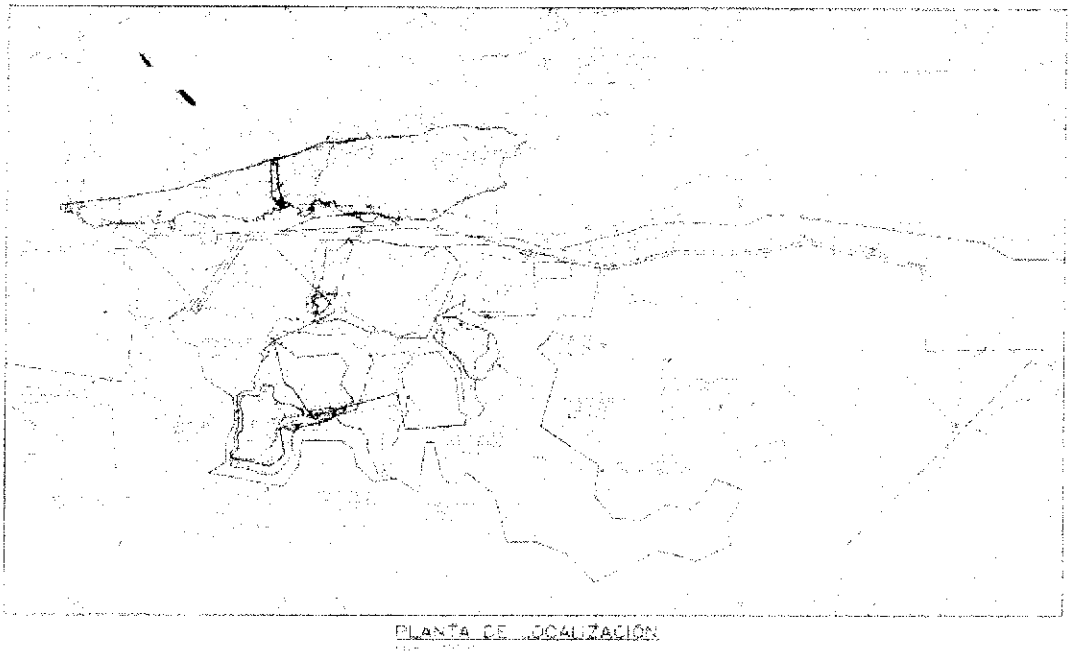


Figura 2. Planta de Localización (Escala 1:10,000)

V. METODOLOGÍA

5.1 Giras de campo e inventario de recursos

Esta actividad se realizó el 14 de febrero, evaluando la logística total que sería necesaria para llevar a cabo el rescate de fauna y adecuando la logística con la superficie y condiciones del terreno.



5.2 Capacitación de personal técnico

El día 27 de febrero, previo al inicio de los trabajos, se dio una capacitación teórica a todo el personal técnico de MECO S.A. y al personal que acompañará a los biólogos de campo.

5.3 Recopilación de información y estudio del área a ser afectada

Se desarrolló aprovechando la ejecución de las actividades de agrimensura, desde el día uno, con una duración de 14 días utilizando un frente de trabajo. Con esto se pudo recolectar valiosa información para la evaluación del área y así obtener datos sobre aspectos de la biología y ecología de las especies que habitan en el área del proyecto. Se recopiló la información sobre la situación, patrones de distribución, desplazamiento y abundancia, así como de las variables ambientales y antropogénicas que afectaban a las especies, lo cual nos indicó la metodología más adecuada para el cumplimiento exitoso del rescate.

5.4 Observación directa

Se realizaron búsquedas generalizadas a través de caminatas, en donde se detectaron a las especies por observación directa y reconocimiento de vocalizaciones. Estas caminatas se realizaron durante las primeras horas de la mañana (6:30 a 7:30 am) y las últimas horas de la tarde (5:00 a 6:30 pm) durante (mientras abrían las trochas) y después de las horas laborables de la agrimensura. Se llevó un registro de campo anotando las especies observadas.

5.5 Monitoreo

Todas la actividades de monitoreo se realizaron durante las últimas horas de la tarde (5:00 a 6:30 pm) después de las horas laborables de la agrimensura.

5.6 Instalación y monitoreo de cámaras de sensor

Para el monitoreo, con el fin de establecer un área libre de fauna, se instalaron cámaras remotas (CUDDEVACK Digital) las cuales fueron programadas para tomar una (1) foto cada minuto cuando un animal active la cámara y una (1) cada hora sin activación. Cinco cámaras fueron colocadas en senderos donde hubo evidencia de paso de fauna y en sitios de uso probable por fauna silvestre en tipos de vegetación representativas dentro de las áreas de trabajo. Las fotos fueron evaluadas para determinar la presencia o no de especies de fauna silvestre.

5.7 Preparación y monitoreo de trampas de huellas

Se monitorearon las trampas naturales que estaban cerca de las áreas de paso. Por las características rocosas del suelo fue imposible fabricar trampas de lodo.

5.8 Evaluación y análisis de la información obtenida

En base a la evaluación que se efectuó previo a los trabajos de topografía por parte de constructora M.E.C.O. y la que se practicó *in situ* a medida que iban avanzando los mismos, se decidió el criterio a seguir para la colocación de las trampas, colocándolas a los lados de las trochas hechas por los macheteros con el propósito de cubrir la mayor área posible tomando en cuenta siempre que no se dejaran a simple vista en senderos donde hubo evidencia de paso de fauna y en sitios de uso probable por fauna silvestre en tipos de vegetación representativas. Al mismo tiempo se hacía una anotación de campo y se geo-posicionaba la trampa para evitar la marcación con cinta que demora en bio-degradarse. Hay que tomar en cuenta que la presencia de animales están muy ligadas a las fuentes de agua y para este sector de la fase de topografía en la zona norte del área de excavación no se encontraron quebradas con el valioso líquido, debido seguramente a la estación seca, sumándose al estado de los rastros (olor de orina, heces y huellas) nos permite concluir que los animales que acostumbran a residir en este sector se han desplazado dificultando las labores de captura de los mismos.

5.9 Recolección manual y captura en campo

Recorridos para la captura de anfibios y reptiles

Esta actividad se realizó al mismo tiempo que se desarrollaba la agrimensura, los rescatistas seguían a los macheteros a distancias prudentes en busca o espera de la detección de algún reptil o anfibio utilizando el método de "Recolectas manuales", utilizando guantes de cuero, ganchos para la captura de serpientes.

Instalación de trampas Sherman y Tomahawk

Esta actividad se realizó durante las últimas horas de la tarde (5:00 a 6:30 pm) después de las horas laborables de la agrimensura, y se recogieron muy temprano en la mañana antes del comienzo de las labores. El trampeo fue ejecutado durante toda la agrimensura y en la fase de homologación.

Trampas Tomahawk y Duke

Se emplearon trampas de diferentes tamaños (41 x 14 x 13.5 cm; 50 x 19.5 x 19.5 cm). Las trampas se ubicaron en transeptos lineales separadas de 10 a 20 m entre sí.

Trampas Sherman

Se utilizaron para la capturar mamíferos no voladores, pequeños. Se emplearon dos tamaños (16 x 5 x 6.5 cm y 20 x 8 x 7.5 cm), dispuestas en transeptos lineales, con 8 - 10 m entre cada trampa. No se tuvo éxito con estas trampas ya que los roedores que se capturaron siempre cayeron en las trampas tomahawk, probablemente debido al poco espacio de las Sherman.

Procedimiento de colocación de trampas Sherman/Tomahawk

1. Se colocaron y cebaron todas las trampas antes de que oscureciera. Si las trampas se colocaban varias horas antes de la puesta del sol, o se dejaban abiertas durante el día, se revisaban frecuentemente, hasta tres veces al día, para la captura de animales diurnos.

2. Se colocaron las líneas de trampas en áreas que estén fuera de la vista, en caminos, veredas, rutas u otras áreas de actividad animal.

3. Se geo-posesionaban y se les enumeraba para luego registrar el orden en que se colocaban en un cuaderno de campo para facilitar su monitoreo.

4. Cuando fue posible, se colocaron las trampas cerca de pilas de leña, troncos caídos, madrigueras, u otros lugares que proveen refugio.

5. Se evitó colocar las trampas de manera que quedaran expuestas al sol directo.

6. Se arrojaba una pequeña cantidad (aproximadamente una cucharada) de cebo dentro de cada una de las trampas; ya fuera de maíz, arroz, manzana, carnes, banano, salchichas, comidas preparadas, etc.

Todas las trampas utilizadas en campo, así como la metodología aplicada son completamente inofensivas para los animales y no representan peligro para los mismos. Son trampas "vivas" diseñadas especialmente para la captura de animales sin hacerles daño, no se utilizaron químicos, ni sustancias que puedan ser dañinas para los animales.

5.10 Análisis sanitario de animales a liberar

Previo a la reintroducción de los animales rescatados se procedió con una evaluación que consistió en un análisis morfométrico (medida) y un análisis físico para determinar parásitos, heridas o fracturas. Todos los animales capturados presentaron buena salud física y un bajo estrés liberándose casi inmediatamente en el Parque Nacional Soberanía.

5.11 Selección de hábitats naturales y liberación de animales silvestres

Esto se realizó junto con el personal técnico de guarda parques de Parque Nacional Soberanía describiéndole con detalle el hábitat o conjunto vegetativo donde fue capturado el espécimen, Los animales capturados y rescatados fueron reubicados en áreas protegidas con características similares a su hábitat de origen, lo que garantiza la no perturbación del ecosistema a largo plazo. Decidiéndose que para la liberación de roedores el mejor lugar era "Camino de Plantación". Se adjunta actas de liberación a este informe.

Tabla No. 1. Listado de las especies de Mamíferos registradas

No.	Nombre Común	Nombre Científico	Observación Directa	Huellas e Indicios
1	Mono Tití	*Saguinus geoffroyi*	✓	

No.	Nombre Común	Nombre Científico	Observación Directa	Huellas e Indicios
2	Conejo Muleto	*Sylvilagus brasiliensis*	✓	
3	Gato Sólo	*Nasua narica*	✓	
4	Venado cola blanca	*Odocoileus virginianus*	✓	
5	Ñeque	*Dasyprocta punctata*	✓	
6	Conejo pintado	*Cuniculus paca*	✓	
7	Mocangué	*Proechimys semispinosus*	✓	
8	Perezoso de tres dedos	*Bradypus variegatus*	✓	
9	Perezoso de dos dedos	*Choloepus hoffmanni*	✓	
10	Armadillo	*Dasypus novemcintus*	✓	
11	Hormiguero	*Tamandua mexicana*	✓	
12	Saíno	*Tayassu tajacu*		✓
13	Capibara	*Hydrochaeris hydrochaeris*		✓
14	Sapo	*Rhinella marinus*	✓	
15	Zarigueya de cuatro ojos	*Philander opossum*	✓	

VI. PLAN DE EDUCACIÓN AMBIENTAL

El personal de rescate y el equipo de topógrafos fueron capacitado en la metodología de trabajo a través de un pequeño taller en las instalaciones de M.E.C.O. ubicadas en Balboa antes de proceder con el trabajo de campo. Los temas a tratados fueron:

1. Cronograma de Trabajo
2. Presentación de la metodología de estudio de campo
3. Metodología para la captura en campo de animales silvestres con equipo especializado.
4. Metodología de instalación y revisión de trampas para la captura de animales
5. Procedimiento para la realización del análisis sanitarios y morfométrico de los animales antes de ser liberados
6. Procedimiento de transporte y reintroducción de los animales rescatados a su nuevo hábitat
7. Información sobre las especies que habitan en el área, para lo cual se les mostraron imágenes de los animales para facilitar su identificación
8. Se les explicó qué hacer en el evento de encontrarse con un animal herido o atrapado, hasta tanto el personal de rescate pudiera acudir al área
9. Se les explicó cómo lidiar con animales que pueden ser peligrosos.

Tabla No. 2. CRONOGRAMA DE TRABAJO
Cronograma de trabajos desarrollados del 27 de febrero al 17 de marzo de 2008

Fecha	No. Personas	Actividad Realizada	Horario	Tiempo total
Sábado 14/02/2009	1	Gira de reconocimiento de campo	10:00 – 15:00	5
Lunes 27/27/2009	2	Charla de capacitación	11:00 - 12:00	1
Miércoles 04/03/2009	2	Monitoreo de agrimensura Trampeo nocturno	7:00 - 21:00	14
Jueves 05/03/2009	2	Monitoreo de agrimensura Trampeo nocturno	7:00 - 21:00	14
Viernes 06/03/2009	4	Monitoreo de agrimensura Trampeo nocturno	7:00 - 19:00	12
Sábado 07/03/2009	4	Monitoreo de agrimensura Captura y liberación de tres hembras de Mocangüe (*Proechimys semispinosus*) en el P.N.S.	7:00 - 19:00	12
Lunes 09/03/2009	2	Monitoreo de agrimensura Trampeo nocturno	7:00 - 19:00	12
Martes 10/03/2009	2	Monitoreo de agrimensura Captura y liberación de 1 hembra de Mocangüe (*Proechimys semispinosus*) en el P.N.S. Trampeo nocturno	7:00 - 17:00	10
Miércoles 11/03/2009	2	Monitoreo de agrimensura Captura y liberación de dos hembras de Mocangüe (*Proechimys semispinosus*) en el P.N.S. Trampeo nocturno	7:00 - 17:00	10
Jueves 12/03/2009	2	Monitoreo de agrimensura Trampeo nocturno	7:00 - 17:00	10
Viernes 13/03/2009	2	Monitoreo de agrimensura Trampeo nocturno	7:00 - 17:00	10
Sábado 14/03/2009	2	Monitoreo de agrimensura Captura y liberación de 1 hembra de Mocangüe (*Proechimys semispinosus*) en el P.N.S.	7:00 - 15:00	8
Lunes 16/03/2009	2	Monitoreo de agrimensura Trampeo nocturno Se instalaron las cámaras trampa área del puente centenario	7:00 - 17:00	10

Fecha	No. Personas	Actividad Realizada	Horario	Tiempo total
Martes 17/03/2009	2	Monitoreo de agrimensura Trampeo nocturno Se instalaron las cámaras trampa área de Cerro Goyo	7:00 - 19:00	12

VII. RESULTADOS

La siguiente tabla presenta los resultados finales de los trabajos en las áreas a ser afectadas por los trabajos de Agrimensura de la Zona de Excavación, fase norte de la construcción del Canal de aproximación Norte (PAC-3), concretamente 32 hectáreas en la rivera izquierda del Canal de Panamá entre la zona comprendida del Puente Centenario y las esclusas de Pedro Miguel en el corregimiento y distrito de Arraiján, provincia de Panamá.

TABLA No. 3. LISTA DE ANIMALES SILVESTRES RESCATADOS EN PAC-3.

# de Pto.	Fecha/Hora de la instalación trampa	Coordenada	Especie encontrada	Nombre común	Reubicado
Pto.5	07-MAR-09 10:00:31AM	17 P 650701 997675	*Rhinella marinus* (2)	Sapo	P.N.S.
Pto.20	07-MAR-09 11:06:51AM	17 P 650834 997568	*Proechimis semispinosus*	Mocangüe	P.N.S.
Pto.21	07-MAR-09 11:07:58AM	17 P 650834 997575	*Proechimis semispinosus*	Mocangüe	P.N.S.
Pto.46	07-MAR-09 9:28:18AM	17 P 650650 997730	*Proechimis semispinosus*	Mocangüe	P.N.S.
Pto.98	09-MAR-09 4:54:00PM	17 P 650658 997834	*Sigmodon hispidus*	Raton algonodero	P.N.S.
Pto.111	10-MAR-09 1:57:25PM	17 P 650581 997837	*Proechimis semispinosus*	Mocangüe	P.N.S.
Pto.117	10-MAR-09 2:08:08PM	17 P 650582 997874	*Proechimis semispinosus*	Mocangüe	P.N.S.
Pto.240	13-MAR-09 6:43:57PM	17 P 650130 998095	*Sigmodon hispidus*	Raton algonodero	P.N.S.

VIII. OBSERVACIONES

La Corporación de Desarrollo Ambiental (CODESA) inició labores con M.E.C.O. el 14 de Febrero de 2009 y el inició de labores en campo fue a partir del 04 de Marzo del 2009. A partir de esta última fecha se laboraron 323 horas hombres; rescatándose un total de 9 animales. Todos fueron reubicados con éxito en el Parque Nacional Soberanía. Se dictó una charla y se ha laborado un total de 16 días en campo.

IX. BIBLIOGRAFÍA

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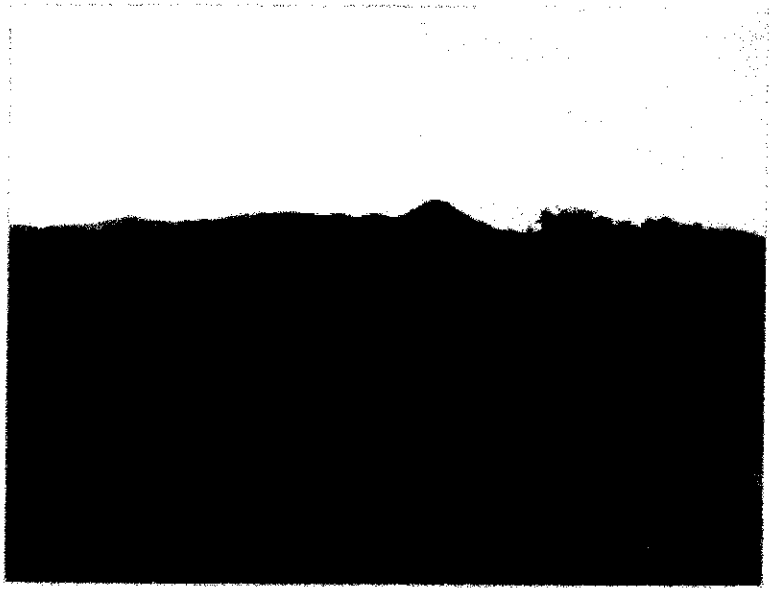
I. ANEXO FOTOGRÁFICO



VISTA DE LA COLOCACIÓN DE LAS TRAMPAS TOMAHAWK



COLOCACIÓN DE CÁMARAS DE VISIÓN NOCTURNA



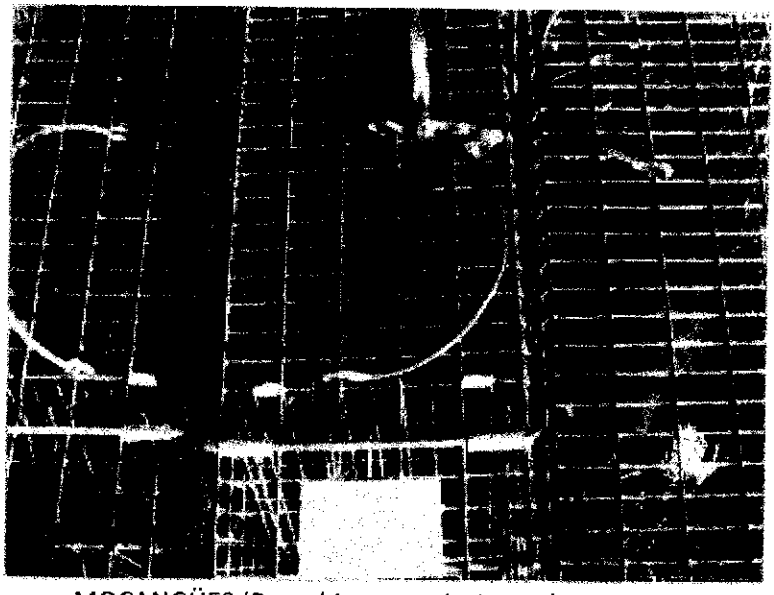
VISTA PANORAMICA DEL ÁREA DE IMPACTO



RATÓN ALGODONERO (*Sigmodon hispidus)*



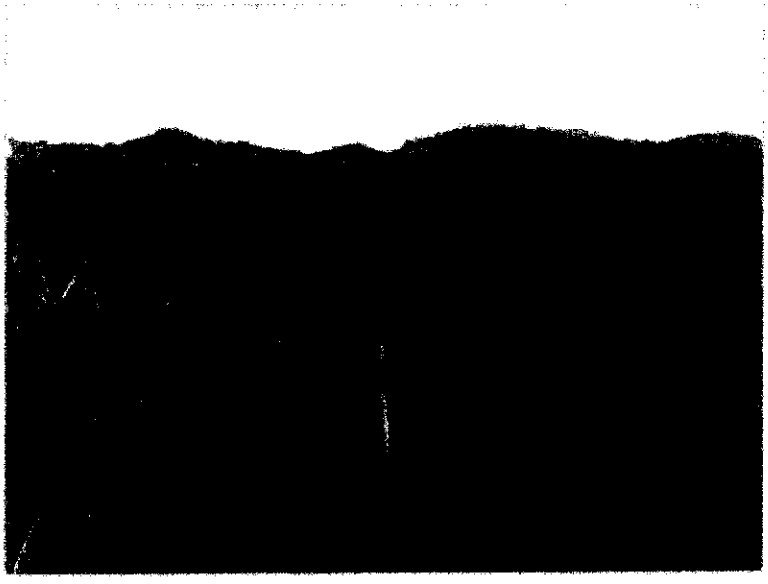
CAMARA EN EL ÁREA DE RESCATE



MOCANGÜES (*Proechimys semispinosus*) HEMBRAS



SAPOS (*Rhinella marinus*) CAPTURADOS DE UNA QUEBRADA EN EL ÁREA DE AGRIMENSURA



VISTA PANORAMICA DEL PAJONAL EN EL ÁREA DE EXCAVACIÓN NORTE

Especies rescatadas durante el mes de Marzo por la Corporación de Desarrollo Ambiental (CODESA) en el PAC-3

Fecha	Área	Nombre científico	Nombre Común	# de individuos	Sexo		Observaciones			
					M	H	Medidas	Reubicación	Estado de desarrollo	Condición física
07/03/2009	Topografia fase norte	*Proechimis semispinosus*	Mocangué	3		x	22 cm TL; 25 cm TL; 20 cm TL	P.N.S	Adultos	Buena
07/03/2009	Topografia fase norte	*Rhinella marinus*	Sapos	2			14 cm y 13 cm TL	P.N.S	adultos	Buena
09/03/2009	MEC-1	*Coragyps atratus*	Gallinazo	2			34 cm; 35 cm	P.N.M.	Pichones	Buena
10/03/2009	Topografia fase norte	*Sigmodon hispidus*	Rata espinosa	1		x	16 cm TL	P.N.S	Adulto	Buena
11/03/2009	Topografia fase norte	*Proechimis semispinosus*	Mocangué	1		x	18 cm TL	P.N.S	Juvenil	Buena
11/03/2009	Topografia fase norte	*Sigmodon hispidus*	Rata espinosa	1		x	15 cm TL	P.N.S	Adulto	Buena
11/03/2009	MEC-1	*Choloepus hoffmanni*	Perezoso de dos garras	1		x	116 cm	P.N.M	Adulto	Buena
12/03/2009	MEC-1	*Sylvilagus brasiliensis*	Conejo Muleto	1		x	23 cm,	P.N.M.	Juvenil	Regular
12/03/2009	MEC-1	*Coragyps atratus*	Gallinazo	1			36 cm	P.N.M.	Pichones	Buena
14/03/2009	Topografia fase norte	*Sigmodon hispidus*	Rata espinosa	1		x	16 cm TL	P.N.S	Adulto	Buena
16/03/2009	MEC-3	*Trachemys scripta*	Jicotea	1		x	17 cm	P.N.M.	Adulto	Buena
17/03/2009	MEC-3	*Corytophanes cristatus*	Cantoral	1	x		16 cm	P.N.S.	Adulto	Buena
17/03/2009	MEC-3	*Bothrops asper*	Equis	1			145 cm	P.N.S.	Adulto	Buena
17/03/2009	MEC-3	*Cyclopes didactylus*	Tapacara	1		x	18 cm	P.N.S.	Adulto	Buena
18/03/2009	MEC-1	*Sylvilagus brasiliensis*	Conejo Muleto	1		x	15 cm	P.N.M.	Infantil	Buena
19/03/2009	MEC-3	*Oligoryzomys fulvescens*	Ratón arrocero	2	x	x	6 cm TL y 8 cm TL, Madre y cria.	P.N.M.	Infante y Adulto	Buena
20/03/2009	MEC-1	*Kinosternon scorpioides*	Tortuga	1	x		27 cm TL	P.N.M.	Adulto	Buena
21/03/2009	MEC-1	*Anolis biporcatus*	Lagartija	1	x		19 cm TL	P.N.M.	Adulto	Buena
23/03/2009	MEC-1	*Anolis biporcatus*	Lagartija	1	x		19 cm TL	P.N.S.	Adulto	Buena
23/03/2009	MEC-1	*Iguana iguana*	Iguana verde	1	x		24 cm TL	P.N.S.	Juvenil	Buena
23/03/2009	MEC-1	*Tamandua mexicana*	Hormiguero	1		x	110 cm TL	P.N.S.	Adulto	Buena
25/03/2009	MEC-2	*Dasypus novencinctus*	Armadillo	1	x		80 cm TL	P.N.M.	Adulto	Regular
25/03/2009	MEC-2	*Sylvilagus brasiliensis*	Conejo muleto	5	x	x	12, 9, 16, 25 y 32 cm TL	P.N.M. y P.N.S	Juvenil y adultos	Buena
25/03/2009	MEC-2	*Cuniculus paca*	Conejo pintado	1		x	70 cm TL	P.N.M.	Adulto	Buena
25/03/2009	MEC-2	*Philander opossum*	Sarigüeya de cuatro ojos	2		x	28 y 27 cm TL	P.N.M.	Adulto	Buena
26/03/2009	MEC-4	*Kinosternon scorpioides*	Tortuga terrestre	1	x		22 cm TL	P.N.S.	Adulto	Buena
26/03/2009	MEC-4	*Trachemis scripta*	Tortuga jicotea	1	x		35 cm TL	P.N.S	Adultos	Buena

Criterios para la colocación de trampas

En base a la evaluación que se efectuó previo a los trabajos de topografía por parte de constructora M.E.C.O. y la que se practico in situ a medidas que iban avanzando los mismos, se decidió el criterio a seguir para la colocación de las trampas, colocándolas a los lados de las trochas hechas por los macheteros con el propósito de cubrir la mayor área posible tomando en cuenta siempre que no se dejaran a simple vista en senderos donde hubo evidencia de paso de fauna y en emplazamientos de uso probable por fauna silvestre en tipos de vegetación representativas. Al mismo tiempo se hacia una anotación de campo y se geo-posicionaba la trampa para evitar la marcación con cinta que demora en bio-degradarse. Para la homologación el esfuerzo se concentro principalmente en el sector del bosque deciduo que se ubica en el lado este del Cerro Goyo, principalmente por la concentración de rastros y emplazamiento que se encontraron en este. Hay que tomar en cuenta que la presencia de animales están muy ligadas a las fuentes de agua y para este sector de la fase de topografía en la zona norte del área de excavación no se encontraron quebradas con el valioso liquido, debido seguramente a la estación seca, sumándose al estado de los rastros (olor de orina, heces y huellas) nos permite concluir que los animales que acostumbran a residir en este sector se han desplazado dificultando las labores de captura de los mismos.



Heces de venado cola blanca
(Odocoileus virginianus)



Lugar de paso de mamíferos pequeños



Lugar de paso de mamíferos grandes





Colocación de trampas

CORRDENADAS DE COLOCACIÓN DE TRAMPAS (LEVANTAMIENTO TOPOGRÁFICO).

# de Pto.	Fecha/Hora	Coordenada	Especie encontrada
Pto.1	06-MAR-09 2:15:17PM	17 P 650782 997677	
Pto.2	06-MAR-09 3:26:11PM	17 P 650731 997647	
Pto.3	06-MAR-09 3:26:19PM	17 P 650731 997647	
Pto.4	07-MAR-09 1:38:35PM	17 P 650834 997642	
Pto.5	07-MAR-09 10:00:31AM	17 P 650701 997675	
Pto.6	07-MAR-09 10:03:15AM	17 P 650715 997690	
Pto.7	07-MAR-09 10:07:13AM	17 P 650719 997667	
Pto.8	07-MAR-09 10:08:23AM	17 P 650731 997649	
Pto.9	07-MAR-09 10:10:32AM	17 P 650744 997673	
Pto.10	07-MAR-09 10:13:42AM	17 P 650746 997654	
Pto.11	07-MAR-09 10:16:02AM	17 P 650735 997634	
Pto.12	07-MAR-09 10:17:11AM	17 P 650741 997638	
Pto.13	07-MAR-09 10:18:17AM	17 P 650747 997635	
Pto.14	07-MAR-09 10:20:44AM	17 P 650751 997625	
Pto.15	07-MAR-09 10:22:43AM	17 P 650749 997648	
Pto.16	07-MAR-09 10:24:53AM	17 P 650775 997677	
Pto.17	07-MAR-09 10:27:06AM	17 P 650826 997671	
Pto.18	07-MAR-09 11:02:41AM	17 P 650809 997563	
Pto.19	07-MAR-09 11:05:14AM	17 P 650816 997556	
Pto.20	07-MAR-09 11:06:51AM	17 P 650834 997568	*Proechimis semispinosus*
Pto.21	07-MAR-09 11:07:58AM	17 P 650834 997575	*Proechimis semispinosus*
Pto.22	07-MAR-09 11:09:15AM	17 P 650843 997581	
Pto.23	07-MAR-09 11:11:01AM	17 P 650848 997570	
Pto.24	07-MAR-09 11:11:56AM	17 P 650852 997559	
Pto.25	07-MAR-09 11:13:01AM	17 P 650867 997551	
Pto.26	07-MAR-09 11:14:46AM	17 P 650846 997613	
Pto.27	07-MAR-09 11:44:33AM	17 P 650830 997653	
Pto.28	07-MAR-09 11:45:42AM	17 P 650825 997658	
Pto.29	07-MAR-09 11:46:39AM	17 P 650827 997659	
Pto.30	07-MAR-09 11:49:45AM	17 P 650818 997664	
Pto.31	07-MAR-09 11:50:47AM	17 P 650816 997664	
Pto.32	07-MAR-09 11:51:33AM	17 P 650815 997664	
Pto.33	07-MAR-09 11:52:19AM	17 P 650804 997663	
Pto.34	07-MAR-09 11:56:45AM	17 P 650828 997637	
Pto.35	07-MAR-09 11:58:27AM	17 P 650800 997641	
Pto.36	07-MAR-09 11:59:11AM	17 P 650808 997647	
Pto.37	07-MAR-09 12:02:11PM	17 P 650813 997677	
Pto.38	07-MAR-09 12:03:03PM	17 P 650820 997685	
Pto.39	07-MAR-09 12:05:29PM	17 P 650829 997696	
Pto.40	07-MAR-09 12:06:33PM	17 P 650840 997708	
Pto.41	07-MAR-09 12:08:18PM	17 P 650789 997692	
Pto.42	07-MAR-09 12:09:12PM	17 P 650806 997705	
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Pto.44	07-MAR-09 12:12:07PM	17 P 650783 997705	

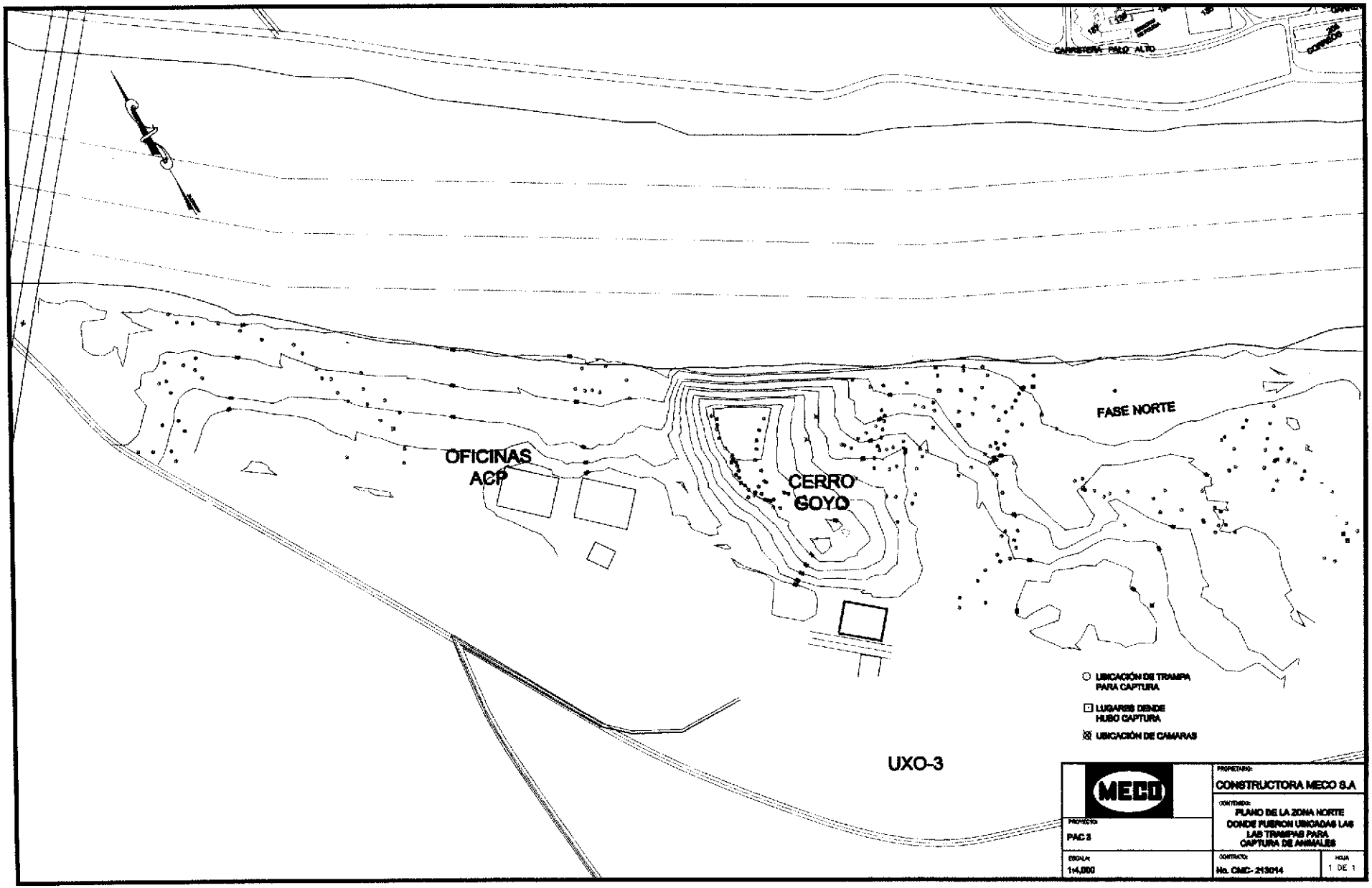
Pto.45	07-MAR-09 12:12:33PM	17 P 650787 997706	
Pto.46	07-MAR-09 9:28:18AM	17 P 650650 997730	*Proechimis semispinosus*
Pto.47	07-MAR-09 9:30:06AM	17 P 650652 997727	
Pto.48	07-MAR-09 9:42:22AM	17 P 650655 997737	
Pto.49	07-MAR-09 9:44:52AM	17 P 650648 997739	
Pto.50	07-MAR-09 9:49:16AM	17 P 650659 997722	
Pto.51	07-MAR-09 9:50:32AM	17 P 650664 997713	
Pto.52	07-MAR-09 9:51:29AM	17 P 650670 997713	
Pto.53	07-MAR-09 9:53:55AM	17 P 650685 997706	
Pto.54	07-MAR-09 9:56:02AM	17 P 650667 997681	
Pto.55	07-MAR-09 9:58:36AM	17 P 650702 997689	
Pto.56	09-MAR-09 11:16:40AM	17 P 650470 997611	
Pto.57	09-MAR-09 12:48:11PM	17 P 650722 997793	
Pto.58	09-MAR-09 2:34:02PM	17 P 650596 997794	
Pto.59	09-MAR-09 2:41:02PM	17 P 650597 997791	
Pto.60	09-MAR-09 2:52:33PM	17 P 650587 997782	
Pto.61	09-MAR-09 2:54:23PM	17 P 650590 997779	
Pto.62	09-MAR-09 3:02:37PM	17 P 650598 997805	
Pto.63	09-MAR-09 3:04:28PM	17 P 650594 997792	
Pto.64	09-MAR-09 3:07:34PM	17 P 650603 997800	
Pto.65	09-MAR-09 3:12:29PM	17 P 650604 997805	
Pto.66	09-MAR-09 3:29:57PM	17 P 650590 997801	
Pto.67	09-MAR-09 3:38:02PM	17 P 650573 997797	
Pto.68	09-MAR-09 3:43:58PM	17 P 650559 997796	
Pto.69	09-MAR-09 3:51:15PM	17 P 650590 997792	
Pto.70	09-MAR-09 4:06:50PM	17 P 650553 997715	
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Pto.72	09-MAR-09 4:08:17PM	17 P 650571 997712	
Pto.73	09-MAR-09 4:09:03PM	17 P 650570 997730	
Pto.74	09-MAR-09 4:09:56PM	17 P 650585 997738	
Pto.75	09-MAR-09 4:10:42PM	17 P 650586 997762	
Pto.76	09-MAR-09 4:11:36PM	17 P 650609 997781	
Pto.77	09-MAR-09 4:12:19PM	17 P 650610 997800	
Pto.78	09-MAR-09 4:13:07PM	17 P 650633 997808	
Pto.79	09-MAR-09 4:13:57PM	17 P 650626 997825	
Pto.80	09-MAR-09 4:14:43PM	17 P 650639 997830	
Pto.81	09-MAR-09 4:27:36PM	17 P 650565 997728	
Pto.82	09-MAR-09 4:28:09PM	17 P 650573 997719	
Pto.83	09-MAR-09 4:28:32PM	17 P 650580 997725	
Pto.84	09-MAR-09 4:29:55PM	17 P 650552 997708	
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Pto.86	09-MAR-09 4:32:29PM	17 P 650525 997703	
Pto.87	09-MAR-09 4:33:34PM	17 P 650503 997698	
Pto.88	09-MAR-09 4:34:20PM	17 P 650498 997690	
Pto.89	09-MAR-09 4:35:15PM	17 P 650521 997682	
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Pto.91	09-MAR-09 4:49:01PM	17 P 650652 997837	

Pto.92	09-MAR-09 4:50:29PM	17 P 650619 997856	
Pto.93	09-MAR-09 4:50:59PM	17 P 650619 997835	
Pto.94	09-MAR-09 4:51:33PM	17 P 650633 997826	
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Pto.96	09-MAR-09 4:52:38PM	17 P 650653 997807	
Pto.97	09-MAR-09 4:53:09PM	17 P 650658 997789	
Pto.98	09-MAR-09 4:54:00PM	17 P 650658 997834	*Sigmodon hispidus*
Pto.99	09-MAR-09 4:54:38PM	17 P 650665 997842	
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Pto.101	09-MAR-09 4:58:54PM	17 P 650589 997886	
Pto.102	09-MAR-09 5:00:06PM	17 P 650561 997894	
Pto.103	09-MAR-09 5:00:53PM	17 P 650541 997903	
Pto.104	09-MAR-09 5:02:06PM	17 P 650519 997922	
Pto.105	09-MAR-09 5:02:59PM	17 P 650530 997908	
Pto.106	09-MAR-09 5:08:22PM	17 P 650617 997822	
Pto.107	10-MAR-09 1:48:18PM	17 P 650629 997872	
Pto.108	10-MAR-09 1:50:56PM	17 P 650629 997863	
Pto.109	10-MAR-09 1:51:57PM	17 P 650608 997850	
Pto.110	10-MAR-09 1:53:11PM	17 P 650599 997839	
Pto.111	10-MAR-09 1:57:25PM	17 P 650581 997837	*Proechimis semispinosus*
Pto.112	10-MAR-09 1:58:45PM	17 P 650589 997847	
Pto.113	10-MAR-09 2:00:24PM	17 P 650601 997863	
Pto.114	10-MAR-09 2:01:28PM	17 P 650614 997881	
Pto.115	10-MAR-09 2:02:24PM	17 P 650612 997878	
Pto.116	10-MAR-09 2:05:32PM	17 P 650591 997893	
Pto.117	10-MAR-09 2:08:08PM	17 P 650582 997874	*Proechimis semispinosus*
Pto.118	10-MAR-09 2:10:35PM	17 P 650573 997866	
Pto.119	10-MAR-09 2:25:22PM	17 P 650570 997859	
Pto.120	10-MAR-09 2:38:58PM	17 P 650529 997821	
Pto.121	10-MAR-09 2:39:31PM	17 P 650539 997828	
Pto.122	10-MAR-09 2:40:14PM	17 P 650541 997835	
Pto.123	10-MAR-09 2:40:53PM	17 P 650545 997830	
Pto.124	10-MAR-09 2:44:38PM	17 P 650509 997795	
Pto.125	10-MAR-09 2:45:10PM	17 P 650516 997801	
Pto.126	10-MAR-09 2:47:32PM	17 P 650527 997839	
Pto.127	10-MAR-09 2:55:11PM	17 P 650561 997846	
Pto.128	10-MAR-09 2:57:50PM	17 P 650563 997867	
Pto.129	10-MAR-09 2:59:00PM	17 P 650557 997872	
Pto.130	10-MAR-09 3:16:01PM	17 P 650531 997849	
Pto.131	10-MAR-09 3:16:38PM	17 P 650528 997843	
Pto.132	10-MAR-09 3:18:56PM	17 P 650507 997833	
Pto.133	10-MAR-09 3:19:22PM	17 P 650514 997832	
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Pto.135	10-MAR-09 3:22:43PM	17 P 650508 997857	
Pto.136	10-MAR-09 3:24:56PM	17 P 650500 997849	
Pto.137	10-MAR-09 3:32:38PM	17 P 650492 997813	
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Pto.140	10-MAR-09 3:40:17PM	17 P 650529 997841	
Pto.141	10-MAR-09 3:44:00PM	17 P 650514 997850	
Pto.142	10-MAR-09 3:44:52PM	17 P 650508 997853	
Pto.143	10-MAR-09 3:45:39PM	17 P 650515 997862	
Pto.144	10-MAR-09 3:46:10PM	17 P 650520 997868	
Pto.145	10-MAR-09 3:46:40PM	17 P 650525 997874	
Pto.146	10-MAR-09 3:47:19PM	17 P 650528 997878	
Pto.147	10-MAR-09 3:47:54PM	17 P 650528 997884	
Pto.148	10-MAR-09 3:48:41PM	17 P 650516 997874	
Pto.149	10-MAR-09 3:49:09PM	17 P 650505 997873	
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Pto.151	10-MAR-09 3:50:19PM	17 P 650482 997873	
Pto.152	10-MAR-09 3:51:08PM	17 P 650480 997875	
Pto.153	10-MAR-09 3:51:51PM	17 P 650486 997868	
Pto.154	10-MAR-09 3:52:35PM	17 P 650489 997854	
Pto.155	10-MAR-09 3:53:50PM	17 P 650495 997841	
Pto.156	11-MAR-09 3:53:13PM	17 P 650388 997874	
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Pto.158	11-MAR-09 3:54:45PM	17 P 650386 997881	
Pto.159	11-MAR-09 3:55:27PM	17 P 650395 997879	
Pto.160	11-MAR-09 3:55:57PM	17 P 650394 997872	
Pto.161	11-MAR-09 3:57:51PM	17 P 650401 997862	
Pto.162	11-MAR-09 3:58:32PM	17 P 650419 997849	
Pto.163	11-MAR-09 3:59:05PM	17 P 650426 997850	
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Pto.172	11-MAR-09 4:09:26PM	17 P 650388 997913	
Pto.173	11-MAR-09 4:09:43PM	17 P 650388 997915	
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Pto.175	11-MAR-09 4:10:41PM	17 P 650389 997916	
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Pto.178	11-MAR-09 4:14:26PM	17 P 650422 997924	
Pto.179	11-MAR-09 4:16:17PM	17 P 650387 997925	
Pto.180	11-MAR-09 4:16:46PM	17 P 650389 997944	
Pto.181	11-MAR-09 4:17:15PM	17 P 650387 997936	
Pto.182	11-MAR-09 4:19:52PM	17 P 650431 997931	
Pto.183	11-MAR-09 4:22:46PM	17 P 650391 997957	
Pto.184	11-MAR-09 4:23:35PM	17 P 650394 997952	
Pto.185	11-MAR-09 4:24:17PM	17 P 650391 997947	

Pto.186	11-MAR-09 4:25:45PM	17 P 650387 997901	
Pto.187	11-MAR-09 4:26:04PM	17 P 650383 997899	
Pto.188	11-MAR-09 4:27:12PM	17 P 650415 997917	
Pto.189	11-MAR-09 4:28:00PM	17 P 650385 997911	
Pto.190	11-MAR-09 4:30:08PM	17 P 650405 997891	
Pto.191	11-MAR-09 4:31:01PM	17 P 650403 997879	
Pto.192	11-MAR-09 4:32:32PM	17 P 650398 997862	
Pto.193	11-MAR-09 4:32:52PM	17 P 650396 997864	
Pto.194	11-MAR-09 4:33:09PM	17 P 650394 997866	
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Pto.197	11-MAR-09 5:19:13PM	17 P 650334 998009	
Pto.198	11-MAR-09 5:21:16PM	17 P 650313 998028	
Pto.199	11-MAR-09 5:21:38PM	17 P 650308 998033	
Pto.200	11-MAR-09 5:22:11PM	17 P 650302 998036	
Pto.201	11-MAR-09 5:23:44PM	17 P 650295 998042	
Pto.202	11-MAR-09 5:24:54PM	17 P 650310 998055	
Pto.203	11-MAR-09 5:26:23PM	17 P 650330 998046	
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Pto.211	13-MAR-09 4:57:14PM	17 P 649966 998240	
Pto.212	13-MAR-09 4:59:16PM	17 P 649994 998243	
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Pto.214	13-MAR-09 5:05:22PM	17 P 649964 998201	
Pto.215	13-MAR-09 5:07:20PM	17 P 649949 998205	
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Pto.218	13-MAR-09 5:19:06PM	17 P 649943 998170	
Pto.219	13-MAR-09 5:23:15PM	17 P 649929 998188	
Pto.220	13-MAR-09 5:27:45PM	17 P 649917 998195	
Pto.221	13-MAR-09 5:35:56PM	17 P 650068 998227	
Pto.222	13-MAR-09 5:40:27PM	17 P 650055 998244	
Pto.223	13-MAR-09 5:48:58PM	17 P 650041 998260	
Pto.224	13-MAR-09 5:54:56PM	17 P 650021 998272	
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Pto.227	13-MAR-09 6:04:36PM	17 P 650091 998208	
Pto.228	13-MAR-09 6:07:23PM	17 P 650094 998197	
Pto.229	13-MAR-09 6:11:45PM	17 P 650098 998178	
Pto.230	13-MAR-09 6:14:58PM	17 P 650098 998168	
Pto.231	13-MAR-09 6:17:10PM	17 P 650105 998163	
Pto.232	13-MAR-09 6:19:53PM	17 P 650104 998149	

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Pto.235	13-MAR-09 6:28:59PM	17 P 650126 998140	
Pto.236	13-MAR-09 6:31:23PM	17 P 650132 998154	
Pto.237	13-MAR-09 6:34:45PM	17 P 650125 998107	
Pto.238	13-MAR-09 6:36:45PM	17 P 650138 998121	
Pto.239	13-MAR-09 6:40:48PM	17 P 650081 998093	
Pto.240	13-MAR-09 6:43:57PM	17 P 650130 998095	*Sigmodon hispidus*
Pto.241	13-MAR-09 6:46:03PM	17 P 650144 998104	
Pto.242	13-MAR-09 6:50:18PM	17 P 650131 998073	
Pto.243	13-MAR-09 6:53:29PM	17 P 650124 998062	
Pto.244	17-MAR-09 2:07:38PM	17 P 650149 997180	Camara
Pto.245	17-MAR-09 4:35:41PM	17 P 650455 997895	Camara
Pto.246	17-MAR-09 4:39:26PM	17 P 650473 997909	Camara
Pto.247	17-MAR-09 5:22:04PM	17 P 650651 997604	Camara
Pto.248	17-MAR-09 6:07:14PM	17 P 647332 1003385	Camara

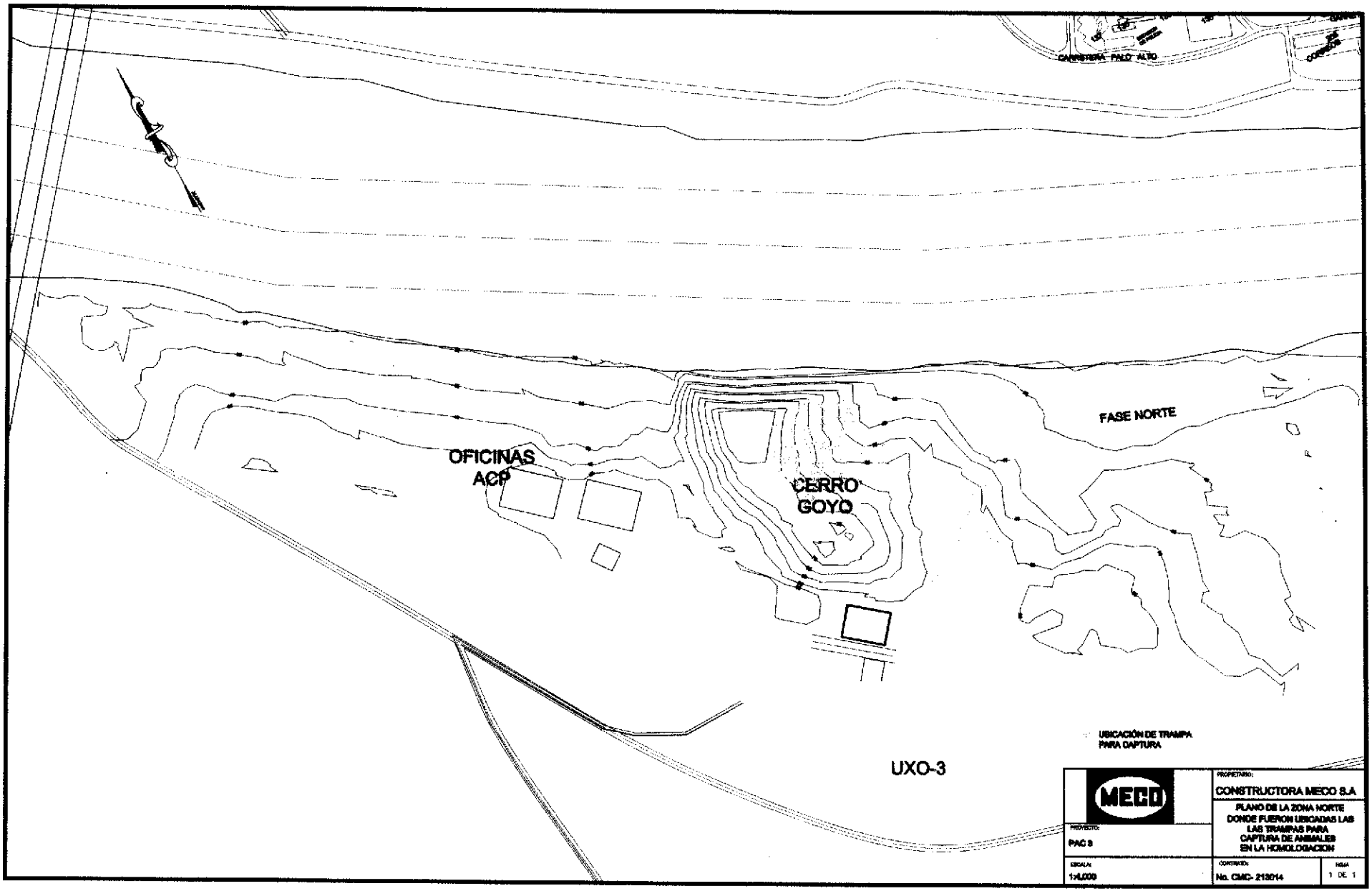

CARRETERA PALO ALTO
FASE NORTE
OFICINAS ACP
CERRO GOYO
UXO-3
UBICACIÓN DE TRAMPA PARA CAPTURA
LUGARES DONDE HUBO CAPTURA
UBICACIÓN DE CAMARAS
MECO
PROPIETARIO:
CONSTRUCTORA MECO S.A
CONTENIDO:
PLANO DE LA ZONA NORTE DONDE FUERON UBICADAS LAS LAS TRAMPAS PARA CAPTURA DE ANIMALES
PROYECTO:
PAC 3
ESCALA:
1:4,000
CONTRATO:
No. CMC- 213014
HOJA
1 DE 1

COORDENADAS COLOCACIÓN DE TRAMPAS (HOMOLOGACIÓN).

# de Pto.	Fecha/Hora	Coordenada
15 N	27-MAR-09 5:14:26PM	17 P 650500 997907
1	27-MAR-09 4:43:03PM	17 P 650447 997869
2	27-MAR-09 5:02:38PM	17 P 650462 997882
10 G	25-MAR-09 6:08:25PM	17 P 650541 997753
10 Gn	27-MAR-09 5:58:59PM	17 P 650438 997856
10 N	27-MAR-09 5:19:01PM	17 P 650473 997905
101	25-MAR-09 6:00:20PM	17 P 650516 997738
11	25-MAR-09 5:22:16PM	17 P 650581 997786
11 G	25-MAR-09 6:28:34PM	17 P 650550 997737
11 Gn	27-MAR-09 5:44:33PM	17 P 650424 997889
12	25-MAR-09 5:24:34PM	17 P 650561 997779
12:00 a.m.	27-MAR-09 4:56:05PM	17 P 650446 997868
13	26-MAR-09 6:00:56PM	17 P 650420 997886
13 A	27-MAR-09 4:57:28PM	17 P 650445 997876
15	25-MAR-09 5:56:54PM	17 P 650504 997734
15 A	27-MAR-09 5:05:47PM	17 P 650479 997885
16	25-MAR-09 5:27:08PM	17 P 650548 997766
16 A	27-MAR-09 5:28:52PM	17 P 650457 997907
17	25-MAR-09 5:38:10PM	17 P 650501 997740
17 N	27-MAR-09 5:30:43PM	*17 P 650442 997899*
18	25-MAR-09 5:53:32PM	*17 P 650495 997730*
18 A	27-MAR-09 5:07:07PM	17 P 650495 997891
18 N	27-MAR-09 5:22:24PM	17 P 650481 997921
19	25-MAR-09 5:35:36PM	17 P 650512 997745
19 N	27-MAR-09 5:29:45PM	17 P 650445 997908
20	25-MAR-09 6:32:58PM	17 P 650541 997739
20 A	27-MAR-09 5:01:26PM	17 P 650450 997877
20 C	27-MAR-09 6:07:07PM	17 P 650431 997850
21	25-MAR-09 5:46:29PM	17 P 650486 997728
21 A	27-MAR-09 4:54:53PM	17 P 650442 997864
21 C	27-MAR-09 5:49:48PM	17 P 650422 997871
21 V	27-MAR-09 5:04:18PM	17 P 650471 997880
22	25-MAR-09 5:42:41PM	17 P 650488 997737
22 A	27-MAR-09 5:16:04PM	17 P 650499 997915
22 C	27-MAR-09 5:46:10PM	17 P 650421 997886
23	25-MAR-09 5:32:51PM	17 P 650526 997751
23 C	27-MAR-09 5:47:26PM	17 P 650416 997882
23 N	27-MAR-09 5:13:32PM	17 P 650499 997901
23 V	27-MAR-09 5:05:05PM	17 P 650464 997891
24 C	27-MAR-09 5:48:52PM	17 P 650418 997876
25	26-MAR-09 5:40:00PM	17 P 650490 997865
25 C	27-MAR-09 6:06:35PM	17 P 650428 997853
25A	28-MAR-09 9:26:08AM	17 P 650464 997893
26	25-MAR-09 6:36:44PM	17 P 650552 997722

26 A	27-MAR-09 5:03:24PM	17 P 650468 997883
27	25-MAR-09 6:37:28PM	*17 P 650546 997719*
28	25-MAR-09 6:38:32PM	17 P 650557 997730
29	25-MAR-09 6:35:27PM	17 P 650555 997738
3	26-MAR-09 5:42:05PM	17 P 650511 997860
3 Gv	27-MAR-09 5:32:01PM	17 P 650434 997898
30	25-MAR-09 6:34:19PM	17 P 650553 997728
33	26-MAR-09 5:49:15PM	17 P 650462 997888
33 A	27-MAR-09 5:06:25PM	17 P 650486 997889
35	26-MAR-09 5:34:00PM	17 P 650461 997863
35 A	27-MAR-09 5:12:44PM	17 P 650491 997896
36	26-MAR-09 5:58:40PM	17 P 650436 997900
36 Gv	27-MAR-09 5:36:39PM	17 P 650420 997896
37	26-MAR-09 5:56:58PM	17 P 650449 997898
37 Gv	27-MAR-09 5:34:21PM	17 P 650424 997896
4	26-MAR-09 5:27:38PM	17 P 650470 997862
04:00 a.m.	27-MAR-09 4:58:15PM	17 P 650449 997886
7	25-MAR-09 5:23:15PM	17 P 650573 997783
07:00 a.m.	27-MAR-09 5:20:24PM	17 P 650475 997911
7 Gn	27-MAR-09 6:01:14PM	17 P 650462 997863
7 M	27-MAR-09 5:43:25PM	17 P 650418 997885
702	25-MAR-09 6:03:53PM	17 P 650521 997742
8	25-MAR-09 6:05:01PM	17 P 650520 997741
08:00 a.m.	27-MAR-09 4:59:46PM	17 P 650450 997890
8 G	25-MAR-09 6:30:16PM	17 P 650554 997744
8 Gn	27-MAR-09 5:51:28PM	17 P 650425 997868
8 M	27-MAR-09 6:01:59PM	17 P 650464 997855
8 V	27-MAR-09 5:21:30PM	17 P 650481 997914
9	25-MAR-09 5:28:55PM	17 P 650536 997760
09:00 a.m.	27-MAR-09 6:05:50PM	17 P 650427 997853
9 G	25-MAR-09 6:25:17PM	17 P 650538 997741
9 Gn	27-MAR-09 5:40:43PM	17 P 650418 997890
a	27-MAR-09 4:53:26PM	17 P 650441 997865
aaa	27-MAR-09 5:27:10PM	17 P 650459 997905
Cam1	30-MAR-09 5:23:43PM	17 P 650442 997869
Cam2	30-MAR-09 5:24:47PM	17 P 650464 997895
15Mch	31-MAR-09 6:18:17PM	17 P 650432 997880
7M	31-MAR-09 5:00:59PM	17 P 650423 997850
3	31-MAR-09 5:16:18PM	17 P 650444 997861
7Ma	31-MAR-09 5:17:54PM	17 P 650443 997862
10M	31-MAR-09 5:20:35PM	17 P 650442 997871
8M	31-MAR-09 5:21:15PM	17 P 650451 997868
19M	31-MAR-09 5:22:05PM	17 P 650459 997867
9M	31-MAR-09 5:23:05PM	17 P 650454 997875
16M	31-MAR-09 5:25:02PM	17 P 650450 997890
20M	31-MAR-09 5:27:04PM	17 P 650464 997888
21M	31-MAR-09 5:28:21PM	17 P 650457 997895

22M	31-MAR-09 5:29:46PM	17 P 650450 997899
12M	31-MAR-09 5:32:43PM	17 P 650471 997895
37M	31-MAR-09 5:33:56PM	17 P 650475 997884
36M	31-MAR-09 5:35:32PM	17 P 650484 997891
28M	31-MAR-09 5:38:20PM	17 P 650499 997891
3M	31-MAR-09 5:39:53PM	17 P 650489 997903
13M	31-MAR-09 5:42:51PM	17 P 650504 997902
18Nm	31-MAR-09 5:44:16PM	17 P 650494 997913
21Nm	31-MAR-09 5:46:05PM	17 P 650501 997925
18M	31-MAR-09 5:48:33PM	17 P 650477 997882
7Mch	31-MAR-09 5:51:50PM	17 P 650445 997914
8Mch	31-MAR-09 5:53:43PM	17 P 650439 997918
4M	31-MAR-09 5:55:25PM	17 P 650435 997926
33M	31-MAR-09 5:56:32PM	17 P 650437 997929
25M	31-MAR-09 5:58:57PM	17 P 650452 997920
15M	31-MAR-09 6:00:50PM	17 P 650458 997928
9Mm	31-MAR-09 6:02:05PM	17 P 650470 997931
11M	31-MAR-09 6:04:40PM	17 P 650440 997898
35M	31-MAR-09 6:07:53PM	17 P 650432 997901
7Mm	31-MAR-09 6:08:55PM	17 P 650431 997894
26M	31-MAR-09 6:10:26PM	17 P 650420 997902
23M	31-MAR-09 6:12:10PM	17 P 650419 997907
17M	31-MAR-09 6:13:30PM	17 P 650424 997912
23Mch	31-MAR-09 6:15:05PM	17 P 650424 997916
9Mch	31-MAR-09 6:16:58PM	17 P 650435 997888
8Mg	31-MAR-09 6:20:00PM	17 P 650428 997872
10mg	31-MAR-09 6:21:31PM	17 P 650422 997883
11Mg	31-MAR-09 6:25:12PM	17 P 650463 997856


CARRETERA PALO ALTO
FASE NORTE
OFICINAS
ACP
CERRO
GOYO
UBICACIÓN DE TRAMPA
PARA CAPTURA
UXO-3
MECO
PROPIETARIO:
CONSTRUCTORA MECO S.A
PLANO DE LA ZONA NORTE
DONDE FUERON UBICADAS LAS
LAS TRAMPAS PARA
CAPTURA DE ANIMALES
EN LA HOMOLOGACION
PROYECTO:
PAC 3
ESCALA:
1:4,000
CONTRATO:
No. CMC- 213014
HOJA
1 DE 1

REPÚBLICA DE PANAMÁ
AUTORIDAD NACIONAL DEL AMBIENTE
DIRECCIÓN EJECUTIVA REGIONAL PANAMAMETRO
DEPARTAMENTO DE ÁREAS PROTEGIDAS Y VIDA SILVESTRE

ACTA DE LIBERACIÓN DE ESPECIES

A las 11:00 de la MAÑANA del día 7 del mes MARZO del 2009
Se procede a la liberación de:

N. Común	Especie	Sitio	Cantidad	Sexo	Condiciones
RATAS		P.N.S CAMINO DE PLANTACIÓN	3	M	BUENAS

Hacemos constancia de presencia en la liberación:

_____
nombre

9-201-260
cédula

Pastor Fernandez
Nombre del Funcionario ANAM

IRVING OETHAMCOURT
nombre

8-500-451
cédula

_____
cargo

Registro #: _____

Rescatado ☑ Donado ☐

Hora de entrada: 12:55

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☐ Mujer ☑

Fecha: 9 de marzo del 2009

Nombre: Najaira Y. Jiménez

Dirección: Colón, Nazareno A

Teléfonos: 6813-6427

Correo electrónico: Jnajaira@yahoo.com

Datos del Animal

Ave ☑ Mamífero ☐ Reptil ☐ Anfibio ☐

Nombre común: Gallinazo Cantidad de individuos: 2

Nombre científico: Coragyps atratus

Procedencia: ACP PAC 3 ampliación del Coral

Alimentación: Sí ☐ No ☑

Qué y cada cuanto?: _____

Sexo
Hembra ☐ Macho ☐ Desconocido ☑ Crias (#) ☐

Hábitos
Duirno ☑ Nocturno ☐

Estado
Salvaje ☑ Doméstico ☐

Edad
Neonato ☐ Infantil ☑ Juvenil ☐ Adulto ☐

Conducta
Pacifico ☑ Agresivo ☐

Observaciones: Bebes emplumando (3 meses) se encontraron en los postizales en el momento de las lluvias.

Recibido por: Sergio Perez

Autoridad Nacional del ambiente

autoridad nacional del ambiente
PARQUE NACIONAL SOBERANÍA

Administración Regional Panamá Metropolitana
Teléfonos: 500-0910 Fax: 500-0908-Curundu.
Apart. 2016, Ancón-Panamá

REPORTE DE RESCATE / ENTREGA DE FAUNA SILVESTRE

Fecha: 10 de MARZO de 2009 Hora 9:05 AM

Colaborador CODESA

Lugar de rescate: ACP-D Puente Centenario

Lugar de entrega: Parque Soberanía

Especies entregadas: 1 Rescatadas: _____

	Nombre Común	Nombre Científico	Cantidad/Sexo
1.	rana		1
2.			
3.			
4.			
5.			

Estado General del espécimen:

Sano: ✓
En recuperación de herida: _____
Buena condiciones físicas: _____

Nombre del Custodio: IRVING BETHANCURT

Observaciones: _____

Entregado por: _____
Cédula: 8-500-451

Recibido por: Jorge Moreno
Cédula: 4-126-2681

2

Autoridad Nacional del ambiente

autoridad nacional del ambiente
PARQUE NACIONAL SOBERANÍA

Administración Regional Panamá Metropolitana
Teléfonos: 500-0910 Fax: 500-0908-Curundu.
Apart. 2016, Ancón-Panamá

REPORTE DE RESCATE / ENTREGA DE FAUNA SILVESTRE

Fecha: 11 de Marzo de 2009 Hora 11:15 am

Colaborador CO-DESA

Lugar de rescate: AC.P -> Puerta Centenario

Lugar de entrega: P.N. Soberanía

Especies entregadas: 2 Rescatadas: _____

	Nombre Común	Nombre Científico	Cantidad/Sexo
1.	Ratón de campo	Proechimys Semispinosus	1 #
2.	Ratón de campo	Sigmus SP	1 - H
3.			
4.			
5.			

Estado General del espécimen:

Sano: ✓
En recuperación de herida: _____
Buena condiciones físicas: _____

Nombre del Custodio: ANAM (Parque Soberanía).

Observaciones: Rescate de fauna del proyecto de la acp. por la ampliación del canal.

Entregado por: Germán Herman
Cédula: 9-717-514

Recibido por: Yuleri Sánchez
Cédula: 7-702-1118

REPÚBLICA DE PANAMÁ
AUTORIDAD NACIONAL DEL AMBIENTE
DIRECCIÓN EJECUTIVA REGIONAL PANAMAMETRO
DEPARTAMENTO DE ÁREAS PROTEGIDAS Y VIDA SILVESTRE

ACTA DE LIBERACIÓN DE ESPECIES

A las 11:15 de la A.M. del día 11 del mes Marzo del 2009
Se procede a la liberación de:

N. Común	Especie	Sitio	Cantidad	Sexo	Condiciones
Ratón de Conto	Proechimys semispinosus	P.N. Soberania	1	H	Buenas
Ratón de campo	Zygodontomys sp.	P.N. Soberania	1	H	Buenas

Hacemos constancia de presencia en la liberación:

[signature]
nombre

9-196-740
cédula

Nombre del Funcionario ANAM

Juan Bethancourt
nombre

8-500 451
cédula

Biologo
cargo

[illegible]
autoridad
nacional del
ambiente

Nombre del Custodio: Avenida Porque Soberanía

Observaciones: Rescate de fauna debido a la afectación de la servidumbre por la ampliación del Canal.

Entregado por: Irving Rodríguez Recibido por: J.A. Jiménez
Cédula: 8-500457 Cédula: 8-715-1124

SUBTERRANEA

Registro #: 17

Rescatado ☐ Donado ☑

Hora de entrada: 12:25 PM

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☑ Mujer ☐

Fecha: 12 de mayo del 2009

Nombre: Irelia Betancourt

Dirección: Residencial las lomas #91

Teléfonos: 65920859

Correo electrónico: _____

Datos del Animal

Ave ☑ Mamífero ☐ Reptil ☐ Anfibio ☐

Nombre común: Gallinazo Cantidad de individuos: 1

Nombre científico: Coragyps atratus

Procedencia: A.C.P Ampliacion del canal

Alimentación: Sí ☐ No ☑

Qué y cada cuanto?: _____

Sexo
Hembra ☐ Macho ☐ Desconocido ☑ Crias (#) ☐

Hábitos
Diurno ☑ Nocturno ☐

Estado
Salvaje ☑ Doméstico ☐

Edad
Neonato ☐ Infantil ☑ Juvenil ☐ Adulto ☐

Conducta
Pacífico ☑ Agresivo ☐

Observaciones: Rescatado por Codesa.

Recibido por: Sergio Pérez Elías Estrada

ISTHMIAN EXPLOSIVE DISPOSAL

ACTA DE ENTREGA
FAUNA SILVESTRE
Proyecto PAC-3 CC-08-33

FECHA: 12 DE MARZO del 2009.

SITIO: ÁREA UXO 1.

Por medio del presente documento le hacemos formal entrega de 1 individuo(s) de la fauna silvestre, conocido comúnmente como Gallinazo, cuyo nombre científico es Coragyps atratus

Entregado IED:

9:05 A.M.

Recibido MECO SA
ENTREGADO A
CODESA:
IRVING BEITHANCOURT

Registro #: _____

Rescatado [X] Donado [ ]

Hora de entrada: 6:40 PM

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre [X] Mujer [ ]

Fecha: 11 de Marzo 2009

Nombre: Irving Bethancourt

Dirección: Residencial Las Lomas #91

Teléfonos: 65920859

Correo electrónico: arcinus07@hotmail.com

Datos del Animal

Ave [ ] Mamífero [X] Reptil [ ] Anfibio [ ]

Nombre común: Perezoso de 2 garras Cantidad de individuos: 1

Nombre científico: Choloepus Hoffmanni

Procedencia: PAC-3 Ampliación ACP

Alimentación: Sí [ ] No [X]

Qué y cada cuanto?: _____

Parque Natural Metropolitano
Recibido: Elías Estrada
Fecha: 11-3-2009
Hora: 6:40 PM

Sexo
Hembra [X] Macho [ ] Desconocido [ ] Crias (#) [ ]

Hábitos
Diurno [X] Nocturno [X]

Estado
Salvaje [ ] Doméstico [ ]

Edad
Neonato [ ] Infantil [ ] Juvenil [ ] Adulto [X]

Conducta
Pacífico [X] Agresivo [ ]

Observaciones: Rescatado Por CODESA

Recibido por: Elías Estrada U

ISTHMIAN EXPLOSIVE DISPOSAL

ACTA DE ENTREGA
FAUNA SILVESTRE
Proyecto PAC-3 CC-08-33

FECHA: 11 de marzo del 2009.

SITIO: ÁREA UXO 1.

Por medio del presente documento le hacemos formal entrega de 1 individuo(s) de la fauna silvestre, conocido comúnmente como Perezoso de dos Garras, cuyo nombre científico es Choloepus Hoffmanni

Entregado IED:

Recibido MECO SA

Codesa
IRVING BETHANCOURT

Registro #: 18

Rescatado ☐ Donado ☑

Hora de entrada: 6:05 PM

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☑ Mujer ☐

Fecha: 12 de mayo del 2009

Nombre: Irvin Bethancourt

Dirección: Residencial las Lomas #91

Teléfonos: 65920859

Correo electrónico: Orvins07@hotmail.com

Datos del Animal

Ave ☐ Mamífero ☑ Reptil ☐ Anfibio ☐

Nombre común: muleto Cantidad de individuos: 1

Nombre científico: Sylvilagus brasiliensis

Procedencia: PHC-3 ampliación del canal ACP

Alimentación: Sí ☐ No ☑

Qué y cada cuanto?:

Sexo
Hembra ☑ Macho ☐ Desconocido ☐ Crias (#) ☐

Hábitos
Duirno ☐ Nocturno ☑

Estado
Salvaje ☑ Doméstico ☐

Edad
Neonato ☐ Infantil ☑ Juvenil ☐ Adulto ☐

Conducta
Pacífico ☑ Agresivo ☐

Observaciones: golpeado Rescatado Por CODESA

Recibido por: Sergio Pérez G.

Autoridad
Nacional del
ambiente

autoridad
nacional del
ambiente
PARQUE NACIONAL
SOBERANÍA

Administración Regional Panamá Metropolitana
Teléfonos: 500-0910 Fax: 500-0908-Curundu.
Apart. 2016, Ancón-Panamá

REPORTE DE RESCATE / ENTREGA DE FAUNA SILVESTRE

Fecha: 14 de MARZO de 2009 Hora 10:05

Colaborador CODESA

Lugar de rescate:
AMPLIACIÓN DEL CANAL

Lugar de entrega: P.N.S

Especies entregadas: 1 Rescatadas:

	Nombre Común	Nombre Científico	Cantidad/Sexo
1.	RATON ESPINOZO	SIGMODON HISPIDUS	1 H
2.			
3.			
4.			
5.			

Estado General del espécimen:

Sano: ✓
En recuperación de herida:
Buena condiciones físicas: ✓

REPÚBLICA DE PANAMÁ
AUTORIDAD NACIONAL DEL AMBIENTE
DIRECCIÓN EJECUTIVA REGIONAL PANAMAMETRO
DEPARTAMENTO DE ÁREAS PROTEGIDAS Y VIDA SILVESTRE

ACTA DE LIBERACIÓN DE ESPECIES

A las 10:20 de la AM del día 14 del mes 11/12/20 del 20 09
Se procede a la liberación de:

N. Común	Especie	Sitio	Cantidad	Sexo	Condiciones
Raton A. FSP 11020	Sigmodon Hispidus	P.N.S	1	H	✓

Hacemos constancia de presencia en la liberación:

Jorge Atencio
nombre

Juan Bethancourt
nombre

4-126-2481
cédula

8-500 451
cédula

Nombre del Funcionario ANAM

cargo

Registro #: 25

Rescatado ☐ Donado ☑

Hora de entrada: 6:17 PM

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☑ Mujer ☐

Fecha: 16 de mayo dd 2009

Nombre: IRUIN BETANCOURT

Dirección: Residencial las lomas # 91

Teléfonos: 65 92 0859

Correo electrónico: Oriuna a7@hotmail.com

Datos del Animal

Ave ☐ Mamífero ☐ Reptil ☑ Anfibio ☐

Nombre común: tortuga Cantidad de individuos: 1

Nombre científico: T. Trachemys scripta

Procedencia: ACP Ampliación del Canal Pac-3

Alimentación: Sí ☐ No ☒

Qué y cada cuanto?:

Sexo
Hembra ☐ Macho ☒ Desconocido ☐ Crias (#) ☐

Hábitos
Duirno ☒ Nocturno ☒

Estado
Salvaje ☒ Doméstico ☐

Edad
Neonato ☐ Infantil ☐ Juvenil ☐ Adulto ☒

Conducta
Pacífico ☒ Agresivo ☐

Observaciones: Tiene una pequeña y muja rajadura en la parte posterior izquierda

Recibido por: Sergio Peña

ISTHMIAN EXPLOSIVE DISPOSAL

ACTA DE ENTREGA
FAUNA SILVESTRE
Proyecto PAC-3 CC-08-33

FECHA: 16-3- del 2009.

SITIO: ÁREA UXO Campamento

Por medio del presente documento le hacemos formal entrega de una individuo(s) de la fauna silvestre, conocido comúnmente como ficotea T. de agua dulce cuyo nombre científico es Trachemys scripta.

Entregado IED: Recibido MECO SA

Autoridad Nacional del ambiente

autoridad nacional del ambiente
PARQUE NACIONAL SOBERANÍA

Administración Regional Panamá Metropolitana
Teléfonos: 500-0910 Fax: 500-0908-Curundu.
Apart. 2016, Ancón-Panamá

REPORTE DE RESCATE / ENTREGA DE FAUNA SILVESTRE

Fecha: 17 de Marzo de 2009 Hora 5:43 PM

Colaborador CODESA

Lugar de rescate: Ampliación del Canal

Lugar de entrega: P.N.S

Especies entregadas: 3 Rescatadas:

	Nombre Común	Nombre Científico	Cantidad/Sexo
1.	Serpiente X	Bothrops asper	1 -
2.	Tapacara	Cyclopa didactylus	1 -
3.	Camaleon	Corytophanes cristatus	1
4.			
5.			

Estado General del espécimen:

Sano: ✓
En recuperación de herida:
Buena condiciones físicas: ✓

Nombre del Custodio: IRVING BETHANCURT

Observaciones: _____

_____

_____

_____

_____

_____

Entregado por: _____ Recibido por: _____

Cédula: 8-500-451 Cédula: 9-[illegible]6-740

REPÚBLICA DE PANAMÁ
AUTORIDAD NACIONAL DEL AMBIENTE
DIRECCIÓN EJECUTIVA REGIONAL PANAMAMETRO
DEPARTAMENTO DE ÁREAS PROTEGIDAS Y VIDA SILVESTRE

ACTA DE LIBERACIÓN DE ESPECIES

A las 5:53 de la TARDE del día 17/03/ del mes MAR del 20 09
Se procede a la liberación de:

N. Común	Especie	Sitio	Cantidad	Sexo	Condiciones
Serrucho X	Bothrops sp.	P.N.S	1		Estable.
Tapacora	Cyclorrhis sp.	P.N.S.	1		"
Comelón	Conepatus Semistriatus	P.N.S	1		Estable

Hacemos constancia de presencia en la liberación:

Edgar Perez
nombre

9-496-740
cédula

Nombre del Funcionario ANAM

Jaime Batista
nombre

8-500 451
cédula

Biólogo
cargo

Registro #: 28

Rescatado ☐ Donado ☑

Hora de entrada: 11:55AM

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☐ Mujer ☑

Fecha: 18 de marzo

Nombre: Najaira Jiménez

Dirección: Colón, Nazareno A

Teléfonos: 6813-6427

Correo electrónico: Jnajaira@yahoo.com.

Datos del Animal

Ave ☐ Mamífero ☑ Reptil ☐ Anfibio ☐

Nombre común: Mulato Cantidad de individuos: 1

Nombre científico: Sylvilagus brasiliensis

Procedencia: PAC-3 ampliación del Canal ACP

Alimentación: Sí ☐ No ☑

Qué y cada cuanto?: _____

Sexo
Hembra ☑ Macho ☐ Desconocido ☐ Crias (#) ☐

Hábitos
Duirno ☐ Nocturno ☑

Estado
Salvaje ☑ Doméstico ☐

Edad
Neonato ☐ Infantil ☑ Juvenil ☐ Adulto ☐

Conducta
Pacífico ☑ Agresivo ☐

Observaciones: Rescatado por CODESA

Recibido por: Sergio Pérez, Elías Estrada

Registro #: 30

Rescatado ☐ Donado ☑ Hora de entrada: 12:15 PM

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☑ Mujer ☐

Fecha: 19 de mayo del 2009

Nombre: IRUIN BGTANCOUR

Dirección: Residencial las lomas #91

Teléfonos: 65920859

Correo electrónico: Oficinas 07@hotmail.com

Datos del Animal

Ave ☐ Mamífero ☑ Reptil ☐ Anfibio ☐

Nombre común: Raton arrozero Cantidad de individuos: 2

Nombre científico: oligorizomys Fulvescens

Procedencia: ACP

Alimentación: Sí ☑ No ☐

Qué y cada cuanto?: Arroz

Sexo
Hembra ☑ Macho ☐ Desconocido ☐ Crias (#) 1

Hábitos
Duirno ☐ Nocturno ☑

Estado
Salvaje ☑ Doméstico ☐

Edad
Neonato ☐ Infantil ☑ Juvenil ☐ Adulto ☑

Conducta
Pacifico ☑ Agresivo ☐

Observaciones: Rescatado por codesa

Recibido por: Sergio Pérez, Elias estrada

12:35 PM 19/05/09

Registro #: 35

Rescatado ☐ Donado ☑ Hora de entrada: 4:53 PM

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☑ Mujer ☐

Fecha: 20 de marzo del 2009

Nombre: IRVIN BETANCOUR

Dirección: Residencial las lomas #91

Teléfonos: 65920859

Correo electrónico: Orcinus07@hotmail.com

Datos del Animal

Ave ☐ Mamífero ☐ Reptil ☑ Anfibio ☐

Nombre común: tortuga Cantidad de individuos: 1

Nombre científico: Trachemys Sp. posible Rhynoclemys ?

Procedencia: A.C.P

Alimentación: Sí ☐ No ☑

Qué y cada cuanto?:

Sexo
Hembra ☐ Macho ☐ Desconocido ☑ Crias (#) ☐

Hábitos
Duirno ☑ Nocturno ☑

Estado
Salvaje ☑ Doméstico ☐

Edad
Neonato ☐ Infantil ☐ Juvenil ☐ Adulto ☑

Conducta
Pacífico ☑ Agresivo ☐

Observaciones: Rescatado Por codesa

Recibido por: Sergio Peiz q.

Registro #: 37

Rescatado ☑ Donado ☐

Hora de entrada: 1:20 Pm.

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☐ Mujer ☑

Fecha: 21 de marzo del 2009

Nombre: Najaira Giménez

Dirección: Colón, Nazareno A

Teléfonos: 6813-6427

Correo electrónico: JNajaira@yahoo.com

Datos del Animal

Ave ☐ Mamífero ☐ Reptil ☑ Anfibio ☐

Nombre común: Anolis Cantidad de individuos: _____

Nombre científico: Dactyloa insignis

Procedencia: PAC-3 ampliación del Canal ACP

Alimentación: Si ☐ No ☑

Qué y cada cuanto?: _____

Sexo
Hembra ☑ Macho ☐ Desconocido ☐ Crias (#) ☐

Hábitos
Duirno ☑ Nocturno ☐

Estado
Salvaje ☑ Doméstico ☐

Edad
Neonato ☐ Infantil ☐ Juvenil ☐ Adulto ☑

Conducta
Pacifico ☑ Agresivo ☐

Observaciones: Rescatado por CODESA

Recibido por: Sergio Pérez J.

Autoridad Nacional del ambiente

autoridad nacional del ambiente
PARQUE NACIONAL SOBERANÍA

Administración Regional Panamá Metropolitana
Teléfonos: 500-0910 Fax: 500-0908-Curundu.
Apart. 2016, Ancón-Panamá

REPORTE DE RESCATE / ENTREGA DE FAUNA SILVESTRE

Fecha: 23 de MARZO de 2009 Hora 11:58 AM

Colaborador CODESA

Lugar de rescate: PAC - 3 AMPLIACIÓN del CANAL

Lugar de entrega: ANAM - PARQUE NACIONAL SOBERANÍA

Especies entregadas: 1 Rescatadas:

	Nombre Común	Nombre Científico	Cantidad/Sexo
1.	Oso hormiguero	TAMANDUA MEXICANA	1 / H
2.			
3.			
4.			
5.			

Estado General del espécimen:

Sano: ✓
En recuperación de herida:
Buena condiciones físicas:

REPÚBLICA DE PANAMÁ
AUTORIDAD NACIONAL DEL AMBIENTE
DIRECCIÓN EJECUTIVA REGIONAL PANAMAMETRO
DEPARTAMENTO DE ÁREAS PROTEGIDAS Y VIDA SILVESTRE

ACTA DE LIBERACIÓN DE ESPECIES

A las 11:58 de la MAÑANA del día 23 del mes MARZO del 2009
Se procede a la liberación de:

N. Común	Especie	Sitio	Cantidad	Sexo	Condiciones
OSO HORMIQUERO	TAMANDUA MEXICANA	P.N SOBERANIA	1	H	

Hacemos constancia de presencia en la liberación:

José Muñoz
nombre

8-323-97
cédula

Roy Quintero B.
nombre

8-761-201
cédula

Nombre del Funcionario ANAM

cargo

Autoridad
Nacional del
ambiente

autoridad
nacional del
ambiente
PARQUE NACIONAL
SOBERANÍA

Administración Regional Panamá Metropolitana
Teléfonos: 500-0910 Fax: 500-0908-Curundu.
Apart. 2016, Ancón-Panamá

REPORTE DE RESCATE / ENTREGA DE FAUNA SILVESTRE

Fecha: 23 de MARZO de 2009 Hora 1:58pm

Colaborador CODESA

Lugar de rescate:
PAC- 3 Ampliación del Canal

Lugar de entrega: Parque Nacional Soberanía

Especies entregadas: 2 Rescatadas: _____

	Nombre Común	Nombre Científico	Cantidad/Sexo	
1.	Iguana Verde	Iguana Iguana	1	M
2.	Lagartija	Anolis biporcatus	1	—
3.				
4.				
5.				

Estado General del espécimen:

Sano: ✓
En recuperación de herida: _____
Buena condiciones físicas: _____

REPÚBLICA DE PANAMÁ
AUTORIDAD NACIONAL DEL AMBIENTE
DIRECCIÓN EJECUTIVA REGIONAL PANAMAMETRO
DEPARTAMENTO DE ÁREAS PROTEGIDAS Y VIDA SILVESTRE

ACTA DE LIBERACIÓN DE ESPECIES

A las 1:30 de la Tarde del día 23 del mes MARZO del 20 09
Se procede a la liberación de:

N. Común	Especie	Sitio	Cantidad	Sexo	Condiciones
Iguana Verde	Iguana Iguana	P.N Soberanía	1	M	Buenas
Lagartija	Anolis bipocatus	P.N Soberanía	1	-	Buenas

Hacemos constancia de presencia en la liberación:

nombre

8-715-1174
cédula

Nombre del Funcionario ANAM

nombre

8-761-201
cédula

cargo

Autoridad
Nacional del
ambiente

autoridad
nacional del
ambiente

PARQUE NACIONAL
SOBERANÍA

Administración Regional Panamá Metropolitana
Teléfonos: 500-0910 Fax: 500-0908-Curundu.
Apart.2016, Ancón-Panamá

REPORTE DE RESCATE / ENTREGA DE FAUNA SILVESTRE

Fecha: 25 de MARZO de 2009 Hora 12:00 MD

Colaborador CODESA

Lugar de rescate:
Ampliación del Canal

Lugar de entrega: Parque Nacional Soberanía

Especies entregadas: 1 Rescatadas:

	Nombre Común	Nombre Científico	Cantidad/Sexo	
1.	Conejo Muleto	Sylvilagus brasiliensis	1	M
2.				
3.				
4.				
5.				

Estado General del espécimen:

Sano: ✓
En recuperación de herida:
Buena condiciones físicas:

Nombre del Custodio: ANAM - PIN-Soberanía

Observaciones: Ampliación del Canal - PAC-3
CODESA

Entregado por:
Cédula: 9-500-[illegible]

Recibido por: Julia Sánchez
Cédula: 8-702-1158

REPÚBLICA DE PANAMÁ
AUTORIDAD NACIONAL DEL AMBIENTE
DIRECCIÓN EJECUTIVA REGIONAL PANAMAMETRO
DEPARTAMENTO DE ÁREAS PROTEGIDAS Y VIDA SILVESTRE

ACTA DE LIBERACIÓN DE ESPECIES

A las 12:00 de la MAÑANA del día 25 del mes MARZO del 2009
Se procede a la liberación de:

N. Comun	Especie	Sitio	Cantidad	Sexo	Condiciones
CONEJO MULETO	Sylvilagus brasiliensis	P.N SOBERANÍA	1	M	BUENA

Hacemos constancia de presencia en la liberación:

ROBERTO GARCIA J
nombre

8-155-967
cédula

Nombre del Funcionario ANAM

Jaime Belhamcourt
nombre

8-500 451
cédula

Biólogo
cargo

autoridad nacional del ambiente
PARQUE NACIONAL SOBERANÍA

Registro #: _____

Rescatado ☐ Donado ☑

Hora de entrada: 7:00 AM

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☑ Mujer ☐

Fecha: 26 de Marzo 2009

Nombre: Irvin Bethancour

Dirección: Residencial Las Lomas #91

Teléfonos: 6592 0859

Correo electrónico: orcinus07@hotmail.com

Datos del Animal

Ave ☐ Mamífero ☑ Reptil ☐ Anfibio ☐

Nombre común: Muletos Cantidad de individuos: 2

Nombre científico: Sylvilagus brasiliensis

Procedencia: PAC-3 ampliacion del canal

Alimentación: Sí ☐ No ☐

Qué y cada cuanto?: _____

Sexo
Hembra ☑ Macho ☐ Desconocido ☐ Crias (#) 1

Hábitos
Duirno ☐ Nocturno ☑

Estado
Salvaje ☑ Doméstico ☐

Edad
Neonato ☐ Infantil ☑ Juvenil ☐ Adulto ☑

Conducta
Pacífico ☐ Agresivo ☑

Observaciones: Rescatado Por Cobra

Recibido por: Elias Estado

Registro #: 45

Rescatado ☐ Donado ☒

Hora de entrada: 2:45pm

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☒ Mujer ☐

Fecha: 25 de marzo de 2009

Nombre: Irvin Bethancourt

Dirección: Residencial Las Lomas #91

Teléfonos: 6592 0859

Correo electrónico: ascines07@hotmail.com

Datos del Animal

Ave ☐ Mamífero ☒ Reptil ☐ Anfibio ☐

Nombre común: Mulato Cantidad de individuos: 2

Nombre científico: Sylvilagus brasiliensis

Procedencia: PAC-3 Ampliación del Canal.

Alimentación: Sí ☐ No ☒

Qué y cada cuanto?: _____

Sexo
Hembra ☒ Macho ☒ Desconocido ☐ Crías (#) 1

Hábitos
Duirno ☐ Nocturno ☒

Estado
Salvaje ☒ Doméstico ☐

Edad
Neonato ☐ Infantil ☒ Juvenil ☐ Adulto ☒

Conducta
Pacífico ☐ Agresivo ☐

PARQUE NATURAL METROPOLITANO PANAMA 2:55pm 2/3/09

Observaciones: Rescatado por CODESA

Recibido por: Omaira M.

Registro #: 48

Rescatado ☐ Donado ☒

Hora de entrada: 2:45pm

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☒ Mujer ☐

Fecha: 25 de marzo de 2009

Nombre: Iván Bethancourt

Dirección: Residencial Los Lomas #91

Teléfonos: 6592059

Correo electrónico: arcinus07@hotmail.com

Datos del Animal

Ave ☐ Mamífero ☐ Reptil ☐ Anfibio ☐

Nombre común: Zorro grisdelVeja Cantidad de individuos: 2

Nombre científico: Philander opossum

Procedencia: PAC-3 Ampliación del Camal

Alimentación: Sí ☐ No ☒

Qué y cada cuanto?: _____

Sexo
Hembra ☒ Macho ☐ Desconocido ☐ Crias (#) ☐ 2 Embolsa

Hábitos
Duirno ☐ Nocturno ☒

Estado
Salvaje ☒ Doméstico ☐

Edad
Neonato ☐ Infantil ☐ Juvenil ☐ Adulto ☒

Conducta
Pacífico ☐ Agresivo ☐

Observaciones: Rescatado por ODESA

Recibido por: Julie M.

Registro #: 46

Rescatado ☐ Donado ☒ Hora de entrada: 2:45pm

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☑ Mujer ☐

Fecha: 25 de marzo de 2009

Nombre: Ivan Bethancourt

Dirección: Residencial Las Lomas #91

Teléfonos: 6592-0859

Correo electrónico: arcinus07@hotmail.com

Datos del Animal

Ave ☐ Mamífero ☒ Reptil ☐ Anfibio ☐

Nombre común: Conejo Pintado Cantidad de individuos: 1

Nombre científico: Agouti paca.

Procedencia: PNC 3 ampliación del Coral.

Alimentación: Sí ☐ No ☑

Qué y cada cuanto?: _____

Sexo
Hembra ☒ Macho ☐ Desconocido ☐ Crias (#) ☐

Hábitos
Duirno ☐ Nocturno ☑

Estado
Salvaje ☑ Doméstico ☐

Edad
Neonato ☐ Infantil ☐ Juvenil ☒ Adulto ☐

Conducta
Pacífico ☐ Agresivo ☐

Observaciones: Rescatado por CODESA.

Recibido por: Amelia M.

Registro #: 47

Rescatado ☐ Donado ☒ Hora de entrada: 2:45 p.m

PARQUE NATURAL METROPOLITANO
Programa de Rescate Rehabilitación y Readaptación de Fauna Silvestre
Registro de Ingreso

Datos de la persona que entrega al animal

Hombre ☒ Mujer ☐

Fecha: 25 de mayo de 2009

Nombre: Irvin Bethancourt

Dirección: Residencial Los Lomas # 91

Teléfonos: 6592 0859

Correo electrónico: acenios07@hotmail.com

Datos del Animal

Ave ☐ Mamífero ☐ Reptil ☐ Anfibio ☐

Nombre común: armadillo de monte Cantidad de individuos: 1

Nombre científico: Dasypus novemcinctus

Procedencia: PAC-3 ampliación del Canal

Alimentación: Sí ☐ No ☒

Qué y cada cuanto?: _____

Sexo
Hembra ☐ Macho ☐ Desconocido ☐ Crias (#) ☐

Hábitos
Duirno ☐ Nocturno ☒

Estado
Salvaje ☒ Doméstico ☐

Edad
Neonato ☐ Infantil ☐ Juvenil ☐ Adulto ☒

Conducta
Pacífico ☐ Agresivo ☐

Observaciones: Rescatado por CODESA

Recibido por: Amelia M.

Appendix J

Air Quality Monitoring, Panama Canal de Area

Resumen Ejecutivo del

Informe trimestral

ORDEN DE COMPRA SAA213442

MONITOREO DE EMISIONES A LA ATMÓSFERA EN ÁREAS DE LA AUTORIDAD DEL CANAL DE PANAMÁ

Para: ***Autoridad del Canal de Panamá***

Departamento de Ambiente, Agua y Energía

División de Ambiente

Sección de Gestión Socio Ambiental

Unidad de Políticas y Programas

De: ***Fundación Universidad de Panamá***

Por: ***Universidad de Panamá***

Instituto Especializado de Análisis

Laboratorio de Evaluaciones Ambientales "Juan A. Palacios D.

Informe revisado y editado por la Unidad de Políticas y Programas Ambientales

Introducción

La contaminación del aire ambiental en nuestro país se da en su mayor proporción por las emisiones vehiculares causadas por motores de combustión interna[1], de no controlarse en el futuro, contribuirá a deteriorar la calidad del aire no sólo en nuestro país, sino en el mundo en general[2]. Por esta razón la Autoridad del Canal de Panamá (ACP), inició desde el año 2007, la medición de la calidad de aire en sus instalaciones operativas.

Actualmente con el desarrollo del proyecto de ampliación del Canal de Panamá, el monitoreo de la calidad de aire es parte de los compromisos adquiridos por la ACP ante instituciones nacionales e internacionales tanto de índole ambiental como financiera por lo que se requiere informar de forma continua sobre la calidad del aire dentro de las áreas operativas de la ACP, al igual que en áreas consideradas como áreas de influencia del proyecto de ampliación del Canal.

Antecedentes

La ACP, con miras a cumplir con sus compromisos y objetivos estratégicos para la ampliación del Canal ha establecido una relación contractual con el Instituto Especializado de Análisis de la Universidad de Panamá, quien tiene la responsabilidad legal[3] de realizar el monitoreo de la Calidad del Aire en el territorio nacional, para llevar a cabo el monitoreo de aire ambiente dentro de sus instalaciones y áreas de influencia del proyecto de ampliación del Canal. La ACP, ha establecido actualmente una red de siete estaciones para el monitoreo de la calidad aire-ambiente las cuales están ubicadas a todo lo largo del Canal para una cobertura de 70 km de longitud.

Objetivos

- Realizar las mediciones de la calidad de aire ambiente y su respectivo análisis.
- Analizar la data obtenida en los tres años de muestreo (2007 al 2009) y proponer una ecuación para el cálculo del índice de calidad de aire corporativo que incluya todos los componentes sustentando sus conclusiones.
- Confeccionar la base de datos y algunos modelos típicos de informe para el uso de la ACP en general y de la Unidad de Políticas y Programas (EACG-PP) de la División de Ambiente, en particular. La base de datos y los informes deben confeccionarse tomando en cuenta que la misma debe ser versátil y ser un apoyo para la toma de decisiones.

[1] Duke, Vasco. Informe de la Calidad del Aire en Ciudad de Panamá, 2002

[2] http://www.gsfc.nasa.gov/gsfc/earth/terra/co.htmNEW NASA/CSA MONITOR PROVIDES GLOBAL AIR POLLUTION VIEW FROM SPACE).

[3] Ley 36 de Mayo de 1996

Procedimiento

El procedimiento general del monitoreo involucra el uso de equipo automático y manual de medición de contaminantes. A continuación se describen los contaminantes a medir y la metodología científica usada para realizarlo. Es importante aclarar que la misma es metodología aprobada para su uso por la Autoridad Nacional del Ambiente (ANAM), por la Agencia de Protección del Ambiente de los Estados Unidos de América (USEPA por sus siglas en ingles) y homologada con la Agencia Europea del Ambiente (AEMA). Ver Tabla N°1.

Tabla Nº1

Sitios de monitoreo, contaminante y metodología

Sitio	Contaminante a medir	[1,2]Método	Medición		
			Digital continuo	Activo	Pasivo
Esclusas de Miraflores	NO_2	Quimiluminiscencia	♦		
	SO_2	Fluorescencia	♦		
	PM_{10}	Gravimétrico		♦	
	$PM_{2.5}$	Gravimétrico		♦	
Cocolí	NO_2	Griess Saltzmann modificado			♦
	PM_{10}	Gravimétrico		♦	
Esclusas de Pedro Miguel	NO_2	Griess Saltzmann modificado			♦
	PM_{10}	Gravimétrico		♦	
Paraíso	NO_2	Griess Saltzmann modificado			♦
	PM_{10}	Gravimétrico		♦	
Gamboa	NO_2	Griess Saltzmann modificado			♦
	PM_{10}	Gravimétrico		♦	
Esclusas de Gatún	NO_2	Griess Saltzmann modificado			♦
	PM_{10}	Gravimétrico		♦	
Gatún (Bomberos)	NO_2	Griess Saltzmann modificado			♦
	PM_{10}	Gravimétrico		♦	

[1]Metodología según Norma de Calidad del Aire Ambiente de la ACP, 2610-ESM-109
[2]40 CFR Part 53 (USEPA)

Trabajo de Campo

El trabajo de campo del monitoreo ambiental se realiza en siete sitios de la ACP, siendo estos los siguientes:

1. Lado oeste de las esclusas de Miraflores,
2. Lado este de las esclusas de Gatún,
3. Lado este de las esclusas de Pedro Miguel,
4. Garita de control del acceso oeste en Cocolí,
5. Poblado de Paraíso,
6. Gamboa, en las Oficinas de Sanidad Ambiental de la ACP y
7. La estación de Bomberos del poblado de Gatún.

Las mediciones de los contaminantes se realizan de acuerdo a la Tabla N°2.

Tabla N° 2

Contaminante, sitios y frecuencia de muestreo

Contaminante	Sitio y frecuencia de muestreo						
	Esclusas de Miraflores	Cocolí	Pedro Miguel	Paraíso	Gamboa	Esclusas de Gatún	Gatún (Bomberos)
NO_2	36 semanas (24 horas 7 días a la semana), tiempo real	9 meses (24 horas 2 días al mes)					
SO_2	20 días al mes x 9 meses						
PM_{10}	36 semanas (24 horas 1 día a la semana)						

Descripción de las estaciones

Esclusas de Miraflores (Ver figura N°1): Localizada en el lado oeste de la esclusa de Miraflores. Consiste en un remolque fijo en el cual se encuentran equipos de monitoreo digital para los principales contaminantes SO_2 y NO_2. Se cuenta con monitores semiautomáticos para la medición de las partículas de PM_{10} y $PM_{2.5}$ y una unidad monitora de meteorología para la medición de velocidad y dirección del viento, precipitación, presión barométrica, radiación solar y temperatura del aire. Su localización geográfica es la siguiente: Coordenadas geográficas =8°59.934´ Norte 79° 35.675´ Oeste y las coordenadas UTM = Zona 17, 654490m Este 995026m Norte.



Figura N°1

Esclusa de Gatún (Ver figura N°2): Estación ubicada en el lado este de la esclusa de Gatún. Consiste en una caseta para la colocación de monitores digitales de los contaminantes del aire y unidades monitoras para partículas. Se monitorea NO_2 y PM_{10}. Su localización geográfica es la siguiente: Coordenadas geográficas = 9° 16.625´ Norte 79°55.258´ Oeste y las Coordenadas UTM = Zona 17, 618514m Este 1025667m Norte.



Figura No2

Paraíso, Estación de bombeo (Ver figura No3): Se encuentra ubicada en el poblado de Paraíso, cercana al área de los transformadores de generación eléctrica de la estación de bombeo. Consiste de un monitor para PM_{10} y los dispositivos para medición pasiva (NO_2). Su localización geográfica es la siguiente: Coordenadas geográficas = 9°01.634´Norte 79°37.489´Oeste y las coordenadas UTM = Zona 17, 651156m Este 998148m Norte.



Figura No3

Cocolí, cercano a transformadores (Antigua Garita de Control de Acceso Oeste) (Ver figura Nº4): Ubicada al final de la carretera Borinquen, en Cocolí. Es un área de continuo paso de camiones y vehículos que se dirigen al proyecto de ampliación.

Consiste de un monitor para PM_{10} y los dispositivos para medición pasiva (NO_2). Su localización geográfica es la siguiente: Coordenadas geográficas = 8°59.126´ Norte 79°35.565´ Oeste y las coordenadas UTM = Zona 17, 654893m Este 993560m Norte.



Figura Nº4

Gamboa, Oficinas de Sanidad Ambiental de la ACP (Ver figura Nº5): Próxima al Cuerpo de Bomberos de Gamboa. Es un área residencial con mucha vegetación y escaso tránsito vehicular. Consiste de un monitor para PM_{10} y los dispositivos para medición pasiva (NO_2). Su localización geográfica es la siguiente: Coordenadas geográficas = 9°07.079´ Norte 79°42.122´ Oeste y las coordenadas UTM = Zona 17, 642630m Este 1008153m Norte.



Figura Nº5

Gatún, Estación de Bomberos (Ver figura Nº 6): Ubicada a pocos metros del Cuartel de Bomberos. Es un área residencial con escaso tránsito vehicular. Consiste de un monitor para PM_{10} y los dispositivos para medición pasiva (NO_2). Su localización geográfica es la siguiente: Coordenadas geográficas 9°16.179 Norte 79°55.024´ Oeste y las coordenadas UTM = Zona 17, 618945m Este 1024848m Norte.



Figura Nº6

Esclusa de Pedro Miguel (Ver figura Nº7): Estación ubicada en el lado este de la esclusa, en un extremo de entrada y salida de los barcos. Consiste de un monitor para PM_{10} y los dispositivos para medición pasiva (NO_2). Su localización geográfica es la siguiente: Coordenadas geográficas = 9°0.962´ Norte 79°36.626´ Oeste y las coordenadas UTM = Zona 17, 652739m Este 996917m Oeste.



Figura No7

Informe de Campo

Para este año 2009, se consideró la reubicación de tres estaciones para un mejor acceso y atención de los instrumentos de medición. Las estaciones que se reubicaron en el mes de febrero y marzo fueron Cocolí, Miraflores y Paraíso. Los datos de las nuevas ubicaciones se reflejaran en el trimestre correspondiente de abril a junio.

Resultados

Tabla N° 4

Valores de las mediciones realizadas por estación y contaminantes (2008)

AÑO 2008	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
SITIO	CONTAMINANTE	MESES												VALORES GUÍA		
		ENE.	FEB.	MARZO	ABRIL	MAYO	JUNIO	JULIO	AGO.	SEP.	OCT.	NOV.	DIC.	ACP	USEPA	
MIRAFLORES	PM_{10}	23.6	28.3	33.5	27.9	30.1	sd	14.5	17.2	15.6	14.3	19.8	28.0	50/150	150	
	$PM_{2.5}$	14.2	17.0	19.3	16.7	17.1	sd	8.2	9.8	8.9	8.2	11.2	16.0	----	15/35	
	NO_2	31.6	23.5	26.0	27.3	21.0	34.2	31.2	33.9	26.1	29.4	25.9	26.7	100/150	100	
	SO_2	9.6	9.6	12.2	sd	33.5	80.8	85.8	58.4	21.6	21.4	21.5	sd	80/365	80/365	
GATÚN	PM_{10}	27.8	38.4	24.0	30.2	21.2	29.3	9.7	11.4	8.3	8.3	9.1	7.9	50/150	150	
	NO_2	11.8	5.7	11.3	12.6	10.2	12.2	11.6	8.9	11.3	10.0	18.6	11.0	100/150	100	
COCOLÍ	PM_{10}	24.4	28.0	102.7	sd	106.4	sd	92.5	27.5	59.2	24.1	38.8	148.4	50/150	150	
	NO_2	18.7	28.0	18.9	26.2	12.0	19.5	17.0	12.6	15.2	15.9	35.2	sd	100/150	100	
PEDRO MIGUEL	PM_{10}	31.3	16.7	18.8	13.9	27.2	18.1	sd	20.8	19.0	18.5	16.7	sd	50/150	150	
	NO_2	15.7	12.2	14.7	18.2	15.9	16.6	16.5	16.4	20.7	11.4	27.6	sd	100/150	100	
PARAÍSO	PM_{10}	26.4	16.0	19.4	30.6	19.4	20.9	sd	13.9	12.5	40.3	sd	19.4	50/150	150	
	NO_2	12.9	11.4	13.4	11.4	10.4	14.2	13.3	15.9	14.8	6.2	25.0	11.3	100/150	100	
GAMBOA	PM_{10}	20.5	14.8	7.8	31.9	33.3	15.3	12.5	40.3	6.0	11.5	8.3	8.3	50/150	150	
	NO_2	4.2	5.7	5.6	4.5	7.5	6.7	7.0	6.5	8.9	5.6	10.0	4.5	100/150	100	
GATÚN [BOMBEROS]	PM_{10}	24.3	37.9	30.5	37.4	35.0	12.2	20.1	17.0	7.8	16.3	6.0	6.3	50/150	150	
	NO_2	18.4	10.2	16.7	15.5	13.6	10.5	6.2	9.6	11.6	8.3	23.8	4.5	100/150	100	

Tabla N° 5
Valores de las mediciones realizadas por estación y contaminantes (2009)

AÑO 2009	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
SITIO	CONTAMINANTE	MESES												VALORES GUÍA		
		ENE.	FEB.	MARZO	ABRIL	MAYO	JUNIO	JULIO	AGO.	SEP.	OCT.	NOV.	DIC.	ACP	USEPA	
MIRAFLORES	PM_{10}	sd	26.8	25.3										50/150	150	
	$PM_{2.5}$	sd	15.3	14.4										----	15/35	
	NO_2	sd	37.3	35.1										100/150	100	
	SO_2	sd	24.6	25.7										80/365	80/365	
GATÚN	PM_{10}	21.8	23.7	26.8										50/150	150	
	NO_2	22.5	7.8	18.0										100/150	100	
COCOLÍ	PM_{10}	sd	136.0	120.0										50/150	150	
	NO_2	sd	24.5	26.2										100/150	100	
PEDRO MIGUEL	PM_{10}	sd	16.2	15.3										50/150	150	
	NO_2	sd	26.5	25.0										100/150	100	
PARAÍSO	PM_{10}	sd	26.4	27.7										50/150	150	
	NO_2	15.4	16.0	15.8										100/150	100	
GAMBOA	PM_{10}	25.5	15.1	21.9										50/150	150	
	NO_2	5.2	1.2	5.6										100/150	100	
GATÚN [BOMBEROS]	PM_{10}	21.2	20.6	20.7										50/150	150	
	NO_2	13.4	2.6	10.3										100/150	100	

CUADRO EXPLICATIVO DE LA TABLA DE RESULTADOS

- **LOS NÚMEROS RESALTADOS EN ROJO EN LAS COLUMNAS NÚMERO 2 a NÚMERO 10 DENOTAN VALORES QUE SE ENCUENTRAN POR ENCIMA DEL VALOR GUÍA UTILIZADO PARA COMPARAR. LOS VALORES GUÍAS ESTÁN EN LA TABLA 3 Y 4 EN LAS COLUMNAS DEL 14 AL 16**
- **COLUMNA 14 SON LOS VALORES GUÍAS DE LA NORMA DE LA ACP, 2610-ESM-109**
- **COLUMNA 15 SON LAS NORMAS DE LA AGENCIA PARA LA PROTECCIÓN DEL AMBIENTE DE LOS ESTADOS UNIDOS DE AMERICA (National Ambient Air Quality Standards) (NAAQS) 2008**
- **LAS COLUMNAS TIENEN DOS NÚMEROS SEPARADOS POR UNA LINEA DE DIVISION ESTO ES PARA SEPARAR VALORES DE DIFERENTES PERÍODOS DE TIEMPO, EL PRIMER NÚMERO ES POR LO GENERAL EL PROMEDIO ANUAL, EL NÚMERO DESPUES DE LA BARRA DIVISORIA ES EL VALOR PERMITIDO PARA UN PERÍODO DE 24 HORAS DE MEDICIÓN.**
- **EN PARAÍSO (sd) MONITORES AFECTADOS POR FUERTES LLUVIAS (noviembre y julio)**
- **EN COCOLÍ (sd) SE RELOCALIZÓ LA ESTACIÓN DEBIDO A LOS TRABAJOS DE LA AMPLIACIÓN E INCONVENIENTES ELÉCTRICOS Y NO SE PERMIITE ACCESO POR IP VENCIDOS (abril y junio y enero 2009)**
- **EN MIRAFLORES (sd) INCONVENIENTES TÉCNICOS (caja de suministro eléctrico a prueba de inclemencias del tiempo) (abril y junio)**
- **EN MIRAFLORES SEPTIEMBRE 2008 CORTE DE ENERGÍA ELÉCTRICA.**
- **EN PARAÍSO (sd), DURANTE EL MES DE NOVIEMBRE NO SE TENÍA ACCESO AL ÁREA PORQUE LA PUERTA SE ENCONTRABA CERRADA**
- **DURANTE EL MES DE NOVIEMBRE SE VENCIERON LOS IP Y NO SE PODÍA TENER ACCESO A ALGUNAS ÁREAS (sd)**

Análisis de los resultados

Hasta el momento, ninguna de las estaciones monitoreadas en el año 2009 muestra elevados niveles de contaminación, salvo la estación de Cocolí debido a las actividades propias de excavación y movimiento de suelo por los trabajos de

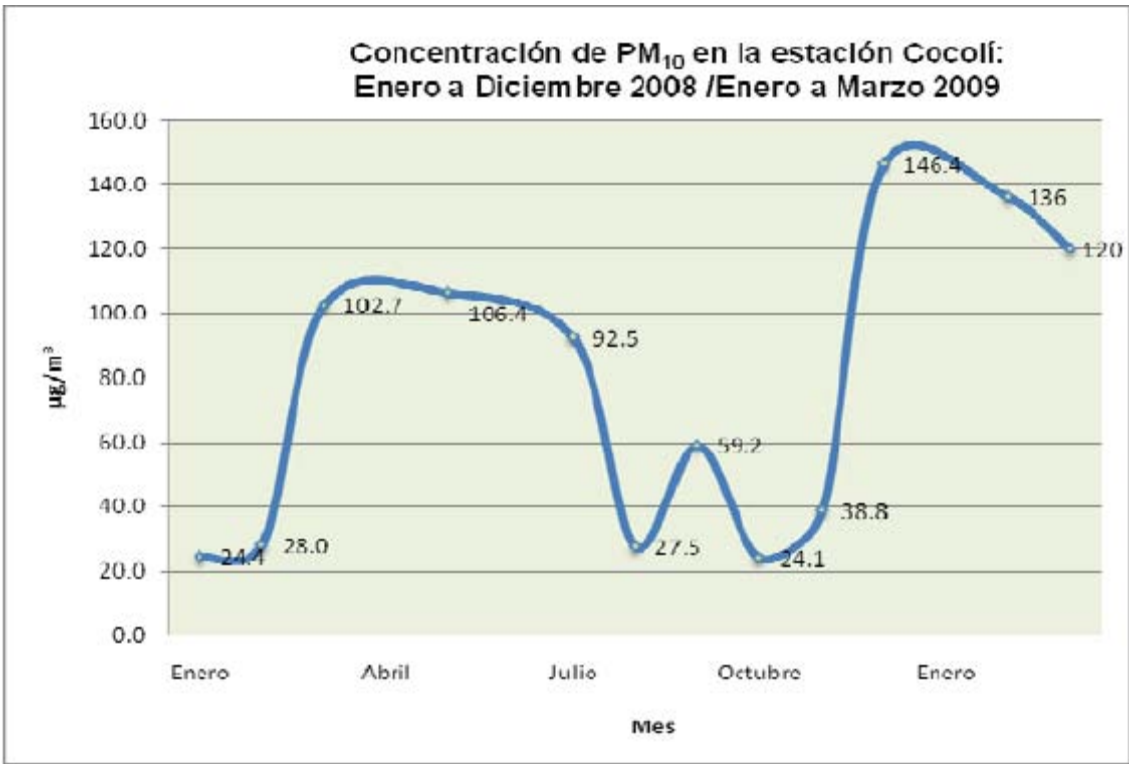
ampliación en el Canal. Aquí se encuentraron niveles elevados de material particulado debido al impacto directo que recibe la estación por estos trabajos.

Estos altos niveles de material particulado se deben principalmente a los trabajos de excavación y movimiento de suelo y no en gran medida por el equipo de transporte o maquinaria liviana o pesada, ya que los niveles de NO_2 se encuentran bajos y se podría considerar para este caso que no existe una relación directa entre la concentración de NO_2 y la de material particulado.

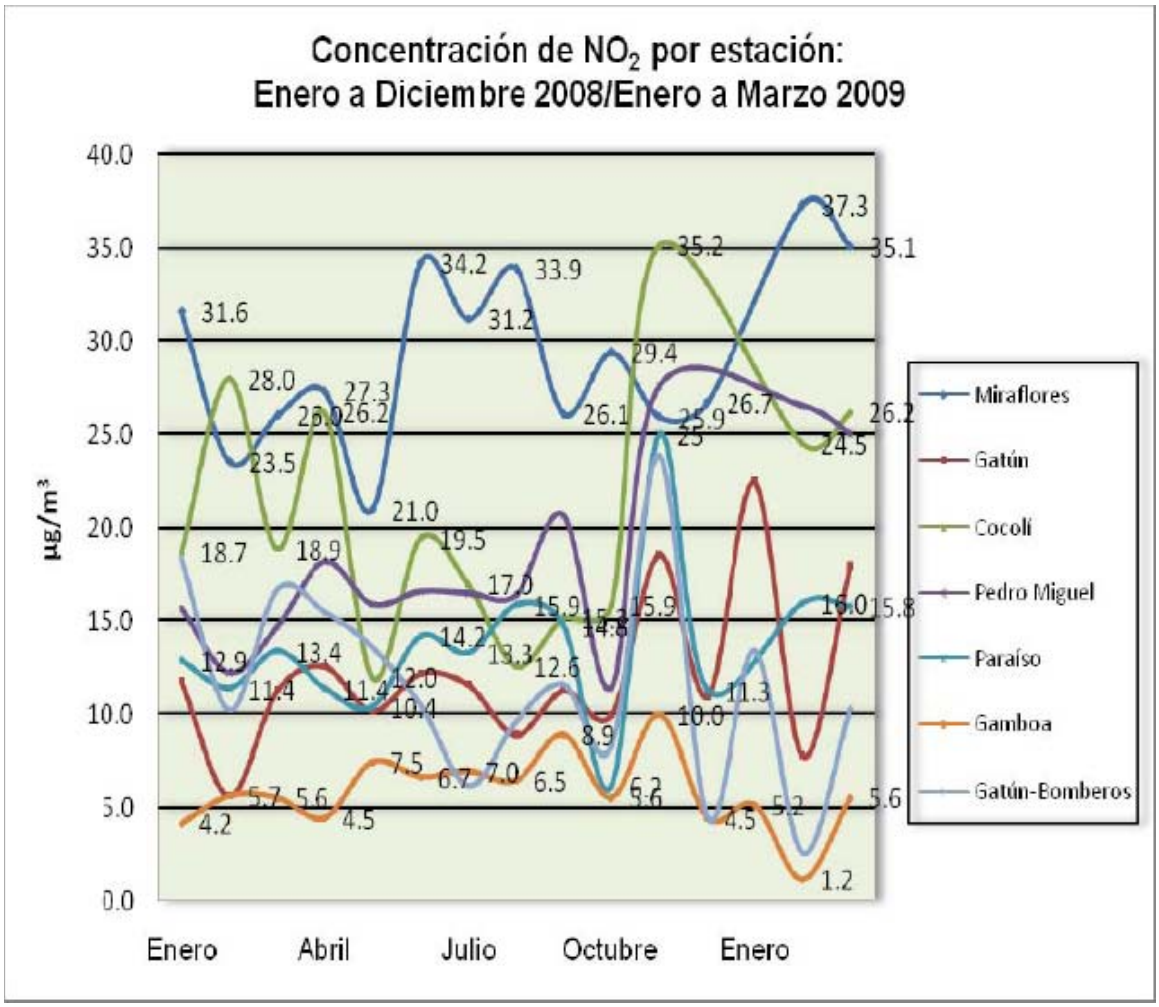
A raíz del traslado de la estación de Cocolí a un punto relativamente distante (~200m) del sitio anterior para este mes de abril, se podría pensar que la captación de material particulado en este nuevo lugar será inferior a los registrados.

Análisis de los resultados del 2007, 2008 y 2009

Según los resultados de material particulado (PM_{10}) en Cocolí que se han obtenido del año pasado a la fecha, se puede observar en las tablas de resultados 2008 y 2009, que los valores máximos se encuentran en los meses de diciembre a marzo durante la estación seca, en donde ha existido una mayor influencia producto de los trabajos de ampliación en donde se incluye el transporte del equipo pesado y las excavaciones. No han existido grandes variaciones en cuanto a los resultados de NO_2 obtenidos (Ver Gráfica N°1).



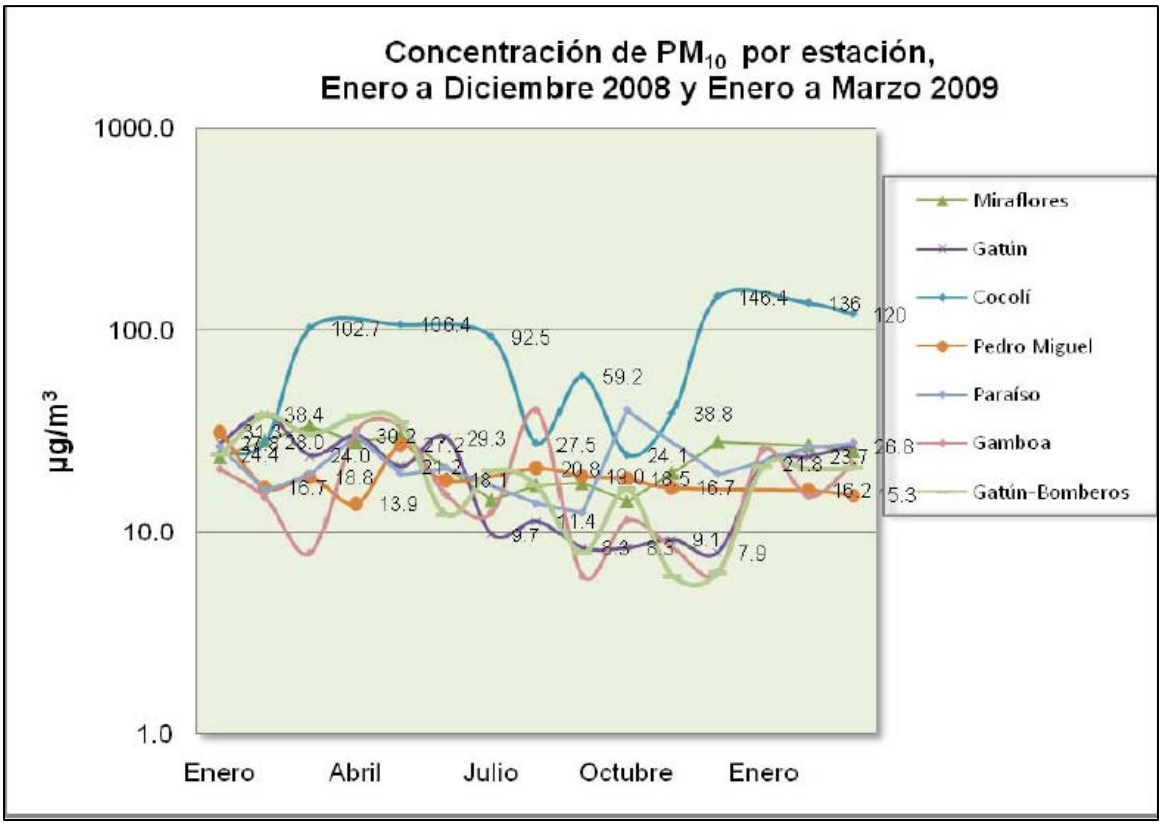
Gráfica N°1



Gráfica N°2

Los contaminantes medidos en las Esclusas de Miraflores en los últimos 2 años y este 2009 no se han registrado grandes cambios en cuanto a las concentraciones registradas.

Para la estación de los Bomberos de Gatún se vio reflejada una ligera disminución de los niveles de PM_{10} debido probablemente a la presencia de la estación lluviosa, para aumentar gradualmente a partir del 2009. Igual comportamiento se presenta en la estación de Gamboa. Para el resto de las estaciones no se observan fuertes tendencias en cuanto a las variaciones en los niveles de los contaminantes medidos (Ver Gráfica N° 3).



Gráfica N°3

Conclusiones

Con los datos obtenidos hasta el momento se tienen las siguientes conclusiones:

- Se verifica la importancia del mantenimiento del monitoreo de material particulado y NO_2, en Cocolí. Con estas mediciones se podrán tomar medidas para disminuir posibles riesgos a la salud y mejorar el rendimiento laboral.
- Según los datos obtenidos este año, no podemos indicar que los niveles de los contaminantes medidos se encuentran elevados, salvo en la estación de Cocolí para material particulado. No obstante, es probable que los niveles bajen en la nueva ubicación ya que en sitio donde estaba ubicada no era el más adecuado debido a su cercanía a la ruta de tránsito del equipo pesado asignado al proyecto de ampliación.

Recomendaciones

- Continuar con las mediciones de material particulado en el sector de Cocolí para garantizar que se mantienen registros de niveles de contaminantes, principalmente de material particulado, en uno de los sitios en donde existe influencia directa de los trabajos de ampliación y que puedan afectar la salud de los trabajadores en el área de trabajo. Para la toma de decisiones y las

comparaciones pertinentes, se debe tomar en cuenta la localización de la estación antes y después de su reubicación.

- En la estación seca, durante el proceso de riego del terreno para evitar la dispersión de polvo producto de los trabajos de ampliación, se recomienda agregar en el agua un producto inocuo que permita mantener la humedad por más tiempo, ya que debido al calor propio de dicha estación y el tránsito constante de vehículos, el agua se evapora rápidamente, ocasionando que se levante nuevamente el polvo en menos de una hora aproximadamente. De ésta manera, se disminuye el periodo de riego, ahorrando dinero y tiempo.

Propiedad intelectual

Todos los datos, información, análisis e informes producidos bajo este contrato serán propiedad de la ACP y no podrán ser emitidos por el Contratista a otras fuentes o usados de otra forma sin el permiso expreso por escrito de la ACP.

Todos los cálculos generados en este informe son propiedad del Instituto Especializado de Análisis de la Universidad de Panamá (IEA) y no podrán ser utilizados sin la autorización por escrito del IEA de la Universidad de Panamá.

Appendix K

PAC 1 Water Quality Analytical Report

UNIVERSIDAD TECNOLÓGICA DE PANAMÁ
"Camino a la excelencia a través del mejoramiento contínuo"

CENTRO EXPERIMENTAL DE INGENIERÍA
LABORATORIO DE ANÁLISIS INDUSTRIALES Y CIENCIAS AMBIENTALES
Dirección: Vía Tocumen, Extensión Universitaria
Tels.: 290-8427/26
Telefax: 290-8427

Panamá, 27 de abril de 2009
Informe No. 05-0786-2009

INFORME SOBRE ENSAYOS QUÍMICOS EFECTUADOS A MUESTRAS DE AGUA.

SOLICITADO POR: **AUTORIDAD DEL CANAL DE PANAMÁ**
Dirección: Corozal, Dpto de Ing. y Adm. De Programas
Seccion de manejo y seguimiento ambiental.
Tel.: 276-1294 Fax: 276-1291
Responsable: Ing. Guadalupe Ortega

Descripción de las muestras: Seis (6) muestras de aguas, identificadas por el interesado como: Río Grande Abajo- Desembocadura – Lago Miraflores, Río Grande Medio, Lago Gatún Superficie-250 m boya 198, Lago Gatún Superficie-5 m boya 198, Lago Gatún Fondo-250 m boya 198 y Lago Gatún Fondo-5 m boya 198. Las muestras fueron identificadas por el laboratorio como: **141-M1**, **141-M2**, **141-M4S**, **141-M4F, 141-M5S y 141-M5F**. (La muestra correspondiente a Río grande arriba, cabecera (**141-M3**) no fue tomada debido a que la quebrada no tenía caudal. No se realizó la medición de oxígeno disuelto por limitaciones técnicas del equipo.

Fecha de recepción: 24/10/2008 Solicitud de Trabajo: No. 05-141-2009
Fecha de recepción de muestras: 25/03/2009

Muestreo efectuado por: El siguiente personal del Laboratorio de Análisis Industriales y Ciencias Ambientales el día 25/03/200: Tec. José M. Pérez y M.Sc. Mario Luis Miranda.

Fecha de ensayos: 25/03/2009 – 27/04/2009
Ensayos realizados por: M.Sc. Mario Miranda, Licda. Vanessa Rodríguez, Mgtr. María Janeiro, Mgtr. Cecilio Hernández B., M.Sc. Víctor Bazán, Téc. Danuska Jiménez, Licda. Lourdes González y Téc. Milka Graell.

Ensayos solicitados: Químicos y microbiológicos, que se describen en los resultados.
Normas utilizadas: "Standard Methods for the Examination of water and wastewater, 20th edition, 1998, APHA-AWWA-WEF".

Centro Experimental de Ingeniería
Laboratorio de Análisis Industriales y Ciencias Ambientales

Este informe presenta los resultados de los ensayos efectuados únicamente a las muestras recibidas en el laboratorio. Este documento es estrictamente confidencial y no se facilitará información del mismo a terceros, salvo autorización por escrito del interesado.
La publicación o reproducción parcial de este documento requiere la autorización escrita del laboratorio.

Dirección: Vía Tocumen, Extensión Universitaria
Tels.: 290-8427/26
Telefax: 290-8427

Informe No. 05-0786-2009

RESULTADOS

ANALISIS	MUESTRAS DE AGUA					
	Río Grande Abajo-Desembocadura – Lago Miraflores Identificado como: 141-M1	Río Grande Medio Identificado como: 141-M2	Lago Gatún Superficie-250 m boya 198 Identificado como: 141-M4S	Lago Gatún Fondo-250 m boya 198 Identificado como: 141-M4F	Lago Gatún Superficie-5 m boya 198 Identificado como: 141-M5S	Lago Gatún Fondo-5 m boya 198 Identificado como: 141-M5F
1. pH	7,5	6,1	7,7	8,0	7,7	7,8
2. Temperatura (°C)	26,4	25,8	28,1	27,8	28,1	27,8
3. Conductividad (µmho/cm)	830	1070	120	120	120	100
5. Alcalinidad (mg $CaCO_3$/L)	350,0	404,0	69,1	73,4	64,8	69,1
6. Sólidos disueltos totales (mg/L)	410	530	60	60	60	50
7. Sólidos suspendidos (mg/L)	108	23	27	4	14	1
8. Turbiedad ($NTU_{FORMAZIN}$)	29,13	3,04	5,98	<0,10	6,34	13,08
9. Salinidad ($^o/_{oo}$)	3	3	3	3	3	3
10. Nitratos (mg NO_3/L)	0,30	0,93	0,36	0,25	0,33	0,72
11. Nitritos (mg NO_2/L)	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01
12. Cloruros (mg Cl^-/L)	21,8	21,8	7,9	8,4	7,9	8,4
13. Sodio (mg Na/L)	100,8	103,3	6,4	6,5	6,5	6,4
14. Magnesio (mg Mg/L)	16,9	18,6	0,2	4,0	2,5	3,8
15. Calcio (mg Ca/L)	38,1	75,7	4,8	8,6	5,9	2,5
16. Potasio (mg K/L)	1,9	< 0,1	< 0,1	<0,1	<0,1	< 0,1
17. Hierro (mg Fe/L)	0,3	0,1	< 0,1	0,2	0,1	< 0,1
18. Cobre (mg Cu/L)	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
19. Plomo (mg Pb/L)	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
20. Zinc (mg Zn/L)	< 0,3	< 0,3	< 0,3	< 0,3	< 0,3	< 0,3
21. Aluminio (mg Al/L)	0,80	0,54	0,15	0,10	0,15	0,15
22. Manganeso (mg Mn/L)	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
23. Berilio (mg Be/L)	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01
24. Coliformes totales (NMP/100 mL)	$2,9x10^2$	$>2,4x10^3$	$4x10^1$	$4,2x10^2$	$2,7x10^2$	$9,3x10^1$
25. E.Coli (NMP/100 mL)	$1,8x10^2$	$3,4x10^2$	2	5,2	4,1	8,6
26. Sulfatos (mg SO_4^{2-}/L)	74,22	77,21	3,64	4,56	4,39	4,67

MGTR. CECILIO FERNÁNDEZ B.
LEPE
LABORATORIO DE ANÁLISIS INDUSTRIALES Y CIENCIAS AMBIENTALES

Centro Experimental de Ingeniería
Laboratorio de Análisis Industriales y Ciencias Ambientales

DRA. TANIA CROSTON
SUBDIRECTORA
CENTRO EXPERIMENTAL DE INGENIERÍA

AQT-FPA-00A
V06-Rev. 0409

Laboratorio de Análisis de Aguas
Urbanización Chanis, Casa N° 145
Teléfono: 221-1481 / 4094
Fax:224-8087
dcastillero@aquateclabs.com

AQUATEC
Testing Laboratories

LE No. 018

REPORTE DE ANÁLISIS

CILSA PANAMÁ

Análisis de Muestras de Agua en el área de Cocolí. Proyecto de Ampliación del Canal de Panamá.

ELABORADO POR:

AQUATEC Laboratorios Analíticos de Panamá, S. A.
R.U.C. 1188395-1-519623 D.V. 36

Químico
Lic. Daniel Castillero C.
Químico - JTNQ
Idoneidad # 0047

09-009-002
Editado e impreso por:
Aquatec Laboratorios Analíticos – 2009
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LE No. 018

I. IDENTIFICACIÓN GENERAL

EMPRESA	CILSA PANAMÁ
ACTIVIDAD	Construcción
PROYECTO	Análisis de muestras de agua natural en el área de Cocolí. Trabajos de ampliación del Canal de Panamá.
DIRECCIÓN	Cocolí. Provincia de Panamá. República de Panamá.
CONTACTO	Ing. Abdiel Delgado
FECHA DE MUESTREO	22 de Abril de 2009.
FECHA DE RECEPCIÓN DE LA MUESTRA	22 de Abril de 2009.
FECHA DE INFORME	14 de Mayo 2009.
Nº DE INFORME	115-09-009-PAN-002
PROCEDIMIENTO DE MUESTREO	AQT-PA-01
No. DE COTIZACIÓN	090-09

II. IDENTIFICACIÓN DE LAS MUESTRAS

# DE LABORATORIO	IDENTIFICACIÓN DEL CLIENTE	UBICACIÓN SATELITAL
191-09	Cauce de Navegación 1	N 992142 E 655905
192-09	Cauce de Navegación 2	N 991792 E 656074
193-09	Río Cocolí – Aguas Arriba	N 993418 E 652761
194-09	Río Cocolí – Aguas Abajo	N 993750 E 653899
195-09	Quebrada La Fuente	N 994627 E 653441
196-09	Río Velázquez	N 991992 E 655667

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III. PARÁMETROS A MEDIR

Análisis de Calidad de agua para determinar los siguientes parámetros: Potencia de Hidrógeno, Turbidez, Sólidos Disueltos, Sólidos Suspendidos, Conductividad, Penetración de la Luz, Color, Olor, Dureza, Oxígeno Disuelto, Alcalinidad Total (Hidróxidos, Carbonatos y Bicarbonatos), Cloruros, Sulfatos, Fosfatos, Nitratos, Nitritos, Trazas de Metales, Calcio, Magnesio, Hierro, Sodio, Hidrocarburos Totales, Hidrocarburos Halogenados, Carbono Orgánico Particulado (COP), Coliformes Totales y Coliformes Fecales.

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IV. RESULTADOS:

Muestra 191-09: Cauce de Navegación 1

PARÁMETRO	SÍMBOLO	UNIDAD	MÉTODO	RESULTADO	INCERTIDUMBRE	L.M.C.	LÍMITE MÁXIMO (*)
Potencial de Hidrógeno	pH	---	SM 4500 H	7,74	±0,02	-2	6,0-9,0
Turbidez	UTN	UTN	SM 2130 B	14,66	±0,03	0,02	< 25,0
Sólidos Disueltos Totales	SDT	mg / L	SM 2540 C	29866,0	±5,4	25,0	< 35000,0
Sólidos Suspendidos Totales	SST	mg / L	SM 2540 D	10,0	±3,0	5,0	< 50,0
Conductividad	COND	µS / cm	SM 2510 B	39000,0	±0,9	20,0	NA
Penetración de la luz	NA	m	Secchi	1,0	**	0	NA
Color	NA	PtCo	SM 2120 C	0,0	**	0	< 25,0
Olor	NA	TON	SM 2150 B	Inodoro	**	**	No Perceptible
Dureza	DUR	mg / L	SM 2340 C	5400,0	**	**	NA
Oxígeno Disuelto	OD	mg / L	SM 4500 O	5,4	**	0,1	> 4,0
Alcalinidad Total	ALC	mg / L	SM 2320 B	600,0	**	**	NA
Hidróxidos	OH^-	mg / L	SM 2320 B	0,0	**	**	NA
Carbonatos	CO_3^{2-}	mg / L	SM 2320 B	0,0	**	**	NA
Bicarbonatos	HCO_3^-	mg / L	SM 2320 B	600,0	**	**	NA
Cloruros	Cl^-	mg / L	SM 4500 Cl C	15456,2	±4,4	3,5	NA
Sulfatos	SO_4	mg / L	SM 4500 SO_4 E	1800,0	±2,0	2,0	NA
Fosfatos	PO_4	mg / L	SM 4500 P E	0,3	**	0,1	NA
Nitratos	NO_3	mg / L	SM 4500 NO_3^- - B	<1,0	**	1,0	NA
Nitritos	NO_2	mg / L	SM 4500 B	0,1	**	0,05	NA
Trazas de Metales							
Arsénico	As	mg / L	SW6010B - SW3010A	<0,05	**	0,05	< 0,05
Bario	Ba	mg / L		0,03	**	0,02	NA
Cadmio	Cd	mg / L		<0,005	**	0,005	< 0,005
Cromo	Cr	mg / L		<0,01	**	0,01	< 0,05
Plomo	Pb	mg / L		<0,01	**	0,01	< 0,01
Selenio	Se	mg / L		<0,02	**	0,02	NA
Plata	Ag	mg / L		0,49	**	0,01	NA
Mercurio	Hg	mg / L		< 0,001	**	0,001	< 0,001
Calcio	Ca	mg / L	SM 3500 Ca B	441,0	**	0,1	NA
Magnesio	Mg	mg / L	SM 3500 Mg B	1044,9	**	0,1	NA
Hierro	Fe	mg / L	SM 3500 Fe B	0,2	**	0,1	< 0,50
Sodio	Na	mg / L	SM 3500 Na B	10034,96	**	2,3	NA
Hidrocarburos Totales	HCT	mg / L	SM 5520 F	0,01	**	0,01	< 0,05
Hidrocarburos Halogenados	HC-X	mg / L	SM 5710 B	<0,1	**	0,1	NA
Coliformes Totales	CT	NMP / 100 mL	SM 9221 B	2282,0	±0,40	1,0	< 500,0
E. Coli	EC	NMP / 100 mL	SM 9221 E	109,0	±1,80	1,0	< 50,0

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Muestra 192-09: Cauce de Navegación 2

PARÁMETRO	SÍMBOLO	UNIDAD	MÉTODO	RESULTADO	INCERTIDUMBRE	L.M.C.	LÍMITE MÁXIMO (*)
Potencial de Hidrógeno	pH	---	SM 4500 H	7,78	±0,02	-2	6,0-9,0
Turbidez	UTN	UTN	SM 2130 B	11,80	±0,03	0,02	< 25,0
Sólidos Disueltos Totales	SDT	mg / L	SM 2540 C	28746,0	±5,4	25,0	< 35000,0
Sólidos Suspendidos Totales	SST	mg / L	SM 2540 D	6,0	±3,0	5,0	< 50,0
Conductividad	COND	µS / cm	SM 2510 B	38100,0	±0,9	20,0	NA
Penetración de la luz	NA	m	Hach DR 2800	0,9	**	0	NA
Color	NA	PtCo	SM 2120 C	0,0	**	0	< 25,0
Olor	NA	TON	SM 2150 B	Inodoro	**	**	No Perceptible
Dureza	DUR	mg / L	SM 2340 C	5200,0	**	**	NA
Oxígeno Disuelto	OD	mg / L	SM 4500 O	6,8	**	0,1	> 4,0
Alcalinidad Total	ALC	mg / L	SM 2320 B	200,0	**	**	NA
Hidróxidos	OH^-	mg / L	SM 2320 B	0,0	**	**	NA
Carbonatos	CO_3^{2-}	mg / L	SM 2320 B	0,0	**	**	NA
Bicarbonatos	HCO_3^-	mg / L	SM 2320 B	200,0	**	**	NA
Cloruros	Cl^-	mg / L	SM 4500 Cl C	14888,9	±4,4	3,5	NA
Sulfatos	SO_4	mg / L	SM 4500 SO_4 E	1700,0	±2,0	2,0	NA
Fosfatos	PO_4	mg / L	SM 4500 P E	0,1	**	0,1	NA
Nitratos	NO_3	mg / L	SM 4500 NO_3^- - B	<1,0	**	1,0	NA
Nitritos	NO_2	mg / L	SM 4500 B	0,09	**	0,05	NA
Trazas de Metales							
Arsénico	As	mg / L	SW6010B - SW3010A	<0,05	**	0,05	< 0,05
Bario	Ba	mg / L		<0,02	**	0,02	NA
Cadmio	Cd	mg / L		0,005	**	0,005	< 0,005
Cromo	Cr	mg / L		<0,01	**	0,01	< 0,05
Plomo	Pb	mg / L		<0,01	**	0,01	< 0,01
Selenio	Se	mg / L		<0,02	**	0,02	NA
Plata	Ag	mg / L		0,15	**	0,01	NA
Mercurio	Hg	mg / L		<0,001	**	0,001	< 0,001
Calcio	Ca	mg / L	SM 3500 Ca B	401,0	**	0,1	NA
Magnesio	Mg	mg / L	SM 3500 Mg B	1020,6	**	0,1	NA
Hierro	Fe	mg / L	SM 3500 Fe B	0,1	**	0,1	< 0,50
Sodio	Na	mg / L	SM 3500 Na B	9677,8	**	2,3	NA
Hidrocarburos Totales	HCT	mg / L	SM 5520 F	0,01	**	0,01	< 0,05
Hidrocarburos Halogenados	HC-X	mg / L	SM 5710 B	<0,1	**	0,1	NA
Coliformes Totales	CT	NMP / 100 mL	SM 9221 B	1162,0	±0,40	1,0	< 500,0
E. Coli	EC	NMP / 100 mL	SM 9221 E	52,0	±1,80	1,0	< 50,0

Notas:

1. La incertidumbre reportada corresponde a un nivel de confianza del 95% (K=2).
2. L.M.C.: Límite mínimo de cuantificación.
3. (*) Niveles establecidos por el Anteproyecto de Norma de la ANAM para aguas marinas y costeras.
4. (**) Valor no determinado aún.
5. La(s) muestra(s) se mantendrá(n) en custodia por quince días luego de la emisión de este informe. Concluido este período se desechará.
6. Los resultados presentados en este documento solo corresponden a la(s) muestra(s) analizada(s).

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Aquatec Laboratorios Analíticos – 2009
Derechos Reservados

AQUATEC
Testing Laboratories

LE No. 018

Muestra 193-09: Río Cocolí (Aguas Arriba)

PARÁMETRO	SÍMBOLO	UNIDAD	MÉTODO	RESULTADO	INCERTIDUMBRE	L.M.C.	LÍMITE MÁXIMO (*)
Potencial de Hidrógeno	pH	---	SM 4500 H	6,76	±0,02	-2	6,5 – 8,5
Turbidez	UTN	UTN	SM 2130 B	23,79	±0,03	0,02	< 50
Sólidos Disueltos Totales	SDT	mg / L	SM 2540 C	184,0	±5,4	25,0	< 500
Sólidos Suspendidos Totales	SST	mg / L	SM 2540 D	22,0	±3,0	5,0	< 50
Conductividad	COND	µS / cm	SM 2510 B	260,0	±0,9	20,0	NA
Penetración de la luz	NA	%	Secchi	NA	**	0	> 1,2
Color	NA	PtCo	SM 2120 C	39,0	**	0	< 100,0
Olor	NA	---	SM 2150 B	Inodoro	**	**	NA
Dureza	DUR	mg / L	SM 2340 C	90,0	**	**	NA
Oxígeno Disuelto	OD	mg / L	SM 4500 O	2,8	**	0,1	> 7
Alcalinidad Total	ALC	mg / L	SM 2320 B	93,0	**	**	NA
Hidróxidos	OH^-	mg / L	SM 2320 B	0,0	**	**	NA
Carbonatos	CO_3^{2-}	mg / L	SM 2320 B	0,0	**	**	NA
Bicarbonatos	HCO_3^-	mg / L	SM 2320 B	93,0	**	**	NA
Cloruros	Cl^-	mg / L	SM 4500 Cl C	17,9	±4,4	3,5	NA
Sulfatos	SO_4	mg / L	SM 4500 SO_4 E	3,0	±2,0	2,0	NA
Fosfatos	PO_4	mg / L	SM 4500 P E	1,0	**	0,1	NA
Nitratos	NO_3	mg / L	SM 4500 NO_3^- - B	1,2	**	1,0	NA
Nitritos	NO_2	mg / L	SM 4500 B	0,67	**	0,05	NA
Trazas de Metales							
Arsénico	As	mg / L	SW6010B - SW3010A	<0,05	**	0,05	< 0,1
Bario	Ba	mg / L		<0,02	**	0,02	NA
Cadmio	Cd	mg / L		0,033	**	0,005	< 0,03
Cromo	Cr	mg / L		<0,01	**	0,01	NA
Plomo	Pb	mg / L		<0,01	**	0,01	< 0,05
Selenio	Se	mg / L		<0,02	**	0,02	NA
Plata	Ag	mg / L		0,15	**	0,01	NA
Mercurio	Hg	mg / L		<0,001	**	0,001	< 0,01
Calcio	Ca	mg / L	SM 3500 Ca B	22,0	**	0,1	NA
Magnesio	Mg	mg / L	SM 3500 Mg B	8,5	**	0,1	NA
Hierro	Fe	mg / L	SM 3500 Fe B	1,7	**	0,1	NA
Sodio	Na	mg / L	SM 3500 Na B	11,6	**	2,3	NA
Hidrocarburos Totales	HCT	mg / L	SM 5520 F	0,01	**	0,01	< 0,05
Hidrocarburos Halogenados	HC-X	mg / L	SM 5710 B	< 0,1	**	0,1	NA
Coliformes Totales	CT	NMP / 100 mL	SM 9221 B	2359,0	±0,40	1,0	NA
E. Coli	EC	NMP / 100 mL	SM 9221 E	31,0	±1,80	1,0	< 250

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AQUATEC
Testing Laboratories

LE No. 018

Muestra 194-09: Río Cocolí (Aguas Abajo)

PARÁMETRO	SÍMBOLO	UNIDAD	MÉTODO	RESULTADO	INCERTIDUMBRE	L.M.C.	LÍMITE MÁXIMO (*)
Potencial de Hidrógeno	pH	---	SM 4500 H	6,47	±0,02	-2	6,5 – 8,5
Turbidez	UTN	UTN	SM 2130 B	219,60	±0,03	0,02	< 50
Sólidos Disueltos Totales	SDT	mg / L	SM 2540 C	210,0	±5,4	25,0	< 500
Sólidos *Suspendidos* Totales	SST	mg / L	SM 2540 D	162,0	±3,0	5,0	< 50
Conductividad	COND	µS / cm	SM 2510 B	301,0	±0,9	20,0	NA
Penetración de la luz	NA	%	Secchi	NA	**	0	> 1,2
Color	NA	PtCo	SM 2120 C	210,0	**	0	< 100,0
Olor	NA	---	SM 2150 B	Inodoro	**	**	NA
Dureza	DUR	mg / L	SM 2340 C	86,0	**	**	NA
Oxígeno Disuelto	OD	mg / L	SM 4500 O	6,6	**	0,1	> 7
Alcalinidad Total	ALC	mg / L	SM 2320 B	96,0	**	**	NA
Hidróxidos	OH^-	mg / L	SM 2320 B	0,0	**	**	NA
Carbonatos	CO_3^{2-}	mg / L	SM 2320 B	0,0	**	**	NA
Bicarbonatos	HCO_3^-	mg / L	SM 2320 B	96,0	**	**	NA
Cloruros	Cl^-	mg / L	SM 4500 Cl C	22,5	±4,4	3,5	NA
Sulfatos	SO_4	mg / L	SM 4500 SO_4 E	< 2,0	±2,0	2,0	NA
Fosfatos	PO_4	mg / L	SM 4500 P E	1,1	**	0,1	NA
Nitratos	NO_3	mg / L	SM 4500 NO_3^- - B	2,7	**	1,0	NA
Nitritos	NO_2	mg / L	SM 4500 B	1,1	**	0,05	NA
Trazas de Metales							
Arsénico	As	mg / L	SW6010B - SW3010A	<0,05	**	0,05	< 0,1
Bario	Ba	mg / L		0,05	**	0,02	NA
Cadmio	Cd	mg / L		0,033	**	0,005	< 0,03
Cromo	Cr	mg / L		<0,01	**	0,01	NA
Plomo	Pb	mg / L		<0,01	**	0,01	< 0,05
Selenio	Se	mg / L		<0,02	**	0,02	NA
Plata	Ag	mg / L		<0,01	**	0,01	NA
Mercurio	Hg	mg / L		<0,001	**	0,001	< 0,01
Calcio	Ca	mg / L	SM 3500 Ca B	20,4	**	0,1	NA
Magnesio	Mg	mg / L	SM 3500 Mg B	8,5	**	0,1	NA
Hierro	Fe	mg / L	SM 3500 Fe B	7,5	**	0,1	NA
Sodio	Na	mg / L	SM 3500 Na B	14,6	**	2,3	NA
Hidrocarburos Totales	HCT	mg / L	SM 5520 F	0,01	**	0,01	< 0,05
Hidrocarburos Halogenados	HC-X	mg / L	SM 5710 B	< 0,1	**	0,1	NA
Coliformes Totales	CT	NMP / 100 mL	SM 9221 B	2863,0	±0,40	1,0	NA
E. Coli	EC	NMP / 100 mL	SM 9221 E	161,0	±1,80	1,0	= < 250

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LE No. 018

Muestra 195-09: Quebrada La Fuente

PARÁMETRO	SÍMBOLO	UNIDAD	MÉTODO	RESULTADO	INCERTIDUMBRE	L.M.C.	LÍMITE MÁXIMO (*)
Potencial de Hidrógeno	pH	- - -	SM 4500 H	7,30	±0,02	-2	6,5 – 8,5
Turbidez	UTN	UTN	SM 2130 B	22,76	±0,03	0,02	< 50
Sólidos Disueltos Totales	SDT	mg / L	SM 2540 C	250,0	±5,4	25,0	< 500
Sólidos Suspendidos Totales	SST	mg / L	SM 2540 D	28,0	±3,0	5,0	< 50
Conductividad	COND	µS / cm	SM 2510 B	409,0	±0,9	20,0	NA
Penetración de la luz	NA	%	Secchi	NA	**	0	> 1,2
Color	NA	PtCo	SM 2120 C	71,0	**	0	< 100,0
Olor	NA	- - -	SM 2150 B	Inodoro	**	**	NA
Dureza	DUR	mg / L	SM 2340 C	187,0	**	**	NA
Oxígeno Disuelto	OD	mg / L	SM 4500 O	5,1	**	0,1	> 7
Alcalinidad Total	ALC	mg / L	SM 2320 B	192,0	**	**	NA
Hidróxidos	OH^-	mg / L	SM 2320 B	0,0	**	**	NA
Carbonatos	CO_3^{2-}	mg / L	SM 2320 B	0,0	**	**	NA
Bicarbonatos	HCO_3^-	mg / L	SM 2320 B	192,0	**	**	NA
Cloruros	Cl^-	mg / L	SM 4500 Cl C	14,4	±4,4	3,5	NA
Sulfatos	SO_4	mg / L	SM 4500 SO_4 E	8,0	±2,0	2,0	NA
Fosfatos	PO_4	mg / L	SM 4500 P E	0,7	**	0,1	NA
Nitratos	NO_3	mg / L	SM 4500 NO_3^- - B	< 1,0	**	1,0	NA
Nitritos	NO_2	mg / L	SM 4500 B	< 0,05	**	0,05	NA
Trazas de Metales							
Arsénico	As	mg / L	SW6010B - SW3010A	<0,05	**	0,05	< 0,1
Bario	Ba	mg / L		<0,02	**	0,02	NA
Cadmio	Cd	mg / L		0,013	**	0,005	< 0,03
Cromo	Cr	mg / L		0,022	**	0,01	NA
Plomo	Pb	mg / L		< 0,01	**	0,01	< 0,05
Selenio	Se	mg / L		< 0,02	**	0,02	NA
Plata	Ag	mg / L		< 0,01	**	0,01	NA
Mercurio	Hg	mg / L		< 0,001	**	0,001	< 0,01
Calcio	Ca	mg / L	SM 3500 Ca B	37,3	**	0,1	NA
Magnesio	Mg	mg / L	SM 3500 Mg B	22,8	**	0,1	NA
Hierro	Fe	mg / L	SM 3500 Fe B	0,8	**	0,1	NA
Sodio	Na	mg / L	SM 3500 Na B	9,3	**	2,3	NA
Hidrocarburos Totales	HCT	mg / L	SM 5520 F	0,01	**	0,01	< 0,05
Hidrocarburos Halogenados	HC-X	mg / L	SM 5710 B	< 0,1	**	0,1	NA
Coliformes Totales	CT	NMP / 100 mL	SM 9221 B	977,0	±0,40	1,0	NA
E. Coli	EC	NMP / 100 mL	SM 9221 E	< 1,0	±1,80	1,0	= < 250

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LE No. 018

Muestra 196-09: Río Velázquez

PARÁMETRO	SÍMBOLO	UNIDAD	MÉTODO	RESULTADO	INCERTIDUMBRE	L.M.C.	LÍMITE MÁXIMO (*)
Potencial de Hidrógeno	pH	NA	SM 4500 H	7,30	±0,02	-2	6,5 – 8,5
Turbidez	UTN	UTN	SM 2130 B	48,39	±0,03	0,02	< 50
Sólidos Disueltos Totales	SDT	mg / L	SM 2540 C	26604,0	±5,4	25,0	< 500
Sólidos Suspendidos Totales	SST	mg / L	SM 2540 D	54,0	±3,0	5,0	< 50
Conductividad	COND	µS / cm	SM 2510 B	38500,0	±0,9	20,0	NA
Penetración de la luz	NA	%	Secchi	NA	**	0	> 1,2
Color	NA	PtCo	SM 2120 C	15,0	**	0	< 100,0
Olor	NA	---	SM 2150 B	Inodoro	**	**	NA
Dureza	DUR	mg / L	SM 2340 C	5500,0	**	**	NA
Oxígeno Disuelto	OD	mg / L	SM 4500 O	4,8	**	0,1	> 7
Alcalinidad Total	ALC	mg / L	SM 2320 B	591,0	**	**	NA
Hidróxidos	OH^-	mg / L	SM 2320 B	0,0	**	**	NA
Carbonatos	CO_3^{2-}	mg / L	SM 2320 B	0,0	**	**	NA
Bicarbonatos	HCO_3^-	mg / L	SM 2320 B	591,0	**	**	NA
Cloruros	Cl^-	mg / L	SM 4500 Cl C	15119,5	±4,4	3,5	NA
Sulfatos	SO_4	mg / L	SM 4500 SO_4 E	1800,0	±2,0	2,0	NA
Fosfatos	PO_4	mg / L	SM 4500 P E	0,3	**	0,1	NA
Nitratos	NO_3	mg / L	SM 4500 NO_3^- - B	<1,0	**	1,0	NA
Nitritos	NO_2	mg / L	SM 4500 B	0,19	**	0,05	NA
Trazas de Metales							
Arsénico	As	mg / L	SW6010B - SW3010A	< 0,05	**	0,05	< 0,1
Bario	Ba	mg / L		0,05	**	0,02	NA
Cadmio	Cd	mg / L		< 0,005	**	0,005	< 0,03
Cromo	Cr	mg / L		< 0,01	**	0,01	NA
Plomo	Pb	mg / L		< 0,01	**	0,01	< 0,05
Selenio	Se	mg / L		< 0,02	**	0,02	NA
Plata	Ag	mg / L		0,29	**	0,01	NA
Mercurio	Hg	mg / L		< 0,001	**	0,001	< 0,01
Calcio	Ca	mg / L	SM 3500 Ca B	400,8	**	0,1	NA
Magnesio	Mg	mg / L	SM 3500 Mg B	1093,5	**	0,1	NA
Hierro	Fe	mg / L	SM 3500 Fe B	0,4	**	0,1	NA
Sodio	Na	mg / L	SM 3500 Na B	9827,7	**	2,3	NA
Hidrocarburos Totales	HCT	mg / L	SM 5520 F	0,01	**	0,01	< 0,05
Hidrocarburos Halogenados	HC-X	mg / L	SM 5710 B	< 0,1	**	0,1	NA
Coliformes Totales	CT	NMP / 100 mL	SM 9221 B	763,0	±0,40	1,0	NA
E. Coli	EC	NMP / 100 mL	SM 9221 E	30,0	±1,80	1,0	= < 250

Notas:

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1. La incertidumbre reportada corresponde a un nivel de confianza del 95% (K=2).
2. L.M.C.: Límite mínimo de cuantificación.
3. (*) Niveles establecidos por el Decreto Ejecutivo No. 75 del 4 de Junio de 2008, el cual establece los niveles de calidad para las aguas continentales de uso recreativo con y sin contacto directo.
4. (**) Valor no determinado aún.
5. La(s) muestra(s) se mantendrá(n) en custodia por días luego de la emisión de este informe. Concluido este período se desechará.
6. Los resultados presentados en este documento solo corresponden a la(s) muestra(s) analizada(s).

V. EQUIPO TÉCNICO

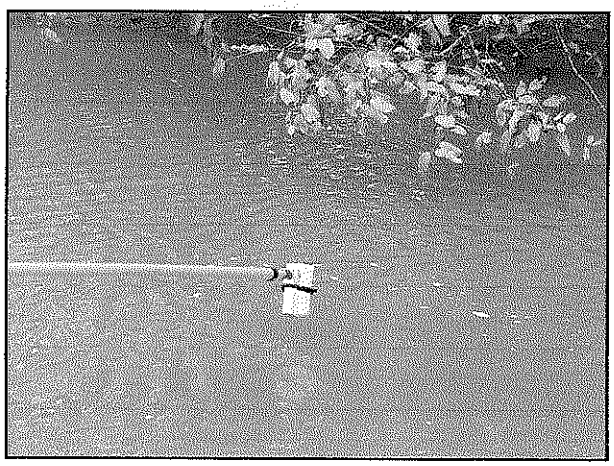
EQUIPO TÉCNICO		
Nombre	**Título**	**Identificación**
Hilber Ortiz	Químico / Muestreador	4-734-1185
Heavenn Ortiz	Ing. Ambiental / Muestreador	9-725-459

VI. ANÁLISIS DE LOS RESULTADOS

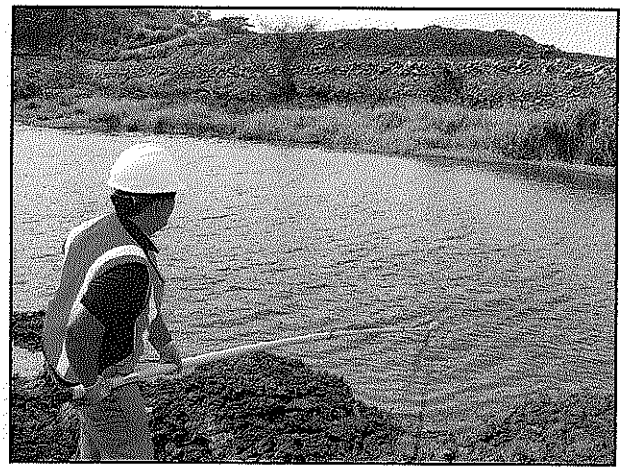
Los resultados obtenidos son aceptables en términos generales. No existe evidencia de contaminación por residuos de hidrocarburos. Las condiciones ambientales no influyeron en la representatividad de la muestra.

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VII. IMÁGENES DEL MUESTREO



Toma de Muestra del Río Velázquez

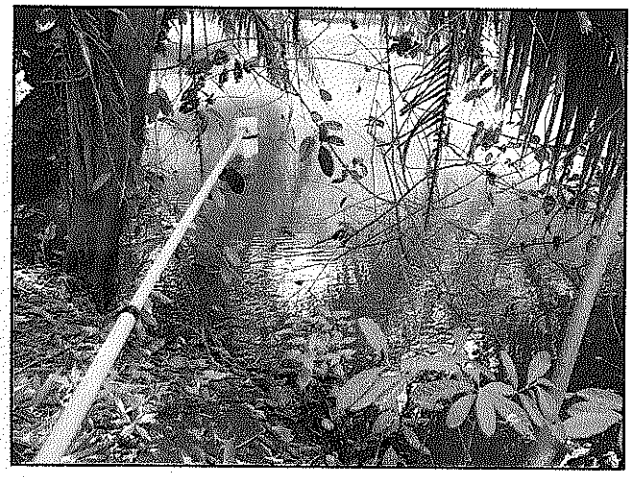


Toma de Muestra del Río Cocolí (Aguas Abajo)

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Toma de Muestra del Río Cocolí (Aguas Arriba)

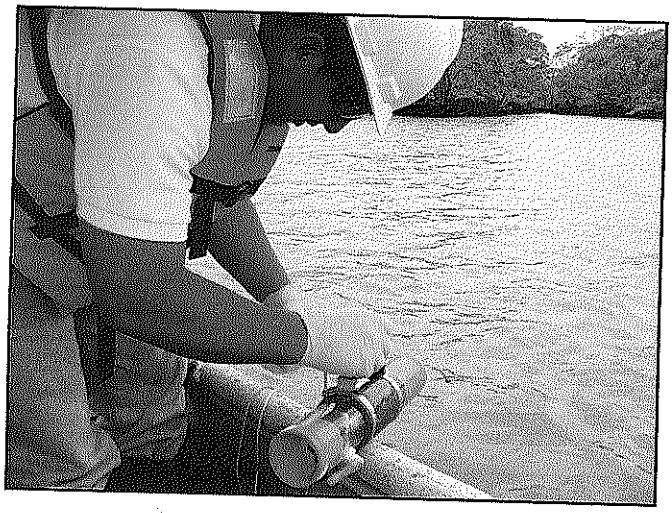


Toma de Muestra Quebrada La Fuente

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Toma de Muestra del Cauce de Navegación 1

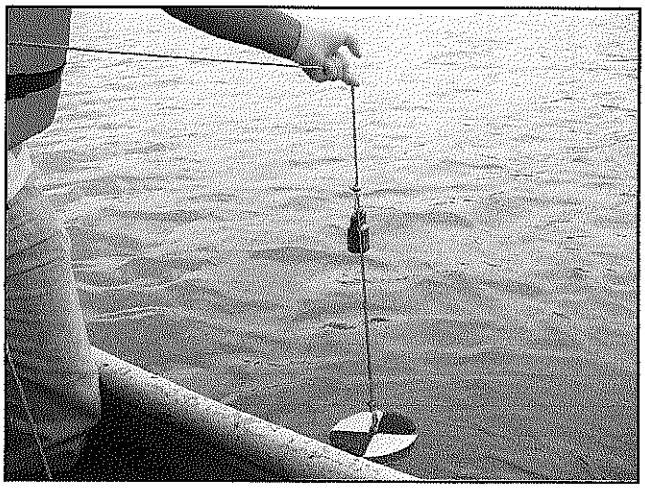


Toma de Muestra del Cauce de Navegación 2

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Determinación de la Penetración de la Luz

ANEXO: COPIA DE LA CADENA DE CUSTODIA

------ FIN DEL DOCUMENTO -----

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CADENA DE CUSTODIA

FORMULARIO DE SOLICITUD DE ANÁLISIS AQU-RPA-01A

Nº 360

AQUATEC LAB. ANALITICOS, S.A.

AQUATEC
Testing Laboratories

NOMBRE DEL CLIENTE: CILSA
DIRECCIÓN: La Boca
PROVINCIA: Panamá
GERENTE DE PROYECTO: Abdiel Delgado
TELÉFONO: —

DIRECCIÓN: Urb. Chanis
TELÉFONO: 221 1481
E-MAIL: dcastillero@aguatec labs.com
MUESTREADOR: Hilber Ortiz
(NOMBRE Y FIRMA): Hilber Ortiz

					MUESTREO		DATOS DE CAMPO					ANÁLISIS A REALIZAR				GPS	TIPO DE MATRIZ				
#	IDENTIFICACION DE LA MUESTRA	FECHA DE MUESTREO	HORA DE MUESTREO	Nº. DE ENVASES	SIMPLE	COMPUESTO	PH	T(º C)	O.D(MG/L)	TURB. (NTU)	CLORO RESIDUAL (MG/L)	Penetración de la luz				COORDENADAS	AGUAS SUPERFICIAL	AGUA RESIDUAL	AGUA SUBTERRANEA	AGUA SALADA	SUELO
1	Cause de	22/4/09	10:40 a.m.	4	✓		7,7	25,1				1,0m				N 0992142 E 0655905				✓	
	Navegación #1																				
2	Cause de	22/4/09	11:00 a.m.	4	✓		7,7	24,7				0,9m				N 0991792 E 0656074				✓	
	Navegación #2																				

OBSERVACIONES: Día nublado. En el cause de navegación #2 se encontraban realizando dragado; Por lo cual se Tomó la muestra lo más cercano Posible.

TEMPERATURA DE LA MUESTRA
☑ MENOR DE 4 °C
☐ TEMPERATURA AMBIENTE

ENTREGADO POR: FECHA: HORA:

RECIBIDO POR: FECHA: HORA:

FIRMA DEL CLIENTE

FECHA: HORA:

NOTA MUESTRAS PRESERVADAS SEGÚN STANDAR METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER

"PROTEJAMOS NUESTRO RECURSO HIDRICO"

CADENA DE CUSTODIA

FORMULARIO DE SOLICITUD DE ANÁLISIS AQU-RPA-01A

Nº 361

AQUATEC LAB. ANALITICOS, S.A.

AQUATEC
Testing Laboratories

NOMBRE DEL CLIENTE: CILSA
DIRECCIÓN: Cocolí
PROVINCIA: Panamá
GERENTE DE PROYECTO: Abdiel Delgado
TELÉFONO:

DIRECCIÓN: Urb. Chanis
TELÉFONO: 221 1481
E-MAIL: dcastillero@aquateclabs.com
MUESTREADOR: Hilber Ortiz
(NOMBRE Y FIRMA): Hilber Ortiz

					MUESTREO		DATOS DE CAMPO					ANÁLISIS A REALIZAR				GPS	TIPO DE MATRIZ				
#	IDENTIFICACION DE LA MUESTRA	FECHA DE MUESTREO	HORA DE MUESTREO	Nº. DE ENVASES	SIMPLE	COMPUESTO	PH	T(º C)	O.D(MG/L)	TURB. (NTU)	CLORO RESIDUAL (MG/L)					COORDENADAS	AGUAS SUPERFICIAL	AGUA RESIDUAL	AGUA SUBTERRANEA	AGUA SALADA	SUELO
1	Río Cocolí 4.A.	22/4/09	12:25 P.m.	4	✓		6,76	27,8								UTM 0993418 17P 0652761	✓				
2	Río Cocolí 4.4b	22/4/09	12:50 P.m.	4	✓		6,47	28,5								UTM 0993750 17P 0653899	✓				
3	Qda La Fuente	22/4/09	1:20 P.m.	4	✓		7,36	28,8								UTM 0994627 17P 0653441	✓				
4	Río Velazquez	22/4/09	2:10 P.m.	4	✓		7,38	26,5								UTM 0991992 17P 0655667	✓				

OBSERVACIONES: Día nublado. El agua se nota un poco turbia y no hay corriente del Río. En aguas Abajo del río Cocolí se estan realizando Trabajos de dragado por este motivo el agua se nota turbia. En la muestra de la quebrada la Fuente el agua estaba represada pero se nota la Presencia de sardinas en el agua.

TEMPERATURA DE LA MUESTRA
☑ MENOR DE 4 °C
☐ TEMPERATURA AMBIENTE

ENTREGADO POR: FECHA: HORA:

FIRMA DEL CLIENTE

RECIBIDO POR: FECHA: HORA:

FECHA: HORA:

NOTA MUESTRAS PRESERVADAS SEGÚN STANDAR METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER

"PROTEJAMOS NUESTRO RECURSO HIDRICO"

Appendix L

Ecological Compensation Payment Log for De Lesseps Island in Lake Gatun

14.4. Anexo 4, Aprobación y Pago de Indemnización Ecológica

AUTORIDAD NACIONAL DEL AMBIENTE
ADMINISTRACIÓN REGIONAL PANAMÁ OESTE

La Chorrera, 09 de febrero de 2009
ARAPO - 227 - 2009

Señor
Daniel M. Muchett Ibarra
Gerente, Sección de Manejo y Seguimiento Ambiental
Autoridad del Canal de Panamá
E. S. D.

Respetado Señor:

Luego de realizar la inspección, a fin de evaluar el tipo de vegetación, para el pago de la indemnización ecológica a **La Isla Lesseps**, bajo la administración de La Autoridad del Canal de Panamá – ACP, estamos en la capacidad de informarle lo siguiente: El tipo de vegetación a eliminar está compuesta por Bosque secundario con desarrollo intermedio, Bosque secundario joven (rastrojo) y gramíneas. Desglosados de la siguiente manera:

Tipo de Vegetación	Superficie (Hás.)	Monto a Pagar (B/.)
Bosque secundario con desarrollo intermedio	2.12	6,360.00
Bosque secundario joven (rastrojo)	1.57	1,570.00
Gramíneas	0.64	320.00
Total		**8,250.00**

Sírvase pasar por nuestras oficinas para notificarse de la resolución.

Atentamente,

Ing. Raúl Custodio.
Administrador Regional
ANAM Panamá Oeste

RC/GJ/GJ

Conservación para el Desarrollo Sostenible
Denuncia Ciudadana – Panamá Oeste: 254-2848

19/2/09

Appendix M

Water and Sediment Analytical Results for Gatun Lake

UNIVERSIDAD TECNOLÓGICA DE PANAMÁ
"Camino a la excelencia a través del mejoramiento contínuo"
CENTRO EXPERIMENTAL DE INGENIERÍA
LABORATORIO DE ANÁLISIS INDUSTRIALES Y CIENCIAS AMBIENTALES
Dirección: Vía Tocumen, Extensión Universitaria
Tels.: 290-8427/26
Telefax: 290-8427

Resultados con conversión de hule del.

Panamá, 28 de abril de 2009
Informe No. 05-0668-2009-RS

INFORME SOBRE ENSAYOS QUÍMICOS EFECTUADOS A MUESTRAS DE AGUA NATURAL Y SEDIMENTOS

SOLICITADO POR: **AUTORIDAD DEL CANAL DE PANAMÁ**
Dirección: Corozal, Edificio 709 – Departamento de Ingeniería y Administración de Programas – Sección de Manejo y Seguridad Ambiental
Teléfono: 276-1294 Fax: 276-1291
Responsable: Ing. Guadalupe Ortega

Descripción e identificación de las muestras recibidas: Veintisiete (27) muestras puntuales de agua natural y nueve (9) muestras de sedimentos, procedentes de 9 sitios del Lago Gatún, obtenidas los días 17 y 18 de febrero del 2009. Las muestras de agua natural fueron tomadas a tres profundidades: superficie (S), medio (M) y fondo (F) y fueron identificadas por el laboratorio como: **079-M1-S, 079-MI-M, 079-M1-F, 079-M2-S, 079-M2-M, 079-M2-F, 079-M3-S, 079-M3-M, 079-M3-F, 079-M4-S, 079-M4-M, 079-M4-F, 079-M5-S, 079-M5-M, 079-M5-F, 079-M6-S, 079-M6-M, 079-M6-F, 079-M7-S, 079-M7-M, 079-M7-F, 079-M8-S, 079-M8-M, 079-M8-F y 079-M9-S, 079-M9-M, 079-M9-F.** Las muestras de sedimentos fueron identificadas por el laboratorio como: **079-M1-Sed, 079-M2-Sed, 079-M3-Sed, 079-M4-Sed, 079-M5-Sed, 079-M6-Sed, 079-M7-Sed, 079-M8-Sed, 079-M9-Sed.**

Fecha de recepción: 13/02/2009 Solicitud de Trabajo: **CEI- 05-079-2009**
Fecha de recepción de las muestras: 17/02-2009 -18/02/2009
Muestreo efectuado por: El siguiente personal del Laboratorio de Análisis Industriales y Ciencias Ambientales, siguiendo el procedimiento DT-LABAICA-008, desde el 17/02/2009 hasta el 18/02/2009: Ing. Jaime Justavino y el M. Sc Víctor Bazán.

Fecha de ensayos: 17/02/2009 – 18/03/2009
Ensayos efectuado por: M.Sc. Víctor Bazán Pedreschi, Licda. Lourdes González, Licda. Alma Espinosa, Mgtr. María Janeiro y Téc. Milka Graell.
Ensayos solicitados: Químicos y Microbiológicos, que se describen en los resultados.

Normas utilizadas: Standard Methods for the Examination of water and wastewater, 21st Edition, 2005, APHA-AWWA-WEF y EPA.

Centro Experimental de Ingeniería
Laboratorio de Análisis Industriales y Ciencias Ambientales

Este informe presenta los resultados de los ensayos efectuados únicamente a las muestras recibidas en el laboratorio. Este documento es estrictamente confidencial y no se facilitará información del mismo a terceros, sin la autorización por escrito del interesado.
La publicación o reproducción parcial de este documento requiere la autorización escrita del laboratorio.

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RESULTADOS

ANALISIS	Método/ Norma (AWWA-APHA-WEF)	Isla Bruja Boya 22 Identificada como: 079-M1-S	Isla Bruja Boya 22 Identificada como: 079-M1-M	Isla Bruja Boya 22 Identificada como: 079-M1-F	Lago Gatún Boya 35 Identificada como: 079-M2-S	Lago Gatún Boya 35 Identificada como: 079-M2-M	Lago Gatún Boya 35 Identificada como: 079-M2-F
1. pH	4500-H^+	8,1	8,1	8,2	7,7	7,8	7,9
2. Conductividad (µmho/cm)	2510	100,0	90,0	100,0	90,0	100,0	90,0
3. Oxígeno disuelto (mg O_2/L)	4500 O-G	8,04	8,01	8,05	8,05	8,07	8,03
4. Turbiedad ($NTU_{FORMAZIN}$)	2130 B	< 0,10	< 0,10	< 0,10	14,83	9,05	< 0,10
5. Sólidos suspendidos (mg/L)	2540 D	4	10	6	8	2	<1
6. Carbono orgánico total (mg/L)	5310	< 1	< 1	< 1	1,2	1,2	2,4
7. Hidrocarburos (mg/L)	2540 B	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5
8. E. Coli (NMP/100 mL)	9223 B	< 1	< 1	$3,0 \times 10^2$	< 1	< 1	<1
9. Coliformes totales (NMP/100mL)	9223 B	5×10^2	$1,5 \times 10^3$	$3,6 \times 10^3$	< 1	$1,1 \times 10^3$	<1
10. Arsénico (mg As/L)	3111 D	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01
11. Bario (mg Ba/L)	3111 D	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5
12. Cadmio (mg Cd/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
13. Cromo (mg Cr/L)	3111 B	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05
14. Cobre (mg Cu/L)	3111 B	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
15. Plomo (mg Pb/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
16. Mercurio (mg Hg/L)	3111 D	< 0,001	< 0,001	< 0,001	< 0,001	< 0,001	< 0,001
17. Niquel (mg Ni/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
18. Vanadio (mg V/L)	3111 D	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
19. Zinc (mg Zn/L)	3111 B	< 0,2	0,2	< 0,2	< 0,2	< 0,2	< 0,2
20. Medición con disco sechi (m)	-	3,0	-	-	1,0	-	-

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RESULTADOS

ANALISIS	Método/ Norma (AWWA-APHA-WEF)	Lago Gatún Boya 44 Identificada como: 079-M3-S	Lago Gatún Boya 44 Identificada como: 079-M3-M	Lago Gatún Boya 44 Identificada como: 079-M3-F	Lago Gatún Boya 58 Identificada como: 079-M4-S	Lago Gatún Boya 58 Identificada como: 079-M4-M	Lago Gatún Boya 58 Identificada como: 079-M4-F
1. pH	4500-H^+	7,8	7,7	7,8	7,8	7,9	7,8
2. Conductividad (µmho/cm)	2510	90,0	100,0	90,0	90,0	90,0	90,0
3. Oxígeno disuelto (mg O_2/L)	4500 O-G	7,76	7,87	7,92	7,88	7,93	7,67
4. Turbiedad ($NTU_{FORMAZIN}$)	2130 B	25,38	21,24	20,40	18,98	38,41	40,91
5. Sólidos suspendidos (mg/L)	2540 D	2	9	7	9	2	21
6. Carbono orgánico total (mg/L)	5310	1,2	2,4	6,0	3,6	1,2	3,6
7. Hidrocarburos (mg/L)	2540 B	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5
8. E. Coli (NMP/100 mL)	9223 B	<1	<1	<1	<1	<1	<1
9. Coliformes totales (NMP/100mL)	9223 B	2×10^2	4×10^2	1×10^2	4×10^2	<1	1×10^2
10. Arsénico (mg As/L)	3111 D	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01
11. Bario (mg Ba/L)	3111 D	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5
12. Cadmio (mg Cd/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
13. Cromo (mg Cr/L)	3111 B	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05
14. Cobre (mg Cu/L)	3111 B	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
15. Plomo (mg Pb/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
16. Mercurio (mg Hg/L)	3111 D	< 0,001	< 0,001	< 0,001	< 0,001	< 0,001	< 0,001
17. Niquel (mg Ni/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
18. Vanadio (mg V/L)	3111 D	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
19. Zinc (mg Zn/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
20. Medición con disco sechi (m)	-	0,5	-	-	0,5	-	-

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RESULTADOS

ANALISIS	Método/ Norma (AWWA-APHA-WEF)	Lago Gatún Boya 69 Identificada como: 079-M5-S	Lago Gatún Boya 69 Identificada como: 079-M5-M	Lago Gatún Boya 69 Identificada como: 079-M5-F	Lago Gatún Boya 82 Identificada como: 079-M6-S	Lago Gatún Boya 82 Identificada como: 079-M6-M	Lago Gatún Boya 82 Identificada como: 079-M6-F
1. pH	4500-H^+	8,0	8,4	8,1	7,7	7,7	7,7
2. Conductividad (µmho/cm)	2510	90,0	90,0	100,0	100,0	100,0	100,0
3. Oxígeno disuelto (mg O_2/L)	4500 O-G	7,81	7,87	7,75	7,73	7,45	7,50
4. Turbiedad ($NTU_{FORMAZIN}$)	2130 B	7,52	17,81	21,71	4,70	5,62	4,85
5. Sólidos suspendidos (mg/L)	2540 D	3	1	1	6	4	9
6. Carbono orgánico total (mg/L)	5310	1,2	1,2	7,3	1,2	2,4	1,2
7. Hidrocarburos (mg/L)	2540 B	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5
8. E. Coli (NMP/100 mL)	9223 B	<1	<1	2×10^2	<1	<1	<1
9. Coliformes totales (NMP/100 mL)	9223 B	<1	<1	$1,5 \times 10^3$	1×10^2	<1	1×10^2
10. Arsénico (mg As/L)	3111 D	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01
11. Bario (mg Ba/L)	3111 D	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5
12. Cadmio (mg Cd/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
13. Cromo (mg Cr/L)	3111 B	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05
14. Cobre (mg Cu/L)	3111 B	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
15. Plomo (mg Pb/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
16. Mercurio (mg Hg/L)	3111 D	< 0,001	< 0,001	< 0,001	< 0,001	< 0,001	< 0,001
17. Niquel (mg Ni/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
18. Vanadio (mg V/L)	3111 D	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
19. Zinc (mg Zn/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
20. Medición con disco sechi (m)	-	0,5	-	-	1,5	-	-

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RESULTADOS

ANALISIS	Método/ Norma (AWWA-APHA-WEF)	Lago Gatún Boya 101 Identificada como: 079-M7-S	Lago Gatún Boya 101 Identificada como: 079-M7-M	Lago Gatún Boya 101 Identificada como: 079-M7-F	Lago Gatún Boya 138 Identificada como: 079-M8-S	Lago Gatún Boya 138 Identificada como: 079-M8-M	Lago Gatún Boya 138 Identificada como: 079-M8-F
1. pH	4500-H^+	7,6	7,7	7,7	7,7	7,7	7,6
2. Conductividad (µmho/cm)	2510	100,0	100,0	100,0	90,0	100,0	100,0
3. Oxígeno disuelto (mg O_2/L)	4500 O-G	7,37	7,35	7,76	7,60	7,59	7,65
4. Turbiedad ($NTU_{FORMAZIN}$)	2130 B	< 0,10	< 0,10	< 0,10	0,11	1,81	< 0,10
5. Sólidos suspendidos (mg/L)	2540 D	2	1	4	1	2	0
6. Carbono orgánico total (mg/L)	5310	< 1	< 1	< 1	1,2	1,2	3,6
7. Hidrocarburos (mg/L)	2540 B	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5
8. E. Coli (NMP/100 mL)	9223 B	<1	2×10^2	<1	<1	<1	<1
9. Coliformes totales (NMP/100 mL)	9223 B	4×10^2	3×10^2	2×10^2	1×10^2	2×10^2	4×10^2
10. Arsénico (mg As/L)	3111 D	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01
11. Bario (mg Ba/L)	3111 D	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5
12. Cadmio (mg Cd/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
13. Cromo (mg Cr/L)	3111 B	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05
14. Cobre (mg Cu/L)	3111 B	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
15. Plomo (mg Pb/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
16. Mercurio (mg Hg/L)	3111 D	< 0,001	< 0,001	< 0,001	< 0,001	< 0,001	< 0,001
17. Niquel (mg Ni/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
18. Vanadio (mg V/L)	3111 D	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2	< 0,2
19. Zinc (mg Zn/L)	3111 B	< 0,2	< 0,2	< 0,2	< 0,2	0,4	< 0,2
20. Medición con disco sechi (m)	-	3,0	-	-	2,0	-	-

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RESULTADOS

ANALISIS	Método/ Norma (AWWA-APHA-WEF)	Lago Gatún Boya 209 Identificada como: 079-M9-S	Lago Gatún Boya 209 Identificada como: 079-M9-M	Lago Gatún Boya 209 Identificada como: 079-M9-F
1. pH	4500-H^+	7,8	7,8	7,8
2. Conductividad (µmho/cm)	2510	110,0	110,0	110,0
3. Oxígeno disuelto (mg O_2/L)	4500 O-G	7,72	7,56	7,38
4. Turbiedad ($NTU_{FORMAZIN}$)	2130 B	15,71	18,53	14,02
5. Sólidos suspendidos (mg/L)	2540 D	10	5	1
6. Carbono orgánico total (mg/L)	5310	7,2	< 1	< 1
7. Hidrocarburos (mg/L)	2540 B	< 0,5	< 0,5	< 0,5
8. E. Coli (NMP/100 mL)	9223 B	3 x 10^2	<1	<1
9. Coliformes totales (NMP/100 mL)	9223 B	<1	1 x 10^2	7 x 10^2
10. Arsénico (mg As/L)	3111 D	< 0,01	< 0,01	< 0,01
11. Bario (mg Ba/L)	3111 D	< 0,5	< 0,5	< 0,5
12. Cadmio (mg Cd/L)	3111 B	< 0,2	< 0,2	< 0,2
13. Cromo (mg Cr/L)	3111 B	< 0,05	< 0,05	< 0,05
14. Cobre (mg Cu/L)	3111 B	< 0,1	< 0,1	< 0,1
15. Plomo (mg Pb/L)	3111 B	< 0,2	< 0,2	< 0,2
16. Mercurio (mg Hg/L)	3111 D	< 0,001	< 0,001	< 0,001
17. Niquel (mg Ni/L)	3111 B	< 0,2	< 0,2	< 0,2
18. Vanadio (mg V/L)	3111 D	< 0,2	< 0,2	< 0,2
19. Zinc (mg Zn/L)	3111 B	0,2	< 0,2	< 0,2
20. Medición con disco sechi (m)	-	1,0	-	-

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RESULTADOS

ANALISIS	Método/ Norma (AWWA-APHA-WEF)	Isla Bruja Boya 22 Identificada como: 079-M1-Sed	Lago Gatún Boya 35 Identificada como: 079-M2-Sed	Lago Gatún Boya 44 Identificada como: 079-M3-Sed	Lago Gatún Boya 58 Identificada como: 079-M4-Sed	Lago Gatún Boya 69 Identificada como: 079-M5-Sed
1. Contenido orgánico (mg/kg)	5310 (Walkley-Black)	10100	6700	7900	2400	3200
2. Pesticidas organohalogenados (mg/kg)	6630 (EPA 8081)	< 0, 1	< 0, 1	< 0, 1	< 0, 1	< 0, 1
3. Pesticidas organofosforados (mg/kg)	6651 (EPA 8141)	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
4. Pesticidas Nitrogenados (mg/kg)	6651 (EPA 8141)	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
5. Carbamatos (mg/kg)	6640	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
6. Piretroides (mg/kg)	6651	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
7. Herbicidas (mg/kg)	6640	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
8. PCBs (mg/kg)	6431 (EPA 8082)	< 0,04	< 0,04	< 0,04	< 0,04	< 0,04
9. Hidrocarburos poliaromáticos (mg/kg)	6440 (EPA 8100)	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
10. Arsénico (mg/kg)	3114 B	< 5	< 5	< 5	< 5	< 5
11. Bario (mg/kg)	3111 D	< 5	< 5	< 5	< 5	< 5
12. Cadmio (mg/kg)	3113 B	< 0,4	< 0,4	< 0,4	< 0,4	< 0,4
13. Cromo (mg /kg)	3113 B	< 5	< 5	< 5	< 5	< 5
14. Cobre (mg /kg)	3111 B	< 5	< 5	< 5	< 5	< 5
15. Plomo (mg /kg)	3111 B	< 5	< 5	< 5	< 5	< 5
16. Mercurio (mg/kg)	3112 B	< 0,4	< 0,4	< 0,4	< 0,4	< 0,4
17. Niquel (mg /kg)	3111 B	< 5	< 5	< 5	< 5	< 5
18. Vanadio (mg /kg)	3111 D	< 5	< 5	< 5	< 5	< 5
19. Zinc (mg /kg)	3111 B	< 5	< 5	< 5	< 5	< 5

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RESULTADOS

ANALISIS	Método/ Norma (AWWA-APHA-WEF)	Lago Gatún Boya 82 Identificada como: 079-M6-Sed	Lago Gatún Boya 101 Identificada como: 079-M7-Sed	Lago Gatún Boya 138 Identificada como: 079-M8-Sed	Lago Gatún Boya 209 Identificada como: 079-M9-Sed
1. Contenido orgánico (mg/kg)	5310 (Walkley-Black)	4900	23000	10000	13800
2. Pesticidas organohalogenados (mg/kg)	6630 (EPA 8081)	< 0, 1	< 0, 1	< 0, 1	< 0, 1
3. Pesticidas organofosforados (mg/kg)	6651 (EPA 8141)	< 0,1	< 0,1	< 0,1	< 0,1
4. Pesticidas Nitrogenados (mg/kg)	6651 (EPA 8141)	< 0,1	< 0,1	< 0,1	< 0,1
5. Carbamatos (mg/kg)	6640	< 0,1	< 0,1	< 0,1	< 0,1
6. Piretroides (mg/kg)	6651	< 0,1	< 0,1	< 0,1	< 0,1
7. Herbicidas (mg/kg)	6640	< 0,1	< 0,1	< 0,1	< 0,1
8. PCBs (mg/kg)	6431 (EPA 8082)	< 0,04	< 0,04	< 0,04	< 0,04
9. Hidrocarburos poliaromáticos (mg/kg)	6440 (EPA 8100)	< 0,1	< 0,1	< 0,1	< 0,1
10. Arsénico (mg/kg)	3114 B	< 5	< 5	< 5	< 5
11. Bario (mg/kg)	3111 D	< 5	< 5	< 5	< 5
12. Cadmio (mg/kg)	3113 B	< 0,4	< 0,4	< 0,4	< 0,4
13. Cromo (mg /kg)	3113 B	< 5	< 5	< 5	< 5
14. Cobre (mg /kg)	3111 B	< 5	< 5	< 5	< 5
15. Plomo (mg /kg)	3111 B	< 5	< 5	< 5	< 5
16. Mercurio (mg/kg)	3112 B	< 0,4	< 0,4	< 0,4	< 0,4
17. Niquel (mg /kg)	3111 B	< 5	< 5	< 5	< 5
18. Vanadio (mg /kg)	3111 D	< 5	< 5	< 5	< 5
19. Zinc (mg /kg)	3111 B	< 5	< 5	< 5	< 5

MGTR. CECILIO HERNÁNDEZ B.
JEFE
LABORATORIO DE ANÁLISIS
INDUSTRIALES Y CIENCIAS AMBIENTALES

DRA. TANIA CROSTON
SUBDIRECTORA
CENTRO EXPERIMENTAL DE INGENIERÍA

Appendix N

Blasting Operation Plan for Pacific Entrance Channel Project

Dredging International | PANAMA
Marine & Waterway Contractor

Dredging International de Panama, S.A.
Member of the DEME Group
Plaza Albrook,
Panama, Rep. de Panama
T +507 340 30 04
F +507 340 30 05
dredging @cwpanama.net
www.deme.be

Dredging International de Panama, S.A.
CMCA-202791-CCP

Ref. n°: CMCA-202791-CCP/T/DB/0691

Date: 13/04/2009

TRANSMITTAL

Addressed to: **AUTORIDAD DEL CANAL DE PANAMA**

Name: Mr. Roderick Lee
Contracting Officer Representative

Item n°	Document n°	Rev.	Description	Issue Code*	Qty
1	CMCA-202791-CCP/DB/BP/003	-	Blasting Plan 003	7	1
2	CMCA-202791-CCP/DB/BP/004	-	Blasting Plan 004	7	1

* Issue Code :
1. for signature
2. for approval
3. request for issue
4. issued for review and return
5. as agreed
6. at your request
7. information
8. for investigation
9. checked
10. as noted
11. to supply us with add. info
12. for construction
13. as built
14. your controlled copy
15. ID Cards
16.

in reference to:
1.
2.
3.

note:

signed on behalf of: Dredging International
name:
date:
sign: .....

please acknowledge receipt by returning this document signed and dated (fax n° : + ...)
name: Gustavo Gonzalez
date / sign: 13/4/09 2:32 PM

Dredging International | PANAMA Marine & Waterway Contractor	Contarct No. CMCA-202791-CCP	Document number: CMCA-202791-CCP/DB/BP/003	Date: 9/04/09

Daily underwater blast notification

	BP 003
Blast plan number	
Date of blast	9/4/2009
Time of the blast	between 2:00 p.m. to 2:30 p.m.
Reach	Diablo dock
Station limits	70K900 TO 71K100
Offset to the Canal's center line	238.944
Offset to the nearest structure	642.509
Maximum charge per delay	100kg
Total amount of Rioflex	165kg
Number of holes	3

Signal before and after the blast

Preblast warning signal

Five minutes prior to the blast, 6 long signals lasting 10 seconds each sounded by a siren.

Blast signal

During one minute prior to the blast, one 10 second signal followed by no more than ten 3 second consecutive signals sounded by a siren.

All clear signal

One long signal lasting at least 10 seconds in duration.

Dredging International | PANAMA Marine & Waterway Contractor	Contarct No. CMCA-202791-CCP	Document number: CMCA-202791-CCP/DB/BP/004	Date: 10/04/09

Daily underwater blast notification

	BP 004
Blast plan number	
Date of blast	13/4/2009
Time of the blast	between 12:00 p.m. to 6:00 p.m.
Reach	Diablo dock
Station limits	70K900 TO 71K000
Offset to the Canal's center line	217.269
Offset to the nearest structure	721.007
Maximum charge per delay	63kg
Total amount of Rioflex	1260kg
Number of holes	20
Section Number	S1
Line Number	L1

Signal before and after the blast

Preblast warning signal

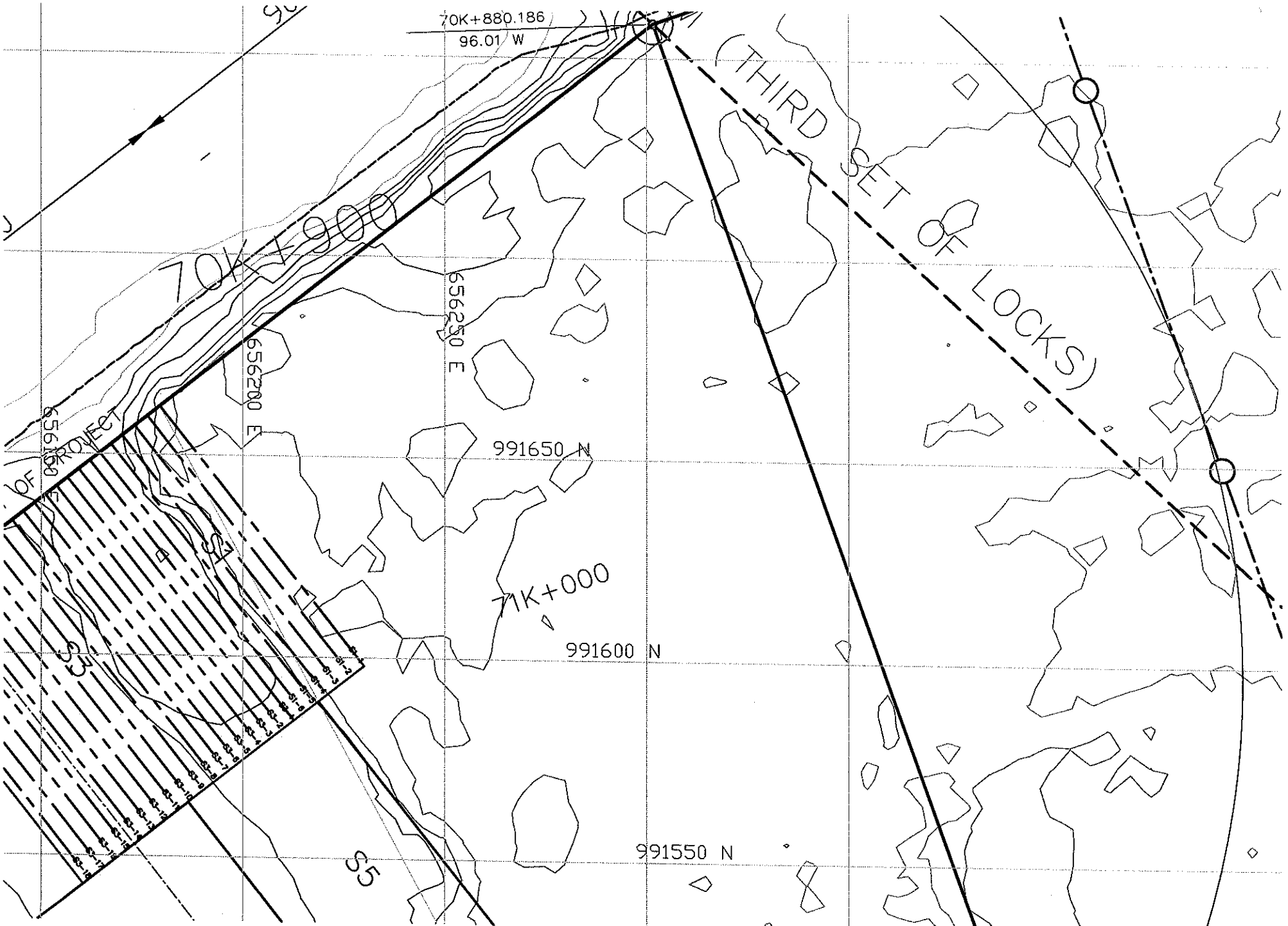
Five minutes prior to the blast, 6 long signals lasting 10 seconds each sounded by a siren.

Blast signal

During one minute prior to the blast, one 10 second signal followed by no more than ten 3 second consecutive signals sounded by a siren.

All clear signal

One long signal lasting at least 10 seconds in duration.


70K+880.186
96.01 W
(THIRD SET OF LOCKS)
70K+900
656250 E
656200 E
991650 N
71K+000
991600 N
991550 N
S1
S3
S5

Appendix O

Blasting Test for Pacific Entrance Channel Project

Dredging International | PANAMA
Marine & Waterway Contractor

Dredging International de Panama, S.A.
Member of the DEME Group
Plaza Albrook,
Panama, Rep. de Panama
T +507 340 30 04
F +507 340 30 05
dredging @cwpanama.net
www.deme.be

Dredging International de Panama, S.A.
CMCA-202791-CCP

Ref. n°: CMCA-202791-CCP/T/DB/0692

Date: 13/04/2009

TRANSMITTAL

Addressed to: **AUTORIDAD DEL CANAL DE PANAMA**

Name: Mr. Roderick Lee

Contracting Officer Representative

Item n°	Document n°	Rev.	Description	Issue Code*	Qty
1	CMCA-202791-CCP/DB/TB/001	-	Test Blast report 001	7	1

* Issue Code :
1. for signature
2. for approval
3. request for issue
4. issued for review and return
5. as agreed
6. at your request
7. information
8. for investigation
9. checked
10. as noted
11. to supply us with add. info
12. for construction
13. as built
14. your controlled copy
15. ID Cards
16.

in reference to:
1.
2.
3.

note:

signed on behalf of: Dredging International
name:
date:
sign: .....

please acknowledge receipt by returning this document signed and dated (fax n° : + ...)
name: Gustavo Gonzalez
date / sign: 13/4/09 2:33

MAXAM International

09/04/2009

Technical Services

TEST BLAST REPORT

MARINE DRILLING AND BLASTING WORKS AND OFFSHORE DISPOSAL

Serviblasting International S.A.

TABLE OF CONTENS

1) INTRODUCTION

2) AREAS TO BE PROTECTED

3) EQUIPMENT USED

   a) SEISMOGRAPHS

   b) GPS

   c) SOFTWARE

4) POSITION OF SEISMOGRAPHS

5) DRILLING AND BLASTING DATA

6) DESCRIPTION OF THE BLAST

7) BLASTING REPORTS

   a) TEST BLAST 1

   b) TEST BLAST 2

   c) TEST BLAST 3

8) VIBRATION REPORT

   a) TEST BLAST 1

   b) TEST BLAST 2

   c) TEST BLAST 3

9) RESULTS

10) CONCLUSIONS

1) INTRODUCTION

The following report contains the design, carry out and results of the study of vibrations transmit ion to the community of Diablo and its surrounding areas, due to the developing project " **MARINE DRILLING AND BLASTING WORKS AND OFFSHORE DISPOSAL".**
The project is part of the expansion program of the Panama Canal, and it was awarded to Dredging International, by the ACP (Autoridad del Canal de Panama).

The aim of the Test Blast is to get a better understanding of the vibration transmission in the specific area. Eight seismographs were set in different positions of interest. Test blast was divided in two days and three individual blasts.

2) AREAS TO BE PROTECTED

The initial drilling and blasting work will be done on the new approach channel; this is located west from the existing prism line of the Panama Canal.

Work will have an influence over the area of Diablo and Diablo dock. These areas will be the more sensitive to the vibrations due to their proximity to the initial drilling and blasting works. Also, DI offices are near by the blasting zones on the west side of the Channel.

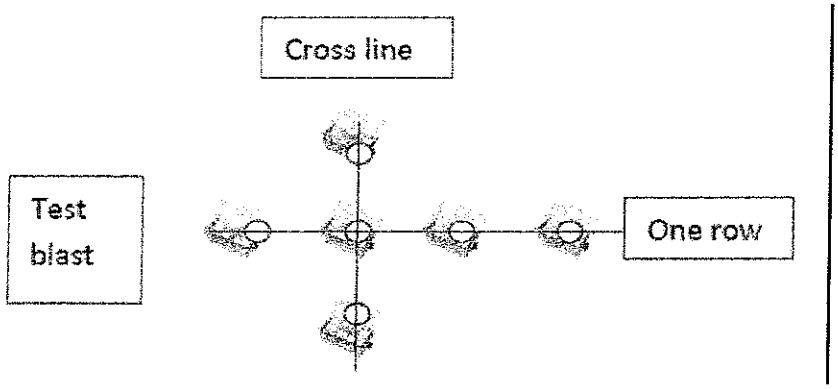


3) EQUIPMENT USED

a. SEISMOGRAPHS

Over the developed test blasts, eight seismographs have been used:

- 6 MINIMATE BLASTERS
- 2 Minimate Plus.



The configuration of the seismographs was deployed over Diablo Hangars.

Minimate Blaster™

Blast Vibration and Overpressure Monitor

Range of Applications:

- Blast-monitoring for compliance

The Instantel® Minimate Blaster™ vibration and overpressure monitor has the features you need for reliable blast monitoring in a simple and economical package.

Simple

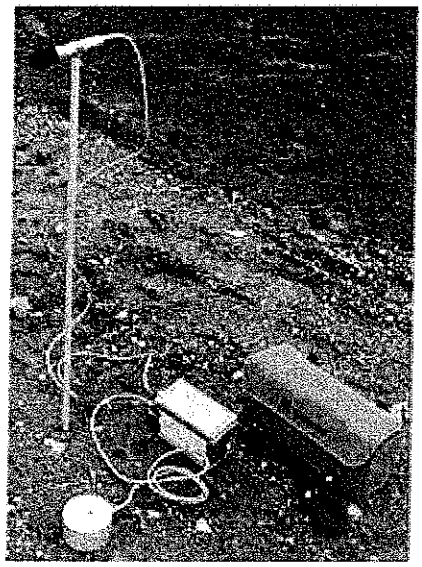
The monitor incorporates an eight-key tactile keypad and on-board LCD, with a clearly structured, menu-driven interface - giving you complete control for quick and easy setup and operation. In addition, the **Instantel® AutoRecord™** record stop mode automatically sets the record length based on vibration and overpressure activity, helping ensure that you record the entire event. It also comes with an integrated monitoring log, for compliance with many local and regional regulatory standards.

Flexible

Producing professional reports is easy. Print directly from the **Minimate Blaster** monitor to one of many compatible printers, or transfer events directly to an **Instantel Blastmate III™** monitor and print using the integrated on-board printer. Events can also be easily downloaded to a computer via a standard RS-232 interface using the included **Instantel Blastware® Compliance Module** software. From there, you have all the tools to generate full-page event reports and frequency analysis.

Reliable

A vibration monitor is a necessity, so it had better work – always. That's why so many blasters trust Instantel reliability. With standard features like zero-dead-time while recording, 300-event memory, and a battery that has the capacity for 210 hours of continuous monitoring, the **Minimate Blaster** monitoring system gives you confidence that you will get the record every time.



Key Features

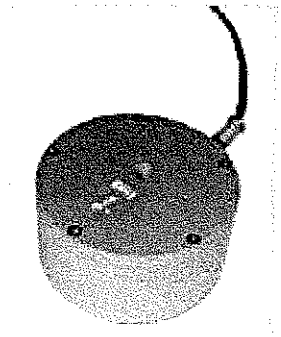
- Small, rugged package for portability and easy setup
- Easy-to-use keypad with intuitive menu-driven operation
- Rechargeable gel cell battery allows continuous monitoring for up to 210 hours
- Non-volatile memory with storage capacity for up to 300 events
- Sample rates from 1,024 to 4,096 S/s
- Integral monitor log records time and duration of monitoring jobs
- **AutoRecord** record stop mode allows the monitor to continue recording as long as activity cycles above the trigger level
- Continuous monitoring means zero dead time, even while the unit is processing
- Fully compliant with the International Society of Explosives Engineers (ISEE) Performance Specifications for Blasting Seismographs

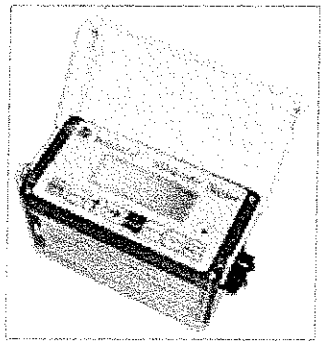
Instantel

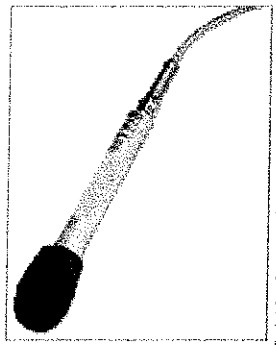
The World's Most Trusted Vibration Monitors www.instantel.com

Minimate Blaster™

General Specifications	Minimate Blaster
Channels	Microphone and Triaxial Geophone
Vibration Monitoring	
Range	Up to 254 mm/s (10 in/s)
Resolution	0.127 mm/s (0.005 in/s) or 0.0159 mm/s (0.000625 in/s) with built-in preamp
Accuracy	+/- 5% or 0.5 mm/s (0.02 in/s), whichever is larger, between 4 and 125 Hz
Transducer Density	2.13 g/cc (133 lbs/ft³)
Frequency Range	2 to 250 Hz, within zero to -3 dB of an ideal flat response
Air Overpressure Monitoring	
Weighting Scale	Linear
Range	88 to 148 dB (500 Pa (0.072 PSI) Peak)
Resolution	0.25 Pa (0.000036 PSI)
Accuracy	+/- 10% or +/- 1 dB, whichever is larger, between 4 and 125 Hz
Frequency Range	2 to 250 Hz between -3 dB roll off points
Record Modes	Manual and Continuous
Seismic Trigger	0.125 to 254 mm/s (0.005 to 10 in/s)
Acoustic Triggers	100 to 148 dB
Sample Rate	1,024 S/s to 4,096 S/s per channel (independent of record time)
Record Stop Mode	Fixed record time, Instantel® AutoRecord™ record stop mode
Record Time	1 to 20 seconds (programmable in one-second steps) plus 0.25 second per trigger
AutoRecord Time	Auto window programmable from 1 to 9 seconds, plus a 0.25 second pre-trigger. Event is recorded until activity remains below trigger level for duration of auto window, or until available memory is filled.
Cycle Time	Recording uninterrupted by event processing - no dead time
Storage Capacity	
Full Waveform Events	300 one-second events at 1,024 S/s sample rate
Event Summaries	1,750
Dimensions	81 x 91 x 160 mm (3.2 x 3.6 x 6.3 in)
Weight (monitor and sensors)	2.0 kg (5.7 lbs)
Battery	Rechargeable 6 V sealed gel cell - capacity for 210 hours of continuous monitoring
User Interface	8-key keypad with domed tactile keys
Display	4-line x 20-character, high contrast, backlit LCD with on-line help
PC Interface	RS-232
Auxiliary Inputs and Outputs	External Trigger, Remote Alarm, coordinate download from GPS
Environmental	
LCD Operating Temperature	-10 to 50°C (14 to 122°F)
Electronics Operating Temperature	-20 to 60°C (-4 to 140°F)
Remote Communications	Compatible with Telephone, GSM, Cellular, RF, Satellite and Short-haul modems
Additional Features	Monitor start/stop timer







Corporate Office:
602 Laperle Drive
Ottawa, Ontario K1K 1A3
Canada

US Office:
DSS Commerce Park Drive
Depew, New York 14043
USA

Toll Free: (800) 267 9111
Telephone: (613) 592 4642
Facsimile: (613) 592 4995
Email: sales@instantel.com

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Instantel

The World's Most Trusted Vibration Monitors CERTIFIED TO THE ISO 9001 QUALITY STANDARD

Minimate Plus™

Advanced Vibration and Overpressure Monitor

Range of Applications:

- Blast monitoring for compliance
- Near-field blast analysis
- Pile driving
- Construction activity
- Demolition activity
- Heavy Transportation
- Bridge monitoring
- Structural analysis
- Underwater blast monitoring
- 4 or 8 channel data acquisition
- Remote monitoring – Auto Call Home™
- Structural monitoring – Flex™

When we asked what you wanted in a vibration monitor, you said "Everything." So, we designed the **Instantel® Minimate Plus™** vibration and overpressure monitor. Ever since, it has become a favourite of contractors, consultants, engineers and blasters, because it offers unrivalled features and versatility in a rugged and easy-to-use package.

Versatile

Use the **Minimate Plus** monitor with an **Instantel Standard Triaxial Geophone** (ISEE or DIN version) and an overpressure microphone (Linear or A Weight) to provide a rugged, reliable compliance monitoring system. Add the **Instantel 8-Channel** option and a single monitor may be used with two triaxial geophones and two microphones.

For more demanding monitoring applications, the **Instantel Blastware® Advanced Module** software provides the capability to monitor a broad selection of vibration and overpressure sensors, as well as sensors for structural and environmental measurements. Monitor vibration, ambient environmental conditions, and the movement of structural cracks, all at the same time, all using the same **Minimate Plus** monitor.

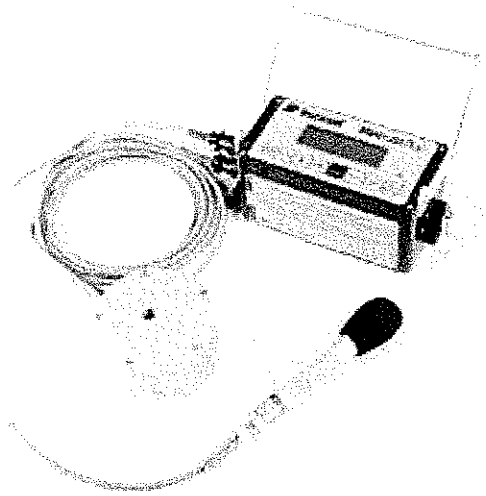
Intelligent

For remote installations, the **Instantel Auto Call Home™** feature will automatically transfer event files from field to office as they are recorded using a variety of wired or wireless modems. From there, the **Blastware Mail** feature of the **Blastware** software automatically distributes files or summary information to multiple e-mail or text messaging addresses.

Easy to use

Even with all of these features, the **Minimate Plus** system is still easy for anyone to use. A high-contrast LCD, eight-key tactile keypad, coupled with simple menu-driven operations, provides complete control and confidence.

Minimate Plus - everything you need and more.



Key Features

- **Instantel Histogram Combo™** mode allows capture of full waveform records while recording in histogram mode.
- **Auto Call Home** feature automates remote monitoring applications.
- Sample rates from 1,024 to 16,000 S/s, per channel with up to 65,000 S/s available on a single channel.
- Available **Instantel 8-channel** option allows for two standard geophones and two microphones to be operated from one **Minimate Plus** monitor.
- Non-volatile memory with standard 300-event storage capacity (optional 1,500-event capacity).
- Records waveform events up to 100 seconds long with standard setup, or up to 500 seconds with advanced setup.
- Continuous monitoring means zero dead time, even while the unit is processing.
- Any channel can be matched to a wide variety of sensors - geophones, accelerometers, or hydrophones.

Instantel

The World's Most Trusted Vibration Monitors www.instantel.com

Minimate Plus™

General Specifications	Minimate Plus
Channels	Microphone and Triaxial Geophone or 4 independent user-configurable channels (two Microphones and two Triaxial Geophones or 8 independent channels with optional 8-channel upgrade)
Vibration Monitoring (with Standard Triaxial Geophone)	
Range	Up to 254 mm/s (10 in/s)
Resolution	0.127 mm/s (0.005 in/s) or 0.01/59 mm/s (0.000625 in/s) with built-in preamp
Accuracy (ISEE / DIN)	+/- 5% or 0.5 mm/s (0.02 in/s), whichever is larger, between 4 and 125 Hz / DIN 45669-1 standard
Transducer Density	2.13 g/cc (133 lbs/ft³)
Frequency Range (ISEE / DIN)	2 to 550 Hz, within zero to -3 dB of an ideal flat response / 1 to 315 Hz
Maximum Cable Length (ISEE / DIN)	75 m (250 ft) / 1,000 m (3,280 ft)
Air Overpressure Monitoring	
Weighting Scales	Linear or A-weight
Linear Range	88 to 148 dB (500 Pa (0.072 PSI) Peak)
Linear Resolution	0.25 Pa (0.0000363 PSI)
Linear Accuracy	+/- 10% or +/- 1 dB, whichever is larger, between 4 and 125 Hz
Linear Frequency Response	2 to 250 Hz between -3 dB roll off points
A-weight Range	50 to 140 dBA
A-weight Resolution	0.1 dBA
Record Modes	Manual, Single-shot, Continuous
Seismic Trigger	0.127 to 254 mm/s (0.005 to 10 in/s)
Acoustic Trigger	
Linear	100 to 148 dB
A-weight	55 to 110 dBA
Sample Rate	1,024 to 16,384 S/s per channel (independent of record time), up to 65,536 S/s in single-channel mode with advanced software (max 8,192 S/s per channel for 8 channels)
Record Stop Mode	Fixed record time, Instantel® AutoRecord™ record stop mode
Record Time	1 to 100 seconds (programmable in one-second steps) or 500 seconds plus 0.25 seconds pre-trigger
AutoRecord Time	Auto window programmable from 1 to 9 seconds, plus a 0.25 second pre-trigger. Event is recorded until activity remains below trigger level for duration of auto window, or until available memory is filled.
Cycle Time	Recording uninterrupted by event processing - no dead time
Storage Capacity	
Full Waveform Events	300 one-second events at 1,024 S/s sample rate (1,500 event capacity with optional memory upgrade)
Event Summaries	1,750 (8,750 event capacity with optional memory upgrade)
Record Modes	Histogram and Instantel Histogram Combo™ (monitor captures triggered waveforms while recording in Histogram mode)
Recording Interval	2, 5 or 15 seconds; 1, 5 or 15 minutes
Storage Capacity	46,656 intervals - 3 days at 5-second intervals or 102 days at 15-minute intervals (with memory upgrade - 15 days at 5-second intervals or 540 days at 15-minute intervals)
Dimensions	81 x 91 x 150 mm (3.2 x 3.6 x 6.3 in)
Weight	1.4 kg (3 lbs)
Battery	Rechargeable 6 V sealed gel cell - capacity for 210 hours of continuous monitoring
User Interface	8-key keypad with domed tactile keys
Display	4-line x 20-character, high-contrast, backlit LCD
PC Interface	RS-232
Auxiliary Inputs and Outputs	External Trigger, Remote Alarm, coordinate download from GPS
Environmental	
LCD Operating Temperature	-10 to 50°C (14 to 122°F)
Electronics Operating Temperature	-20 to 60°C (-4 to 140°F)
Remote Communication	Compatible with Telephone, GSM, Cellular, RF, Satellite, Short-haul modems and Ethernet/IP device servers. Automatically transfer events when they occur through the Instantel Auto Call Home™ feature.
Additional Features	Monitor that stop times

Corporate Office: 328 Legget Drive, Ottawa, Ontario, K2K 2A3 Canada
US Office: 602 Commerce Park Drive, Ogdensburg, New York 13669 USA
Toll Free: (800) 267 9135
Telephone: (613) 592 4648
Fax/Local: (613) 592 4256
Email: (sales@instantel.com)

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Instantel

The World's Most Trusted Vibration Monitors CERTIFIED TO THE ISO 9001 QUALITY STANDARD

b. GPS

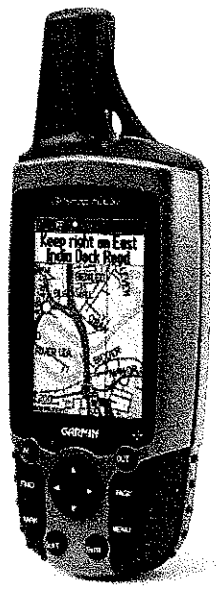
A GPS have been used in order to get the coordinates of all seismographs, the accuracy of it is presented in the following data:

GARMIN. GPSMAP® 60Cx and 60CSx

On the road, on the trail, or on the water, the Garmin GPSMAP® 60 series

Add a dash of color to your outdoor adventures

is your ideal guide to the great outdoors. Both the 60Cx and 60CSx versions are rugged, waterproof, full-color navigators that feature a built-in autorouting basemap and include a 64 MB microSD card for storage of optional MapSource® topo, marine or city street map detail. High-sensitivity GPS receivers assure improved reception in tree cover or canyons. And both units feature auto-save of track data to help guide you back to any point along your route. In addition, the "sensor version" 60CSx includes an electronic compass and barometric altimeter – making it the trailblazing tool of choice for hikers and climbers.



GARMIN. GPSMAP® 60Cx and 60CSx

Navigation features

Waypoints/routes:	1000 with name and graphic symbol, 10 nearest (automatic), 10 proximity
Routes:	50 reversible routes with up to 250 points each, plus MOB and TracBack® modes
Tracks:	10K point automatic track log; 20 saved tracks 500 points each let you retrace your path in both directions
Trip computer:	Current speed, average speed, resettable max. speed, trip timer and trip distance
Alarms:	Anchor drag, approach and arrival, off course, proximity waypoint, shallow water and deep water
Tables:	Built-in celestial tables for best times to fish and hunt, sun and moon rise, set and location
Map datums:	More than 100 plus user datum
Position format:	Lat/Lon, UTM/UPS, Maidenhead, MGRS, Loran TDs and other grids, including user UTM grid/zone

GPS performance

Receiver:	12 channel SiRFstar III™ high-sensitivity GPS receiver (WAAS-enabled) continuously tracks and uses up to 12 satellites to compute and update your position
Acquisition times*:	
Warm:	<1 sec
Cold:	<38 sec
Autolocate™:	<45 sec
Update rate:	1/second, continuous
GPS accuracy:	
Position:	<10 meters, typical
Velocity:	.05 meter/sec steady state
[WAAS/EGNOS/MSAS] accuracy:	
Position:	<5 meters, typical
Velocity:	.05 meter/sec steady state
Protocol messages:	NMEA 0183 output protocol
Antenna:	Built-in quad helix receiving antenna, with external antenna connection (MCX)

Moving map features

Basemap:	Detailed routable basemap with cities, highways, interstates, exit info, rivers, lakes, preloaded with worldwide cities
Uploadable maps:	Accepts downloaded or plug-in microSD map detail from a variety of optional MapSource® media (64 MB microSD card included)

Electronic compass features
(GPSMAP 60CSx only)

Accuracy:	±2 degrees with proper calibration (typical); ±5 degrees extreme northern and southern latitudes
Altimeter features:	(GPSMAP 60CSx only)
Resolution:	1 foot
Range:	-2,000 to 30,000 feet
Elevation computer:	Current elevation, resettable minimum and maximum elevation, ascent/descent rate, total ascent/descent, average and maximum ascent/descent rate
Pressure:	Local pressure (inches Hg)

Power

Source:	Two "AA" batteries (not included)
Battery life:	18 hours, typical; up to 30 with battery saving

Physical

Size:	2.4W x 6.1H x 1.2D inches (61mm x 155mm x 30mm)
Weight:	7.5 oz. (213 g) wt.
Display:	1.5 x 2.2 inches (38.1mm x 56mm); 256-color transflective TFT (240 x 240 pixels) (160 x 240 pixels)
Case:	Waterproof to IPX7 standards
Temp. range:	5°F to 158°F (-15°C to 70°C)

Accessories

Standard:	64 MB microSD data card Belt clip USB PC interface cable MapSource Trip & Waypoint Manager CD Users manual Quick reference guide Wrist strap
Optional:	Automotive Navigation Kit (includes City Navigator™) Automotive mount Marine mount Suction cup mount Carrying case 12-volt adapter cable PowerMotor cable Remote GPS antenna



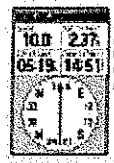
With enhanced street map detail from optional MapSource® software, you can look up destinations and have automatic point-to point routes.



The GPSMAP 60 series accepts downloaded map detail, including topo maps with elevation information.



The barometric altimeter feature on the GPSMAP 60CSx provides elevation profiles for compass and hikers.



Optional "sensor version" GPSMAP 60CSx also features a large, easy-to-read electronic compass display.

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GARMIN.

Garmin International Inc.
1200 East 151st Street
Olathe, Kansas 66062, U.S.A.
913/397.8200 Fax 913/397.8282

Garmin (Europe) Ltd.
Unit 5, The Quadrangle
Abbey Park Industrial Estate
Romsey, SO51 9DL, U.K.
44/1794.519944 Fax 44/1794.519222

Garmin Corporation
No. 68, Jangshu 2nd Rd.
Shijr, Taipei County, Taiwan
886/2.2642.9199 Fax 886/2.2642.9099

www.garmin.com

Specifications are subject to change without notice.

* Subject to accuracy degradation to 100 meters 2DRMS under the U.S. Department of Defense imposed Selective Availability Program.

** Time will be less when receiver retains almanac and last position between the 3- and 4-day limit.

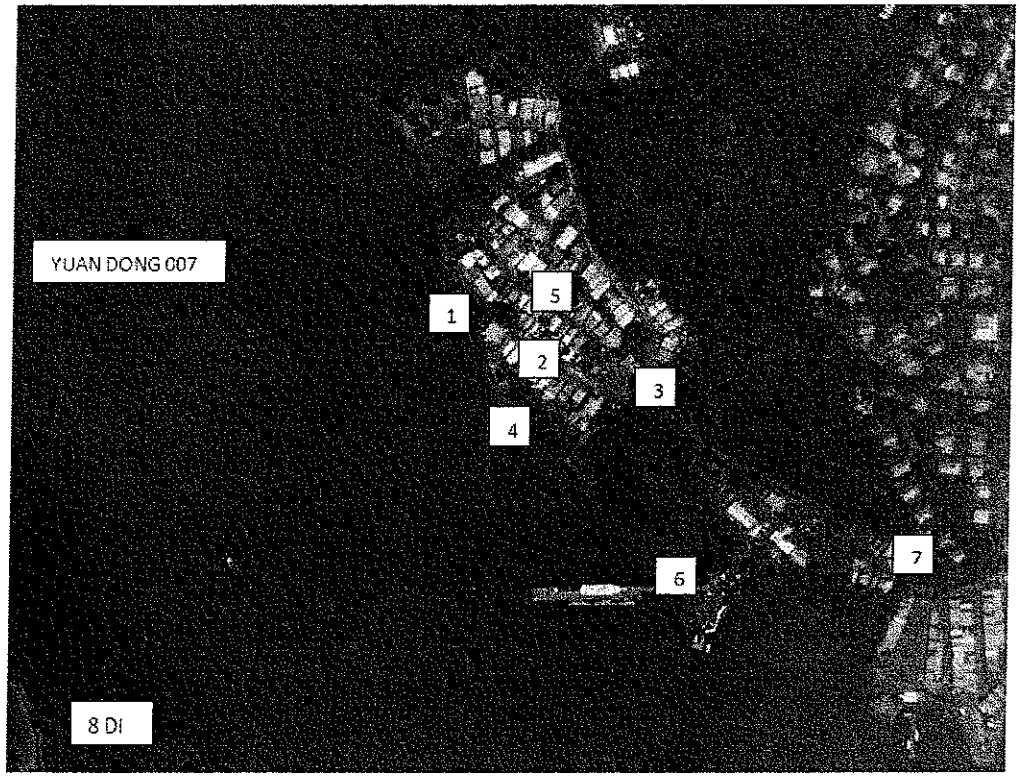
D2006 MDS-10155-00

c. SOFTWARE

- Blastware Software, Compliance/Advance Module Specification t Version 8.12
- AutoCad 2009.

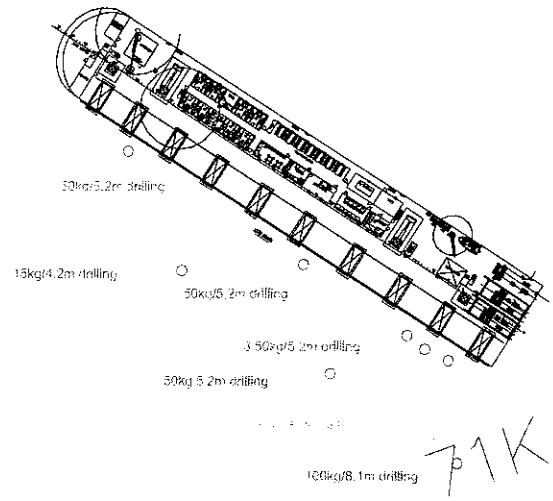
4) POSITION OF SEISMOGRAPHS

The selected positions allow the monitoring of the reduction in particle velocity with increasing distance from the shot and identify possible anisotropy of the terrain. Other positions include Diablo Docks, Diablo Town and main offices of Dredging International.



5) DRILLING AND BLASTING DATA

The following graph shows the drilling and the amount of explosives loaded per borehole, also the position of them.



Test Blast 1				
Rig no.	Easting	Northing	Hole Depth (m)	LOAD (kg)
2	656224,02	991468,9	5,2	50
5	656257,26	991448,19	5,2	50
6	656276,72	991435,23	5,2	50
7	656280,07	991432,73	5,2	50
8	656284,52	991430,63	5,2	50

Test Blast 2				
Row 1				
Rig no.	Easting	Northing	Hole Depth (m)	LOAD (kg)
6	656275,7	991428,7	5,2	50
7	656279,18	991425,94	5,2	50
8	656282,55	991422,31	5,2	50
10	656288,32	991418,25	5,2	50

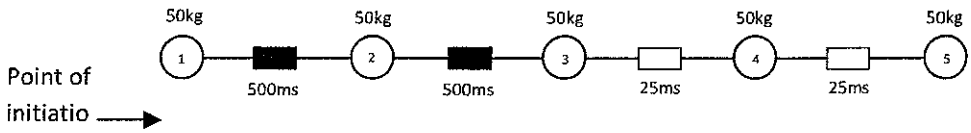
Row 2				
Rig no.	Easting	Northing	Hole Depth (m)	LOAD (kg)
7	656275,65	991422,64	5,2	50
9	656282,21	991417,25	5,2	50
10	656285,75	991414,5	5,2	50

Test Blast 3				
Rig no.	Easting	Northing	Hole Depth (m)	LOAD (kg)
1	656234,5	991447,01	5,5	50
5	656262,6	991428,23	4,2	15
7	656286,47	991411,86	8,1	100

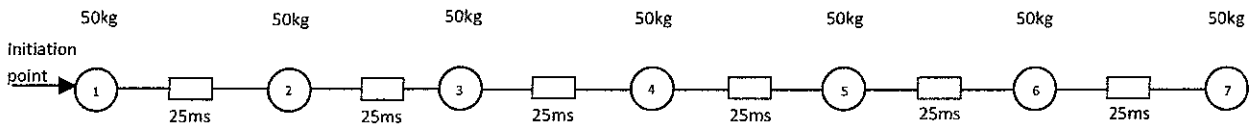
6) DESCRIPTION OF THE BLAST

Original test blast plan, had to be changed due to the dredging works been carry out at the moment.

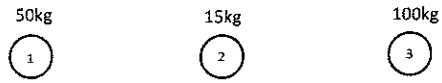
Test Blast 1 detonated on the 8th of April at 1:05pm. It consisted of 5 explosive charges of 50kg. Two charges were initiated with 500ms delay intervals, and the other three were initiated with 25ms delay intervals:



Test Blast 2 detonated on the 8th of April at 5:58pm. It consisted of 7 explosive charges of 50kg detonated with 25ms delay intervals:



Test Blast 3 detonated on the 9th of April at 14:25pm. It consisted of thee explosive charges detonated individually, with one minute intervals between them. The first charge contained 50kg of explosive, the second one 15kg and the third one 100kg.



7) BLASTING REPORTS

The following reports represent the general description of the activity in each test blast. Powder factor, grid, area and volume are not present, due to the objective of the actual blasts.

TEST BLAST 1

MAXAM International

Daily Underwater Blasting Report

BLASTING No: ACP-001
Date: 08/04/2009
Time: 13:05

BLASTING

BLAST TIME	13:05	
REACH	DIABLO DOCK	
COORDINATE:	FROM	TO
STATION:	71 + 100	71 + 200
OFFSET:	220 W	260 W

HOLE DIAMETER (mm)	140			
BENCH HEIGH (m)	5			
THEORETICAL GRID (m)	0,0	X	0,0	(B X S)
TEO. DEPTH (m)	15,0			
STEMMING (m)	2,5			
STEMMING MATERIAL	GRAVEL			
BOREHOLES	Charged:	5		
	Blocked:	0		
	TOTAL	5		

GEOMETRY

AREA (m^2)	0
VOLUME (m^3)	0,0

MATERIAL

BASALT

MEASUREMENTS

MEASUREMENTS	BURDEN (m)	AVERAGE	0,0
	SPACING(m)	AVERAGE	0,0
	DEPTH (m)	AVERAGE	5,2
	INCLINATION (º)	0	

ENVIRONMENTAL MEASUREMENTS

DISTANCE TO CLOSEST STRUCUTRE (m)	437

SEISMOGRAPHs

VIBRATIONS NUMBER	Particle velocity (mm/s)	LOCATION
1	8.3	DIABLO HANGARS
2	4.83	DIABLO HANGARS
3	1.27	DIABLO HANGAR
4	4.06	DIABLO HANGAR
5	3.56	DIABLO HANGAR
6	1.4	DIABLO DOCK
7	1.52	DIABLO COM.
8	1.14	DI

OBSERVATIONS

TOXIC FUMES: NONE
SEISMOGRAPH 7 POSITION BY ACP REQUEST

PRODUCTS

EXPLOSIVES

RIOFLEX	DENSITY (Kg/m³)	1140
	CARTRIDGE (Kg)	
	BULK (Kg)	250
	TOTAL	250

POWDER FACTOR (Kg/m³)	#¡DIV/0!
MAXIMUM LOAD (Kg)	50

ACCESSORIES

BOOSTERS	TYPE	450g
	NUM.	10
	QUANTITY	10
NONEL DETONATORS	TYPE	EX 30m (500ms)
	NUM.	12
	TYPE	-
	NUM.	
	TYPE	-
	NUM.	
	QUANTITY	12
INITIATORS	TYPE	TUBE LINE
	QUANTITY	1

CLIMATE

CLEAR

OBSERVATIONS

ONE ROW OF 5 BOREHOLES.

Blaster	RAMSES POLONIA	Dredging int.		Surveyor	
License	8-290-588	Position		ACP	
Signature		Signature		Signature	

TEST BLAST 2

MAXAM International

Daily Underwater Blasting Report

BLASTING No: ACP-002

Date: 08/04/2009

Time: 17:58

BLASTING

BLAST TIME	17:58	
REACH	DIABLO DOCK	
COORDINATE:	FROM	TO
STATION:	71 + 100	71 + 200
OFFSET:	220 W	260 W

HOLE DIAMETER (mm)	140			
BENCH HEIGH (m)	5			
THEORETICAL GRID (m)	0,0	X	0,0	(B X S)
TEO. DEPTH (m)				
STEMMING (m)	2,5			
STEMMING MATERIAL	GRAVEL			

BOREHOLES	Charged:	7
	Blocked:	0
	TOTAL	7

GEOMETRY

AREA (m^2)	0
VOLUME (m^3)	0,0

MATERIAL

BASALT

MEASUREMENTS

MEASUREMENTS	BURDEN (m)	AVERAGE	0,0
	SPACING(m)	AVERAGE	0,0
	DEPTH (m)	AVERAGE	5,2
	INCLINATION (°)	0	

ENVIRONMENTAL MEASUREMENTS

DISTANCE TO CLOSEST STRUCUTRE (m)	437

VIBRATIONS	NUMBER	Particle velocity (mm/s)	LOCATION
SEISMOGRAPHs	1	6,98	DIABLO HANGARS
	2	3.68	DIABLO HANGARS
	3	1.02	DIABLO HANGAR
	4	3.56	DIABLO HANGAR
	5	2.92	DIABLO HANGAR
	6	1.14	DIABLO DOCK
	7	1.14	DIABLO COM.
	8	NONE	DI

OBSERVATIONS

TOXIC FUMES: NONE

PRODUCTS

EXPLOSIVES

RIOFLEX	DENSITY (Kg/m³)	1140
	CARTRIDGE (Kg)	
	BULK (Kg)	350
	TOTAL	350

POWDER FACTOR (Kg/m³)	#¡DIV/0!
MAXIMUM LOAD (Kg)	50

ACCESSORIES

BOOSTERS	TYPE	450g
	NUM.	14
	QUANTITY	14
NONEL DETONATORS	TYPE	EX 30m (500ms)
	NUM.	18
	TYPE	-
	NUM.	
	TYPE	-
	NUM.	
	QUANTITY	18
INITIATORS	TYPE	TUBE LINE
	QUANTITY	1

CLIMATE

CLEAR

OBSERVATIONS

TWO ROWS OF 4 AND 3 BOREHOLES.

4 DETONATORS USED TO EXTEND THE SHOT LINE

Blaster RAMSES POLONIA
License 8-290-588
Signature

Dredging int. ----------
Position ----------
Signature

Surveyor ----------
ACP ----------
Signature

TEST BLAST 3

MAXAM International

Daily Underwater Blasting Report

BLASTING No: ACP-003
Date: 9/04/2009
Time: 14:24

BLASTING

BLAST TIME	14:24	
REACH	DIABLO DOCK	
COORDINATE:	FROM	TO
STATION:	71 + 100	71 + 200
OFFSET:	220 W	260 W

HOLE DIAMETER (mm)	140		
BENCH HEIGH (m)	5		
THEORETICAL GRID (m)	0.0 X	0.0	(B X S)
TEO. DEPTH (m)			
STEMMING (m)	2.5		
STEMMING MATERIAL	GRAVEL		
BOREHOLES	Charged:	3	
	Blocked:	0	
	TOTAL	3	

GEOMETRY

AREA (m^2)	0
VOLUME (m^3)	0.0

MATERIAL: BASALT

MEASUREMENTS

MEASUREMENTS	BURDEN (m)	AVERAGE	0.0
	SPACING(m)	AVERAGE	0.0
	DEPTH (m)	AVERAGE	4.85
	INCLINATION (°)	0	

ENVIRONMENTAL MEASUREMENTS

DISTANCE TO CLOSEST STRUCUTRE (m)	437

SEISMOGRAPHs

VIBRATIONS NUMBER	Particle velocity (mm/s)	LOCATION
1	1.52	DIABLO HANGARS
2	NONE	DIABLO HANGARS
3	NONE	DIABLO HANGAR
4	NONE	DIABLO HANGAR
5	NONE	DIABLO HANGAR
6	NONE	DIABLO DOCK
7	NONE	DIABLO COM.
8	NONE	DI

OBSERVATIONS: TOXIC FUMES: NONE

PRODUCTS

EXPLOSIVES

RIOFLEX	DENSITY (Kg/m³)	1140
	CARTRIDGE (Kg)	
	BULK (Kg)	165
	TOTAL	165

POWDER FACTOR (Kg/m³)	#¡DIV/0!
MAXIMUM LOAD (Kg)	100

ACCESSORIES

BOOSTERS	TYPE	450g
	NUM.	6
	QUANTITY	6
NONEL DETONATORS	TYPE	EX 30m (500ms)
	NUM.	13
	TYPE	-
	NUM.	
	TYPE	-
	NUM.	
	QUANTITY	13
INITIATORS	TYPE	TUBE LINE
	QUANTITY	1

CLIMATE
CLEAR

OBSERVATIONS
3 INDIVIDUAL BOREHOLES.
7 DETONATORS USED TO EXTEND THE SHOT LINE
100 KG LOADED WITH SMALL DETONATION

Blaster	RAMSES POLONIA	Dredging int.		Surveyor	
License	8-290-588	Position		ACP	
Signature		Signature		Signature	

8) VIBRATION REPORT

TEST BLAST 1

Instantel

Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 13:05:44 April 8, 2009	**Serial Number**	BE14571 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	5.4 Volts
Range	Geo: 254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	8.0 sec (Auto=3Sec) at 2048 sps	**File Name**	P571CNXZ.1K0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

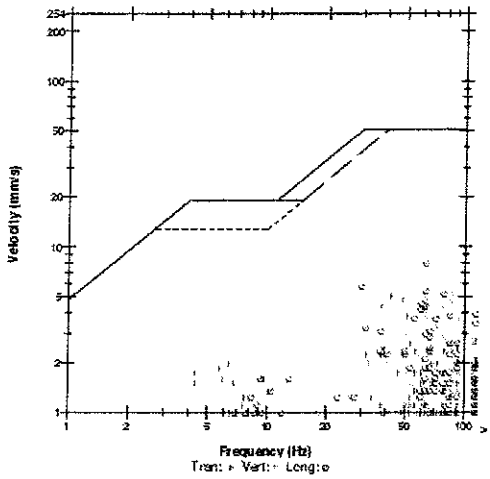
Post Event Notes
Seismograph: MAXAM 571
Point Coordinates: 656711 ; 991501
Max. Instantaneous Charge (MIC): 90kg / Minimum Delay: 25ms
Distance to Blast: 432m

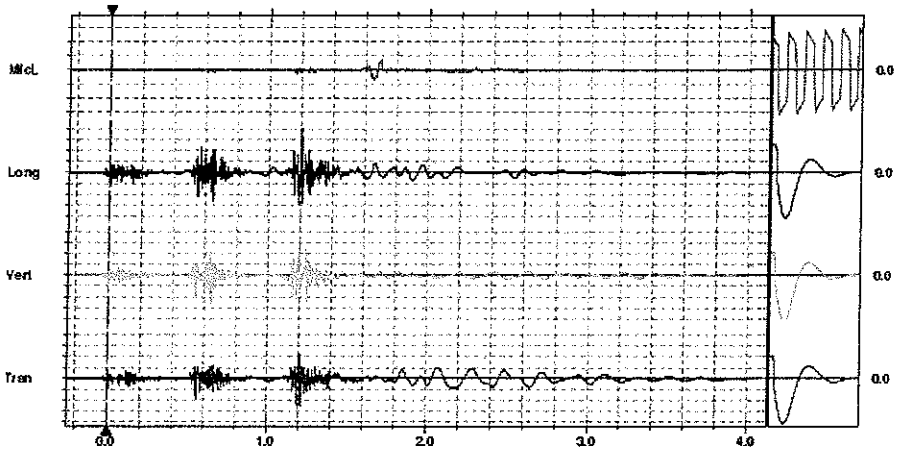
Microphone	Linear Weighting
PSPL	111.5 dB(L) at 1.696 sec
ZC Freq	24 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 427 mm)

	Tran	Vert	Long	
PPV	5.21	5.46	8.13	mm/s
ZC Freq	43	85	54	Hz
Time (Rel. to Trig)	1.215	0.536	1.204	sec
Peak Acceleration	0.239	0.318	0.318	g
Peak Displacement	0.0751	0.0303	0.0272	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.3	7.5	7.5	Hz
Overswing Ratio	3.6	3.4	3.5	

Peak Vector Sum 9.71 mm/s at 1.204 sec

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 pa,(L)/div
Trigger ×

Sensorcheck

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FFT Report

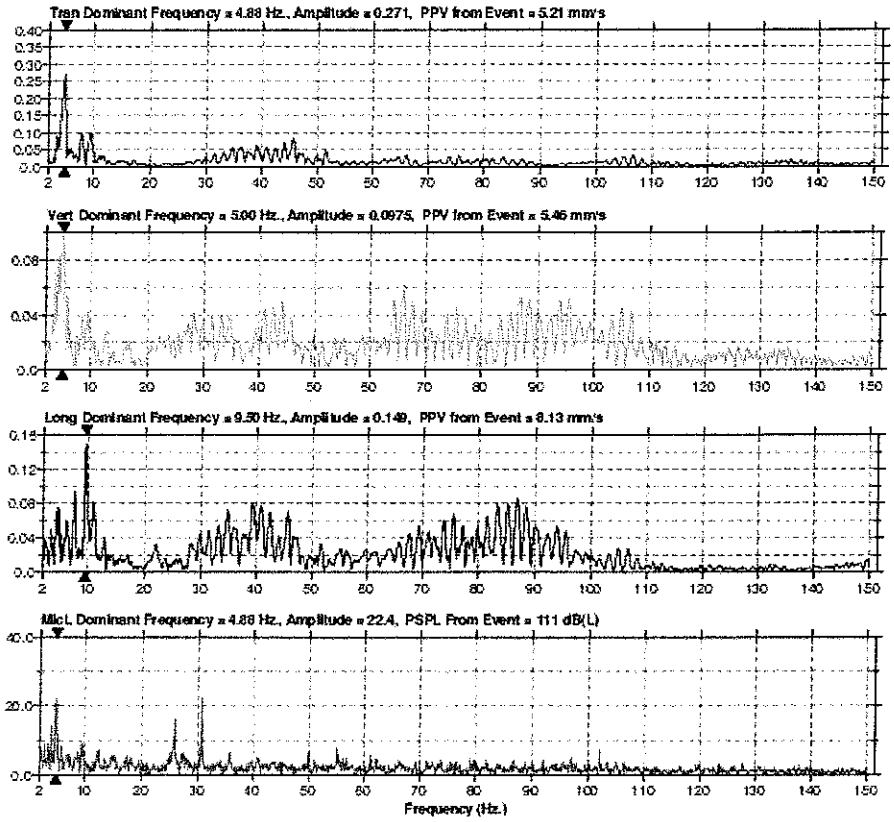
MAXAM

Date/Time	Vert at 13:05:44 April 8, 2009	**Serial Number**	BE14571 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	9.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	5.0 sec (Auto-3Sec at 2048 sps	**File Name**	P571CNXZ.1K0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servblasting / Maxam
General:

Extended Notes

Post Event Notes
Seismograph: MAXAM 571
Point Coordinates: 658711 ; 991501
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 432m



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Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 13:05:45 April 8, 2009	**Serial Number**	BE14554 V 8.12-8.0 MiniMate Plus
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	5.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	4.0 sec (Auto-3Sec) at 2048 sps	**File Name**	P554CNXZ.I L0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting
General:

Extended Notes

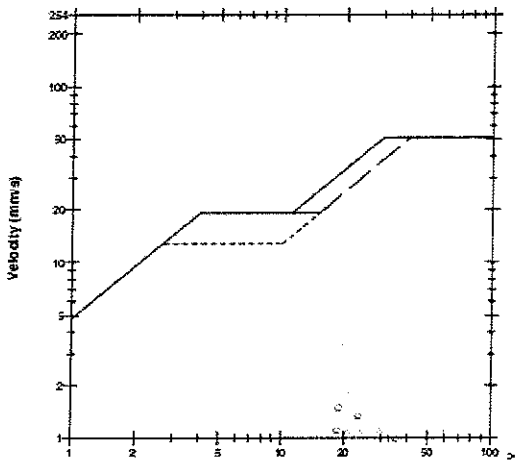
Post Event Notes
Sismograph: MAXAM P54
Point Coordinates: 656848 ; 911500
Max. Instantaneous Charge (MIC): 50kg ; Minimum Delay: 25ms
Distance to Blast: 552m

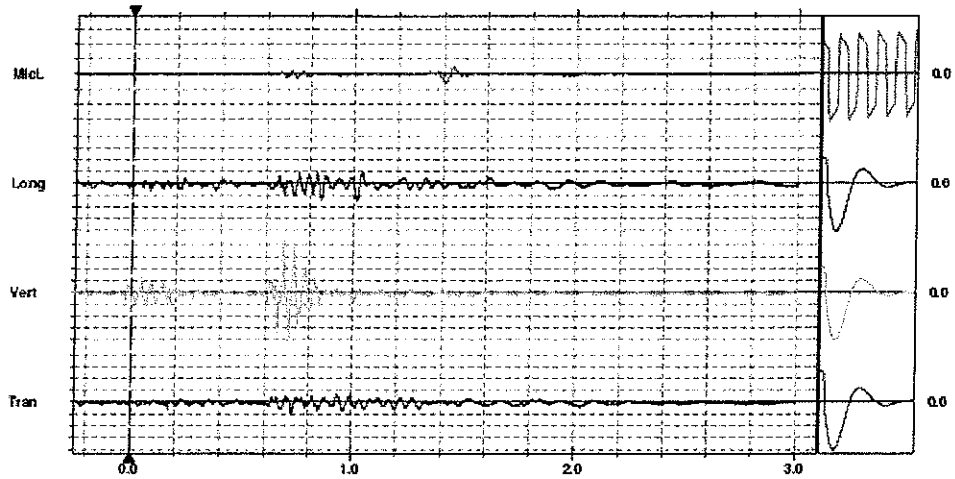
Microphone	Linear Weighting
PSPL	109.5 dB(L) at 1.400 sec
ZC Freq	9.4 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 390 mV)

	Tran	Vert	Long	
PPV	1.02	4.80	1.52	mm/s
ZC Freq	33	31	19.0	Hz
Time (Rel. to Trig)	0.722	0.680	1.012	sec
Peak Acceleration	0.0530	0.108	0.0530	g
Peak Displacement	0.0109	0.0260	0.0122	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.8	7.5	7.8	Hz
Overswing Ratio	3.8	3.7	3.5	

Peak Vector Sum 4.95 mm/s at 0.680 sec

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 10.00 pa.(L)/div
Trigger = ▶—— ——◀

Sensorcheck

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Instantel

FFT Report

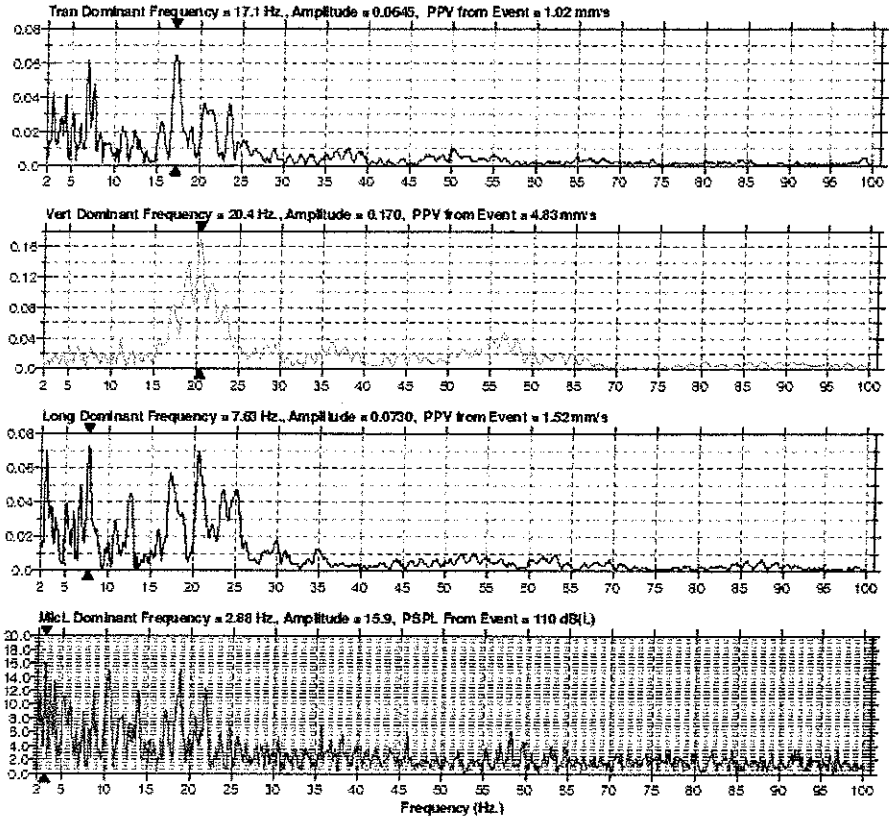
MAXAM

Date/Time	Vert at 13:05:45 April 8, 2009	**Serial Number**	BE14554 V 8.12-8.0 MiniMate Plus
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	5.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	4.0 sec (Auto=3Sec) at 2048 sps	**File Name**	P554CNXZ.1L0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servibla sing
General:

Extended Notes

Post Event Notes
Sismograph: MAXAM P54
Point Coordinates: 656848 ; 911500
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 552m



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Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 13:05:49 April 8, 2009	**Serial Number**	BE14569 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	9.5 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.0 sec (Auto=3Sec) at 2048 sps	**File Name**	P588CNXZ.1P0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

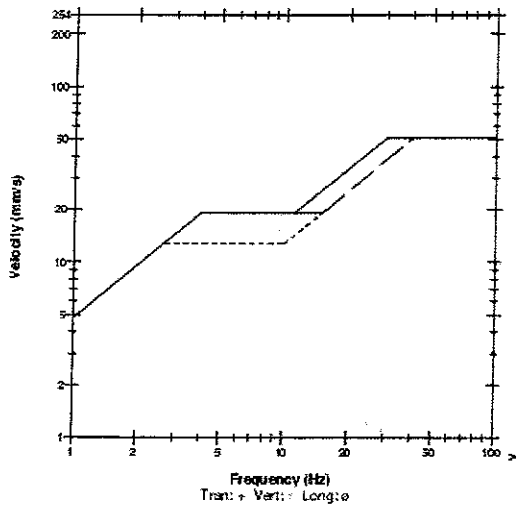
Post Event Notes
Seismograph: MAXAM 869
Point Coordinates: 656 988 : 991415
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 680m

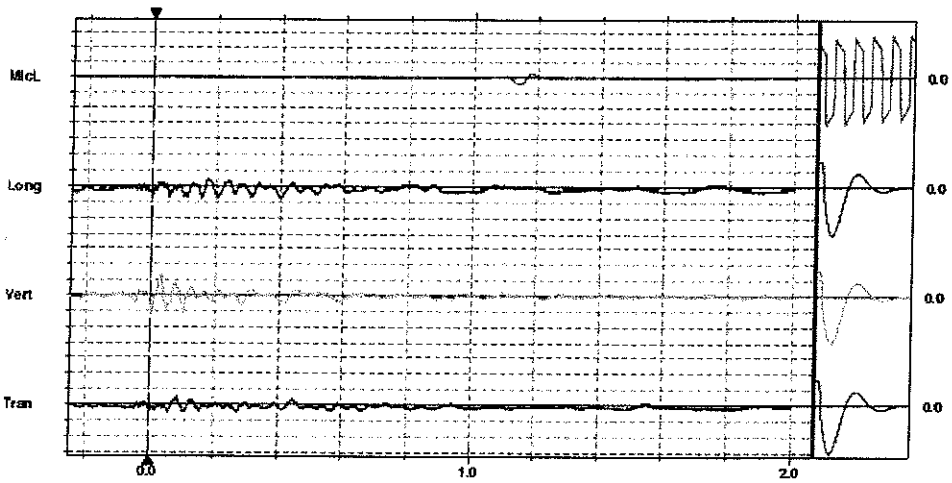
Microphone Linear Weighting
PSPL 108.5 dB(L) at 1.132 sec
ZC Freq 9.7 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 394 mv)

	Tran	Vert	Long	
PPV	0.508	1.27	0.762	mm/s
ZC Freq	38	25	28	Hz
Time (Rel. to Trig)	0.054	0.028	0.152	sec
Peak Acceleration	0.0530	0.0530	0.0530	g
Peak Displacement	0.00378	0.00628	0.0181	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.8	7.5	7.8	Hz
Overswing Ratio	3.5	3.4	3.8	

Peak Vector Sum 1.31 mm/s at 0.099 sec

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 10.00 ps..(L)/div
Trigger = ▶—— ——◀

Sensorcheck

Printed: April 10, 2009 (V 8.12 - 8.12)

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Instantel

FFT Report

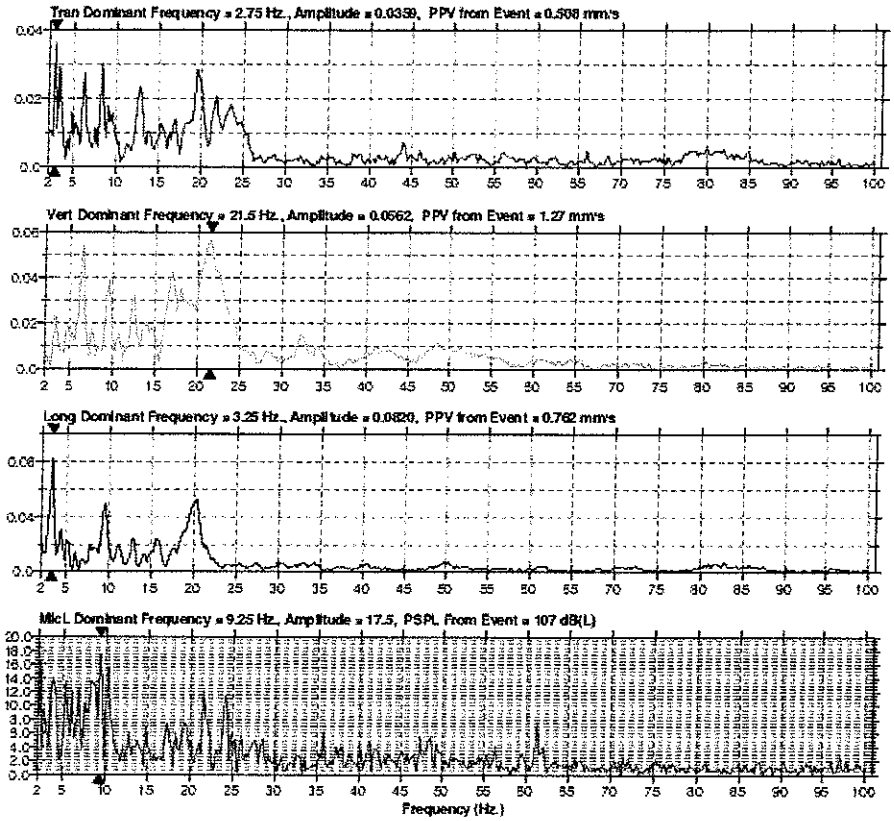
MAXAM

Date/Time	Vert at 13:05:49 April 8, 2009	**Serial Number**	BE14589 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	6.5 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.0 sec (Auto-3Sec) at 2048 sps	**File Name**	P599CNXZ.1P0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servibla sting / Maxam
General:

Extended Notes

Post Event Notes
Seismograph: MAXAM B89
Point Coordinates: 658 988 ; 991415
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 680m



Printed: April 10, 2009 (V 8.12 - 8.12)

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Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 10:05:43 April 8, 2009	**Serial Number**	BE14572 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	5.4 Volts
Range	Geo: 254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	4.0 sec (Auto=3Sec) at 2048 sps	**File Name**	PS72CNXZ.IJ0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

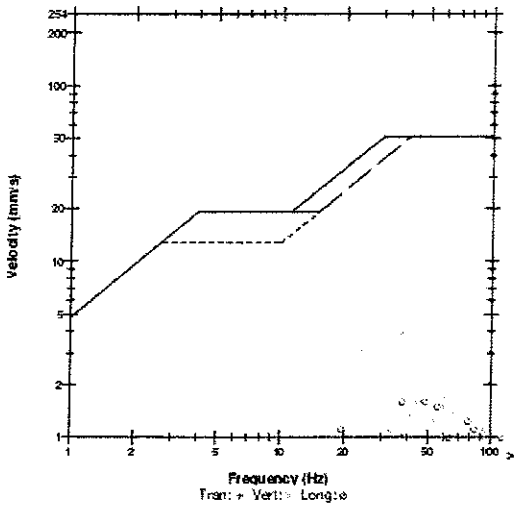
Post Event Notes
Sismograph: MAXAM 872
Point Coordinates: 656794 ; 991373
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 512m

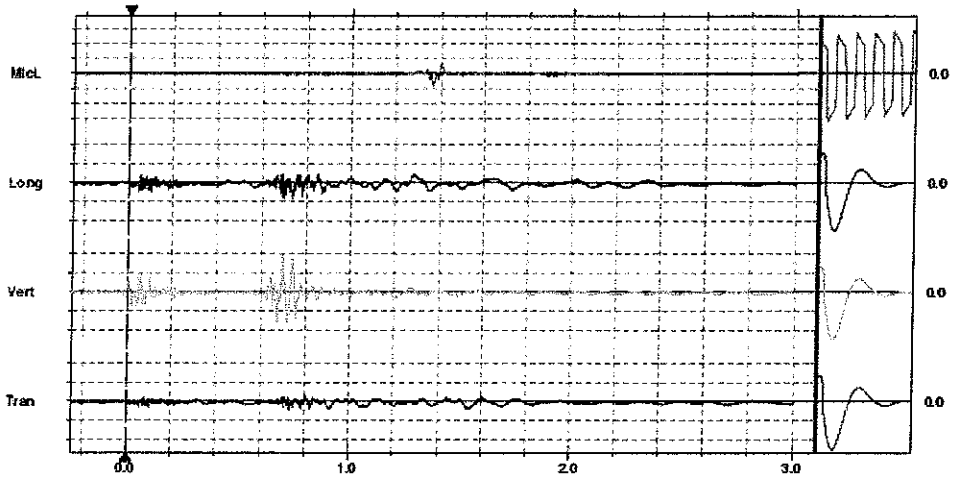
Microphone	Linear Weighting
PSPL	112.3 dB(L) at 1.383 sec
ZC Freq	14.2 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 425 mV)

	Tran	Vert	Long	
PPV	1.02	4.06	1.65	mm/s
ZC Freq	38	38	49	Hz
Time (Rel. to Trig)	0.731	0.894	0.893	sec
Peak Acceleration	0.0530	0.105	0.0795	g
Peak Displacement	0.0148	0.0229	0.0159	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.3	7.5	7.5	Hz
Overswing Ratio	3.8	3.8	3.8	

Peak Vector Sum 4.39 mm/s at 0.894 sec

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 pa.[L]/div
Sensorcheck
Trigger =

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FFT Report

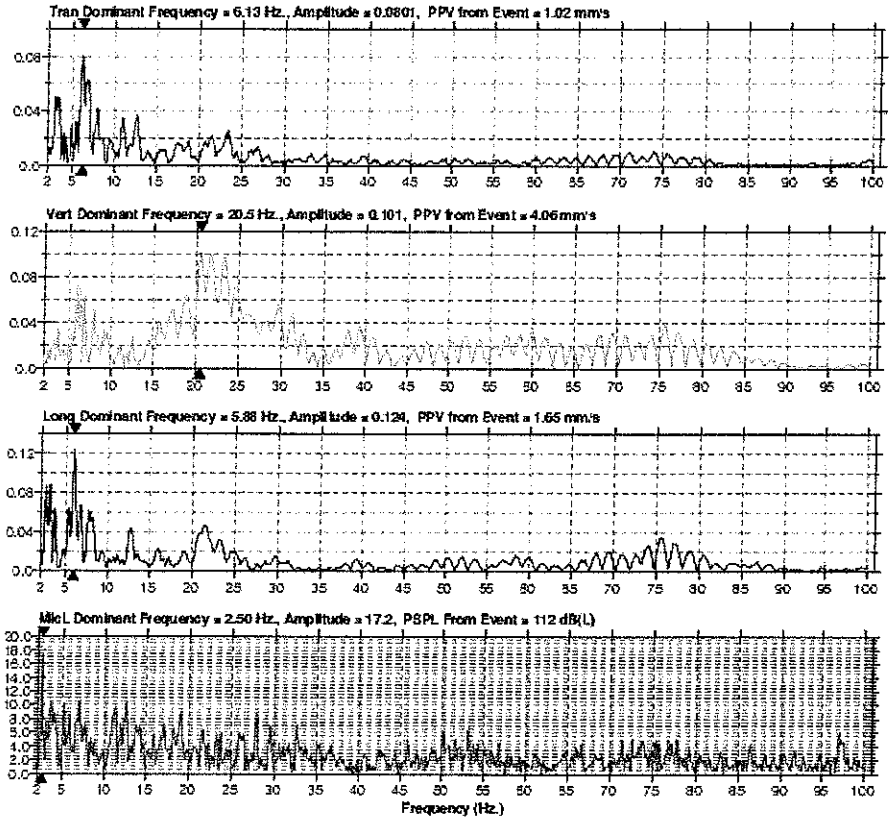
MAXAM

Date/Time	Vert at 13:05:43 April 8, 2009	**Serial Number**	BE14572 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	5.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	4.0 sec (Auto-3Sec) at 2048 sps	**File Name**	P572CNXZ.1J0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servibla sting / Maxam
General:

Extended Notes

Post Event Notes
Sismograph: MAXAM 572
Point Coordinates: 658794 : 991373
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 512m



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Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 13:05:53 April 8, 2009	**Serial Number**	BE14574 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	5.4 Volts
Range	Geo: 254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	4.5 sec (Auto+3Sec) at 2048 sps	**File Name**	P574CNXZ.1T0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

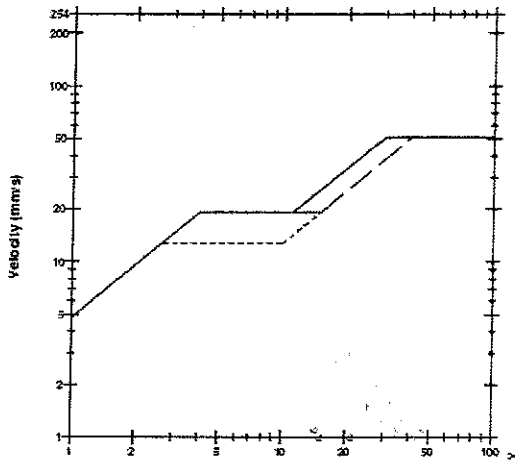
Post Event Notes
Sismograph: MAXAM 874
Point Coordinates: 658822 ; 991422
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 567m

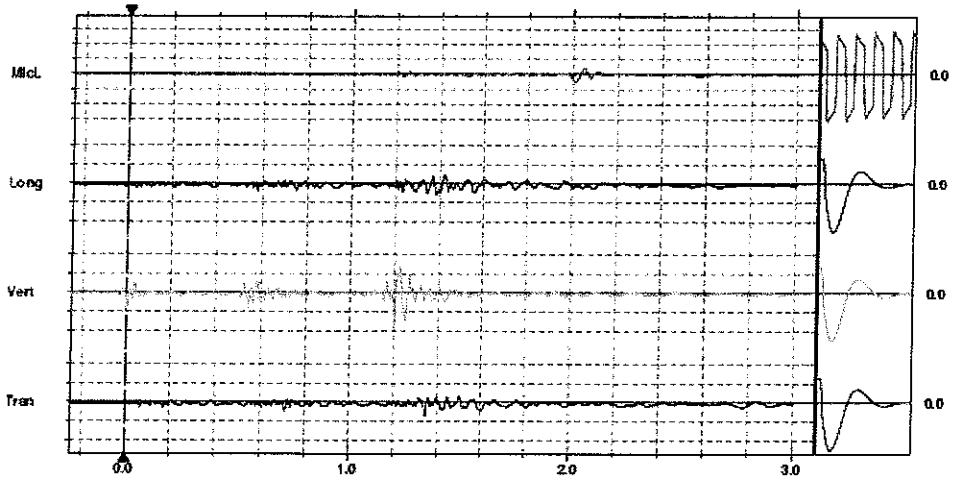
Microphone	Linear Weighting
PSPL	108.4 dB(L) at 2.005 sec
ZC Freq	10.5 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 442 mv)

	Tran	Vert	Long	
PPV	1.52	3.56	1.14	mm/s
ZC Freq	28	31	14.6	Hz
Time (Rel. to Trig)	1.348	1.196	1.383	sec
Peak Acceleration	0.0530	0.0795	0.0310	g
Peak Displacement	0.0197	0.0235	0.0152	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.4	7.5	7.4	Hz
Overswing Ratio	3.7	3.4	3.8	

Peak Vector Sum 3.57 mm/s at 1.196 sec

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 ps (L)/div
Sensorcheck
Trigger ▸ ——— ◂

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FFT Report

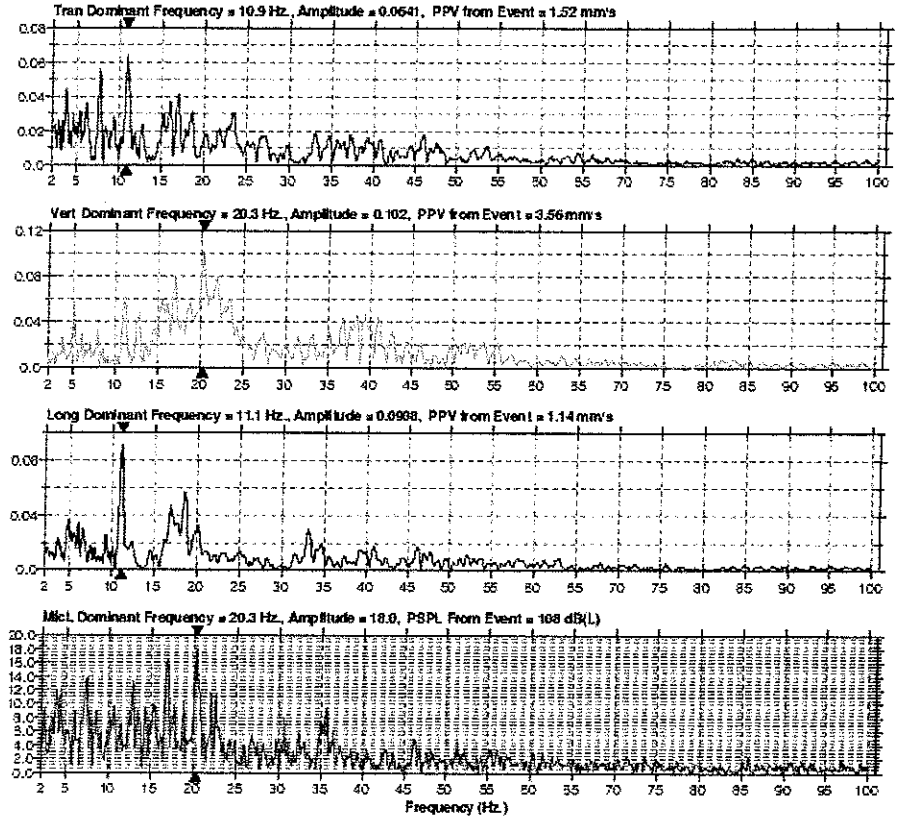
MAXAM

Date/Time	Vert at 13:05:53 April 8, 2009	**Serial Number**	BE14574 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	5.4 Volts
Range	Geo: 254 mm/s	**Calibration**	January 6, 2009 by Instantel Inc.
Record Time	4.5 sec (Auto=3Sec) at 2048 sps	**File Name**	PS74CNXZ.1T0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servidiesting / Maxam
General:

Extended Notes

Post Event Notes
Seismograph: MAXAM 874
Point Coordinates: 636822 ; 991422
Max. Instantaneous Charge (MIC): 30kg / Minimum Delay: 25ms
Distance to Blast: 567m



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Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 13:05:48 April 8, 2009	**Serial Number**	BE14553 V 8.12-8.0 MiniMate Plus
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	5.5 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.0 sec (Auto=3Sec) at 2048 sps	**File Name**	P553CNXZ.1C0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting
General:

Extended Notes

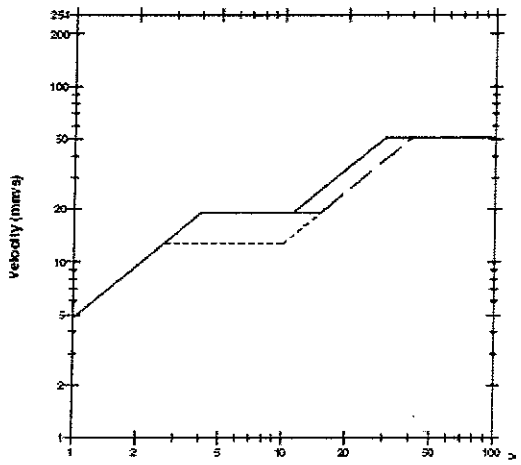
Post Event Notes
Sismograph: MAXAM P53
Point Coordinates: 657004 : 991156
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 770m

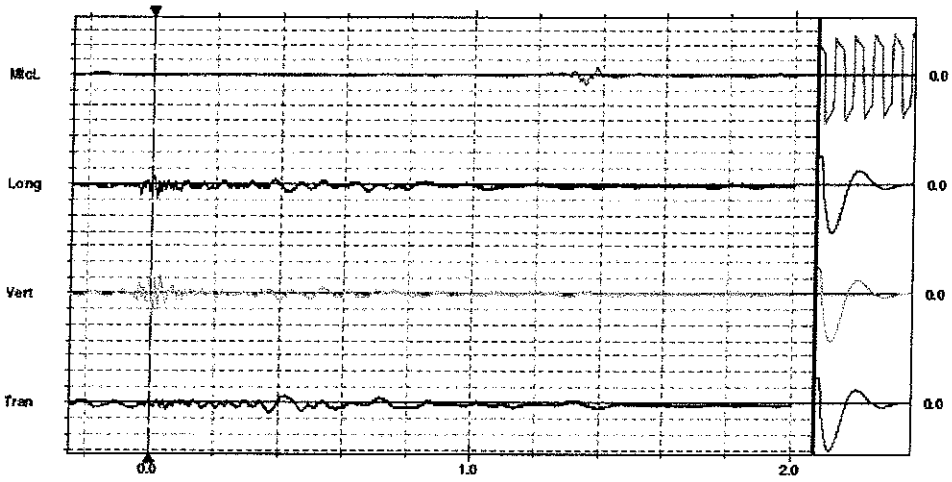
Microphone Linear Weighting
PSPL 110.2 dB(L) at 1.345 sec
ZC Freq 13.8 Hz
Channel Test Passed (Freq = 20.1 Hz Amp = 485 mv)

	Tran	Vert	Long	
PPV	0.635	1.40	0.889	mm/s
ZC Freq	13.0	43	54	Hz
Time (Rel. to Trig)	0.367	0.003	0.015	sec
Peak Acceleration	0.0530	0.0830	0.0530	g
Peak Displacement	0.0121	0.00564	0.00784	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.5	7.5	7.5	Hz
Overswing Ratio	3.7	3.5	3.5	

Peak Vector Sum 1.49 mm/s at 0.004 sec

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 10.00 pa.(L)/div
Trigger =

Sensorcheck

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Instantel

FFT Report

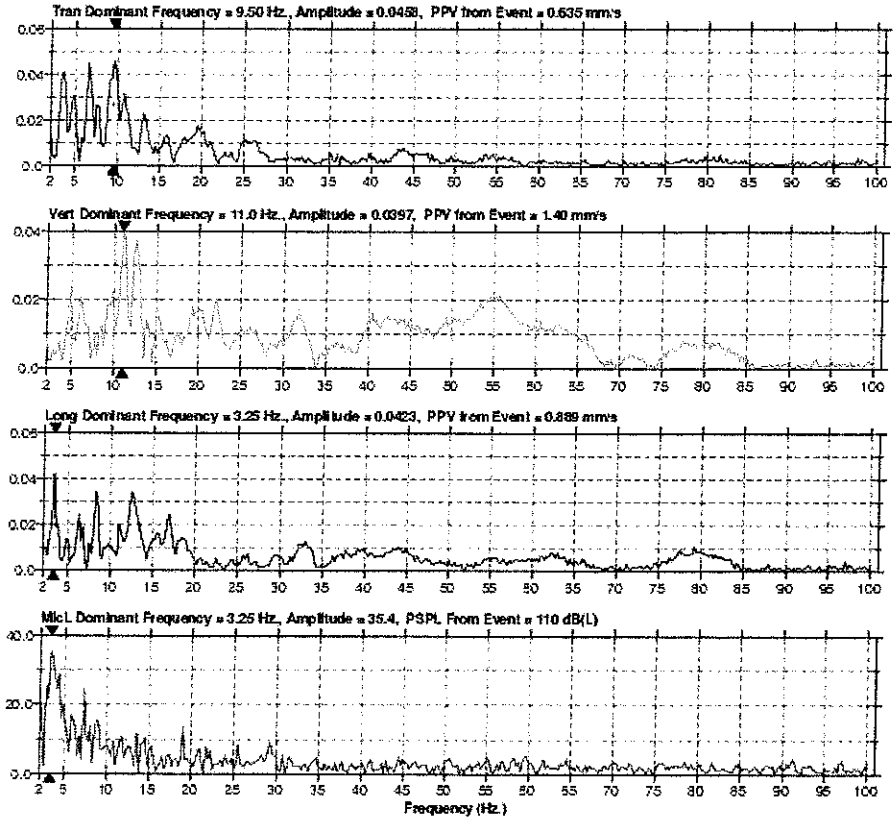
MAXAM

Date/Time	Vert at 13:05:48 April 8, 2009	**Serial Number**	BE14553 V 8.12-8.0 MiniMate Plus
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	6.5 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	3.0 sec (Auto+3Sec) at 2048 sps	**File Name**	P553CNXZ.1C0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Semtiblasting
General:

Extended Notes

Post Event Notes
Point Coordinates: 657004 ; 991158
Maximum Instantaneous Charge (MIC): 50kg
Minimum Delay: 25ms
Distance to Blast:



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Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 13:05:44 April 8, 2009	**Serial Number**	BE14573 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 0.700 mm/s	**Battery Level**	5.4 Volts
Range	Geo: 254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	3.0 sec (Auto+3Sec) at 2048 sps	**File Name**	P573CNXZ.1K0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

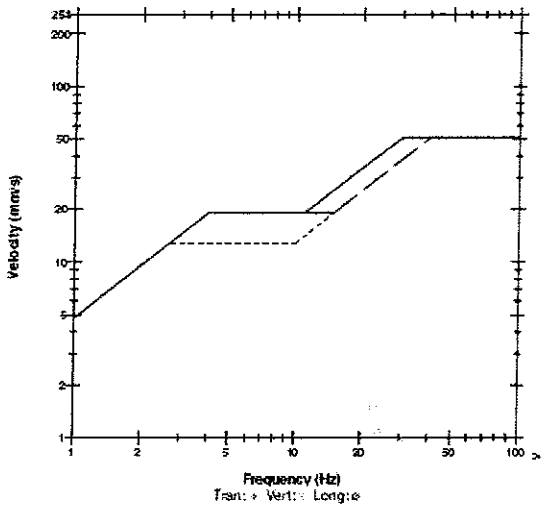
Post Event Notes
Point Coordinates: 657287 ; 991178
Maximum Instantaneous Charge (MIC): 50kg
Minimum Delay: 25ms
Distance to Blast:

Microphone Linear Weighting
PSPL 105.6 dB(L) at 1.926 sec
ZC Freq 9.9 Hz
Channel Test Passed (Freq = 20.1 Hz Amp = 484 mV)

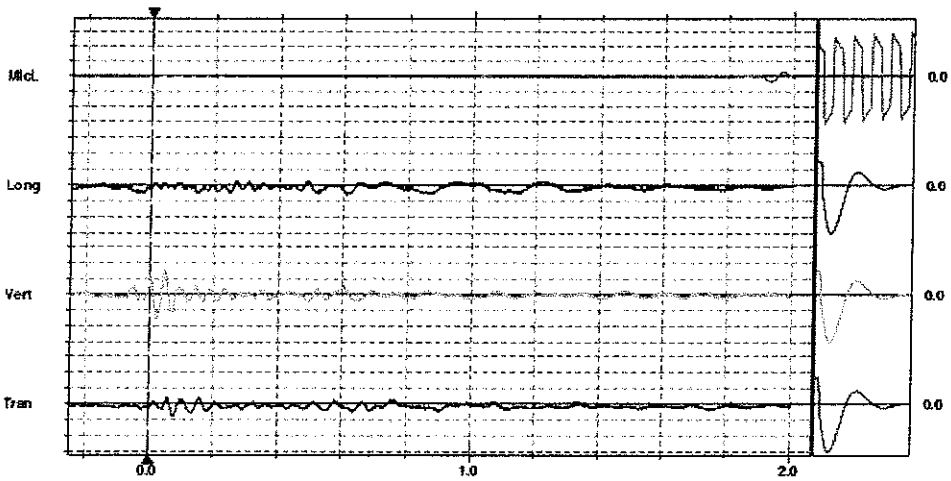
	Tran	Vert	Long	
PPV	0.762	1.52	0.535	mm/s
ZC Freq	23	22	12.8	Hz
Time (Rel. to Trig)	0.073	0.020	0.807	sec
Peak Acceleration	0.0530	0.0530	0.0530	g
Peak Displacement	0.00809	0.0112	0.0202	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.4	7.8	7.5	Hz
Overswing Ratio	3.6	3.4	3.7	

Peak Vector Sum 1.55 mm/s at 0.045 sec

USBM RI8507 And OSMRE



Tran: + Vert: ○ Long: ⊕



Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 10.00 ps.(L)/div
Sensorcheck
Trigger =

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Instantel

FFT Report

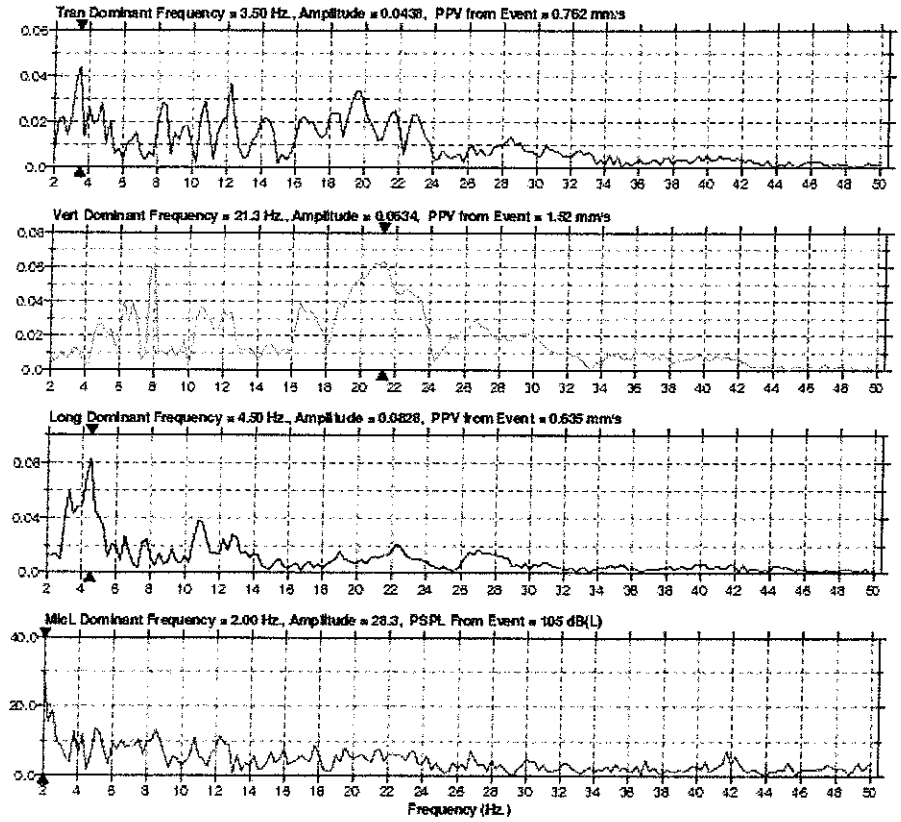
MAXAM

Date/Time	Vert at 13:05:44 April 8, 2009	**Serial Number**	BE14573 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 0.700 mm/s	**Battery Level**	5.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.0 sec (Auto+3Sec) at 2048 sps	**File Name**	P573CNXZ.1K0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servibla sting / Maxam
General:

Extended Notes

Post Event Notes
Sismograph: MAXAM 573
Point Coordinates: 657287 ; 991178
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 1014m



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Serviblasting - Panama Canal

MAXAM

Date/Time	Long at 13:05:45 April 8, 2009	**Serial Number**	BE14570 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	6.5 Volts
Range	Geo: 254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.0 sec (Auto-3Sec) at 2048 sps	**File Name**	PS70CNXZ.1L0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

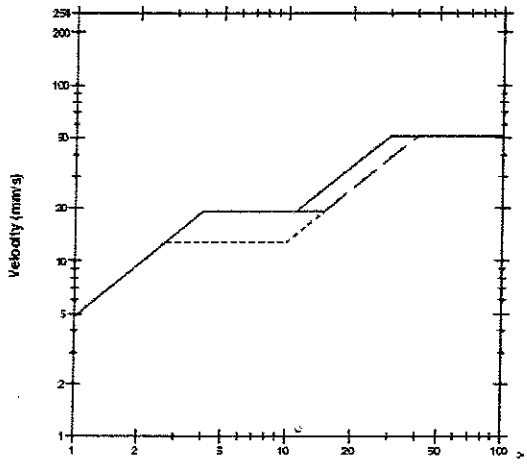
Post Event Notes
Seismograph: MAXAM 870
Point Coordinates: 656243 ; 990870
Max. Instantaneous Charge (MIC): 50kg Minimum Delay: 25ms
Distance to Blast: 574

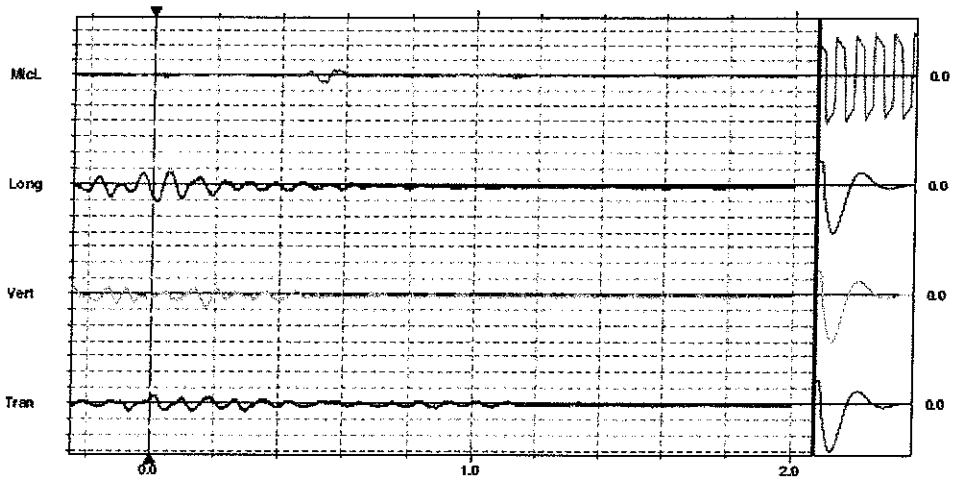
Microphone	Linear Weighting
PSPL	108.0 dB(L) at 0.536 sec
ZC Freq	10.7 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 496 mv)

	Tran	Vert	Long	
PPV	0.508	0.889	1.14	mm/s
ZC Freq	18.3	13.7	11.8	Hz
Time (Rel. to Trig)	-0.071	0.169	0.009	sec
Peak Acceleration	0.0530	0.0530	0.0530	g
Peak Displacement	0.00620	0.0107	0.0150	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	3.8	3.5	3.8	

Peak Vector Sum 1.21 mm/s at 0.009 sec

USBM RI 8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 10.00 pa.(L)/div
Trigger = ▶—— ——◀

Sensorcheck

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Instantel

FFT Report

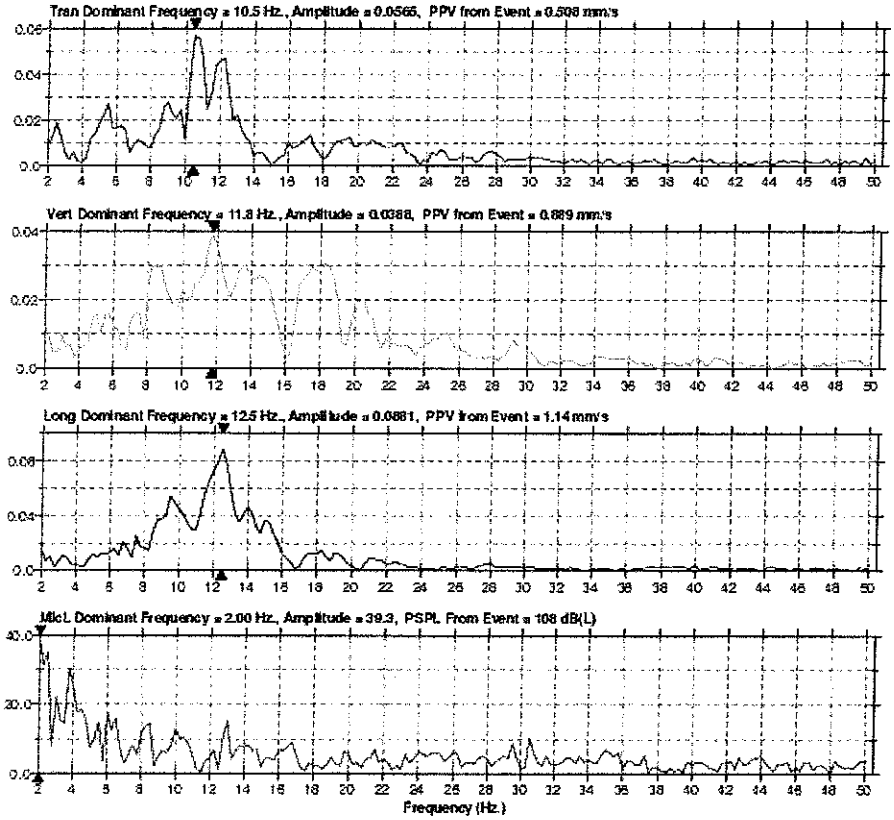
MAXAM

Date/Time	Long at 13:05:45 April 8, 2009	**Serial Number**	BE14570 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	8.5 Volts
Range	Geo: 254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	3.0 sec (Auto-3Sec) at 2048 sps	**File Name**	P57CCNXZ.1L0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servibla sting / Maxam
General:

Extended Notes

Post Event Notes
Seismograph: MAXAM 870
Point Coordinates: 656243 ; 990873
Max. Instantaneous Charge (MIC): 50kg Minimum Delay: 25ms
Distance to Blast: 574



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TEST BLAST 2

Instantel

Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 17:58:11 April 8, 2009	**Serial Number**	BE14571 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	9.0 Volts
Range	Geo: 254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	5.0 sec (Auto=3Sec) at 2048 sps	**File Name**	P571CNYC.KZ0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

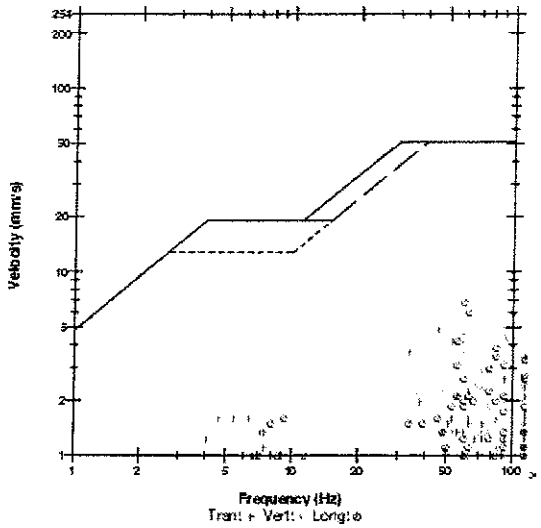
Post Event Notes
Sismograph: MAXAM 71B
Point Coordinates: 658711; 991501
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 437m

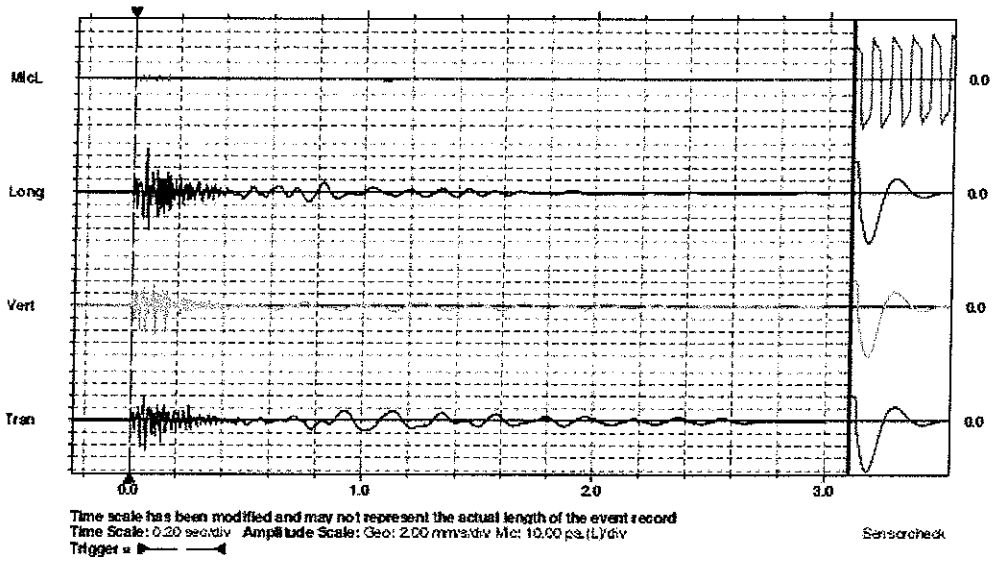
Microphone Linear Weighting
PSPL 100.0 dB(L) at 0.147 sec
ZC Freq 93 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 499 mV)

	Tran	Vert	Long	
PPV	4.95	4.83	5.98	mm/s
ZC Freq	47	50	50	Hz
Time (Rel. to Trig)	0.057	0.059	0.057	sec
Peak Acceleration	0.239	0.255	0.255	g
Peak Displacement	0.0625	0.0257	0.0304	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.3	7.5	7.8	Hz
Overswing Ratio	3.6	3.4	3.5	

Peak Vector Sum 8.89 mm/s at 0.057 sec

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 ps.(L)/div
Trigger ▸ ——◂

Sensorcheck

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Instantel

FFT Report

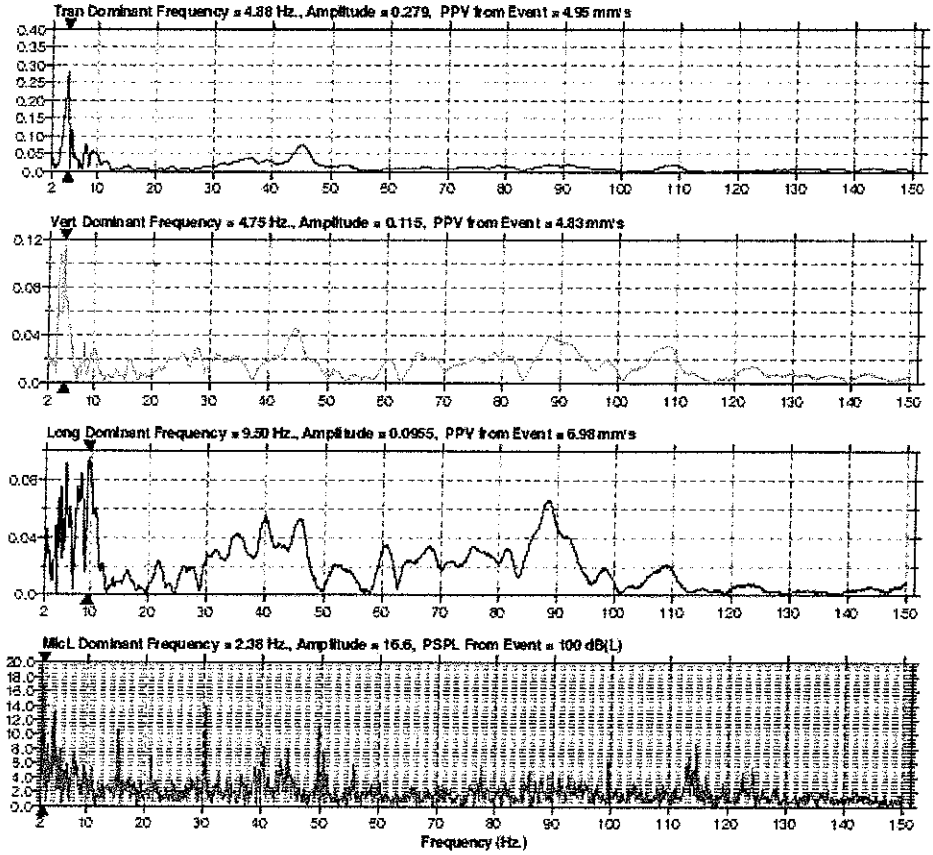
MAXAM

Date/Time	Vert at 17:56:11 April 8, 2009	**Serial Number**	BE14571 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	8.3 Volts
Range	Geo: 254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	5.0 sec (Auto=3Sec) at 2048 sps	**File Name**	P571CNYC.KZD
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servitbasting / Maxam
General:

Extended Notes

Post Event Notes
Sismograph: MAXAM 71 B
Point Coordinates: 658711; 991501
Max. instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 437m



Printed: April 10, 2009 (V 8.12 - 8.12)

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Instantel

Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 17:58:11 April 8, 2009	**Serial Number**	BE14554 V 8.12-8.0 MiniMate Plus
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	5.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.25 sec (Auto=3Sec) at 2048 sps	**File Name**	P554CNYC.K20
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting
General:

Extended Notes

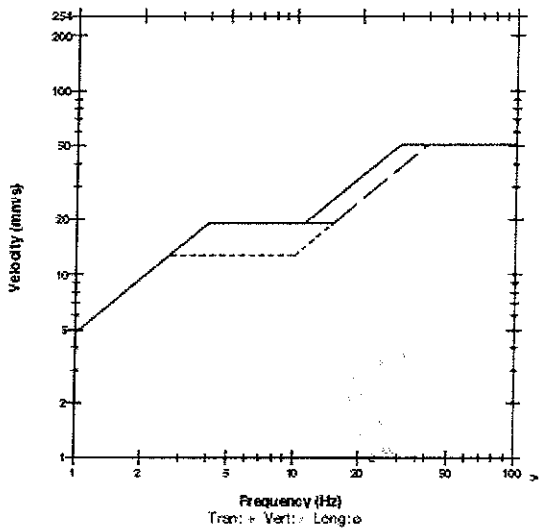
Post Event Notes
Seismograph: MAXAM P54
Point Coordinates: 656837 :991438
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 558m

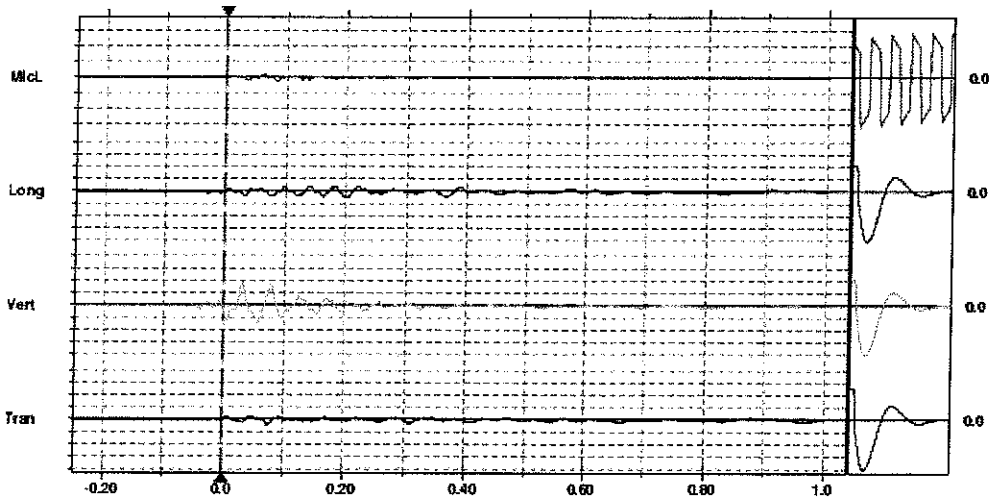
Microphone	Linear Weighting
PSPL	101.9 dB(L) at 0.681 sec
ZC Freq	28 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 481 mv)

	Tran	Vert	Long	
PPV	1.02	3.58	1.02	mm/s
ZC Freq	37	32	24	Hz
Time (Rel. to Trig)	0.073	0.031	0.200	sec
Peak Acceleration	0.0530	0.0795	0.0530	g
Peak Displacement	0.00585	0.0203	0.0118	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.5	7.4	7.5	Hz
Overswing Ratio	3.8	3.7	3.5	

Peak Vector Sum 3.80 mm/s at 0.031 sec

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.10 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 pa.(L)/div
Trigger = ▶—— ——◀

Sensorcheck

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Instantel

FFT Report

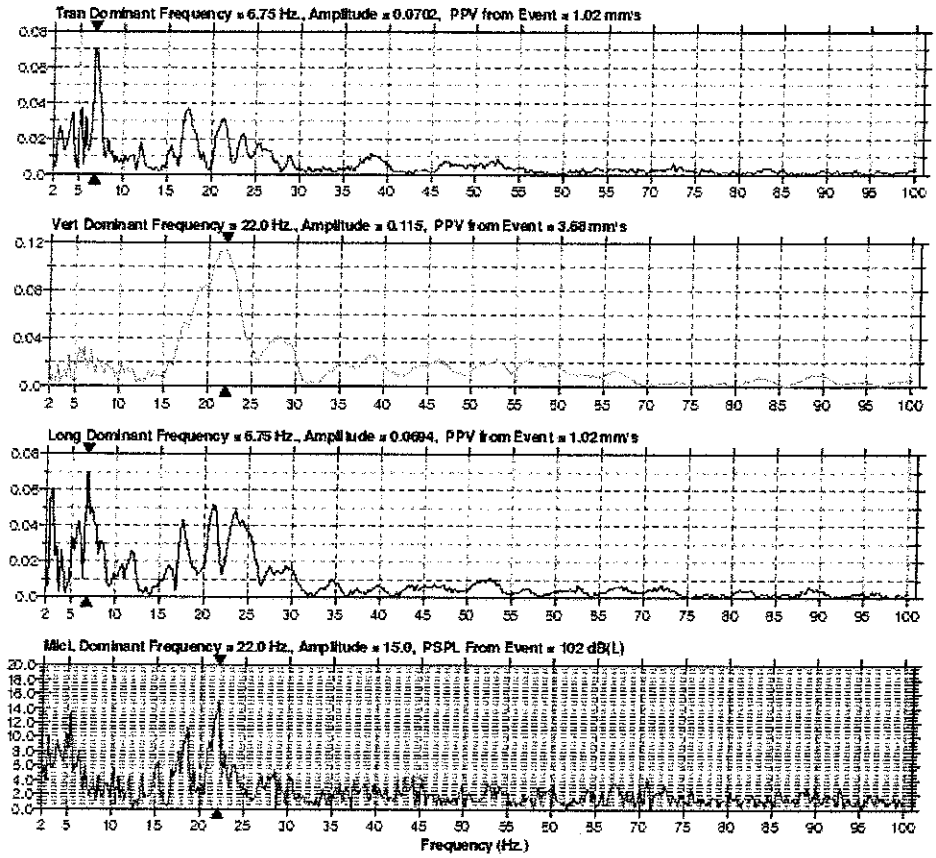
MAXAM

Date/Time	Vert at 17:58:11 April 8, 2009	**Serial Number**	BE14554 V 8.12-8.0 MiniMate Plus
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	8.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.25 sec (Auto=3Sec) at 2048 sps	**File Name**	P554CNYC.KZ0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servibazting
General:

Extended Notes

Post Event Notes
Sismograph: MAXAM P54
Point Coordinates: 658837 ; 991438
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 556m



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Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 17:55:14 April 6, 2009	**Serial Number**	BE14569 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 0.800 mm/s	**Battery Level**	5.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	3.0 sec (Auto=3Sec) at 2048 sps	**File Name**	P589CNYO.L20
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

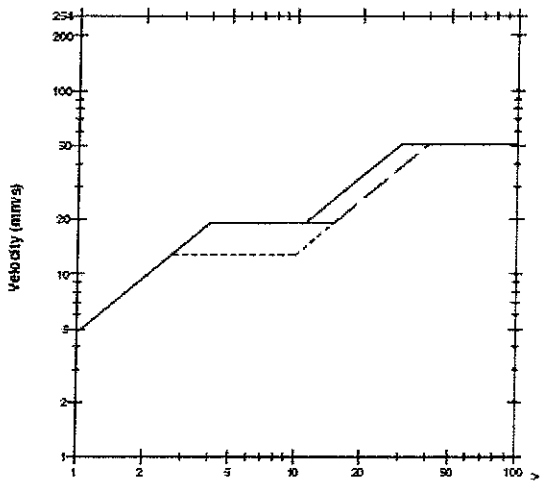
Post Event Notes
Sismograph: MAXAM 03B
Point Coordinates: 658988 : 991415
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 687m

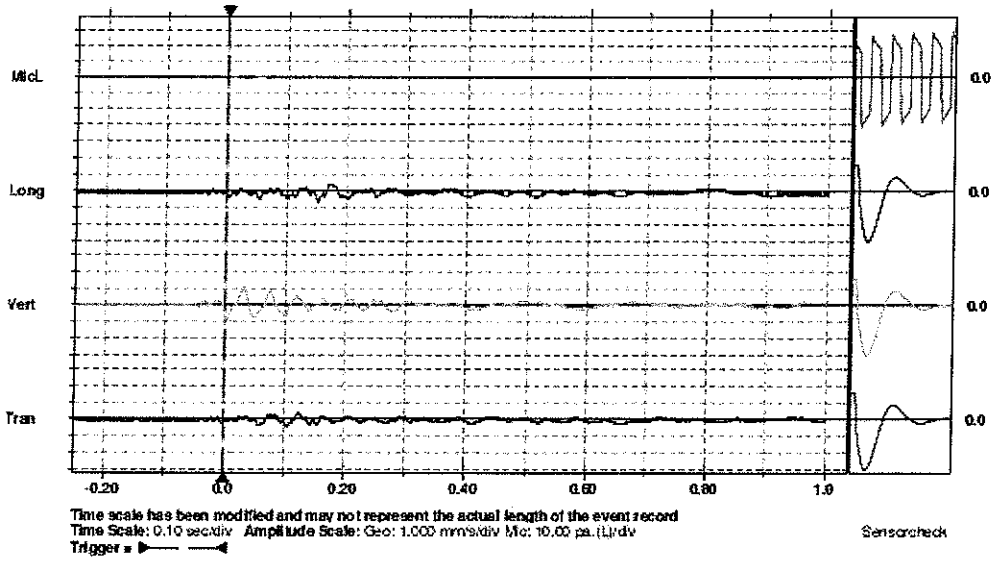
Microphone	Linear Weighting
PSPL	94.0 dB(L) at 1.585 sec
ZC Freq	7.8 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 457 mV)

	Tran	Vert	Long	
PPV	0.508	1.02	0.635	mm/s
ZC Freq	41	28	39	Hz
Time (Rel. to Trig)	0.103	0.030	0.150	sec
Peak Acceleration	0.0285	0.0530	0.0285	g
Peak Displacement	0.00211	0.00595	0.00350	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.6	7.5	7.8	Hz
Overswing Ratio	3.6	3.5	3.7	

Peak Vector Sum 1.02 mm/s at 0.030 sec

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.10 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 10.00 pa.(L)/div
Trigger =

Printed: April 10, 2009 (V 8.12 - 8.12)

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Instantel

FFT Report

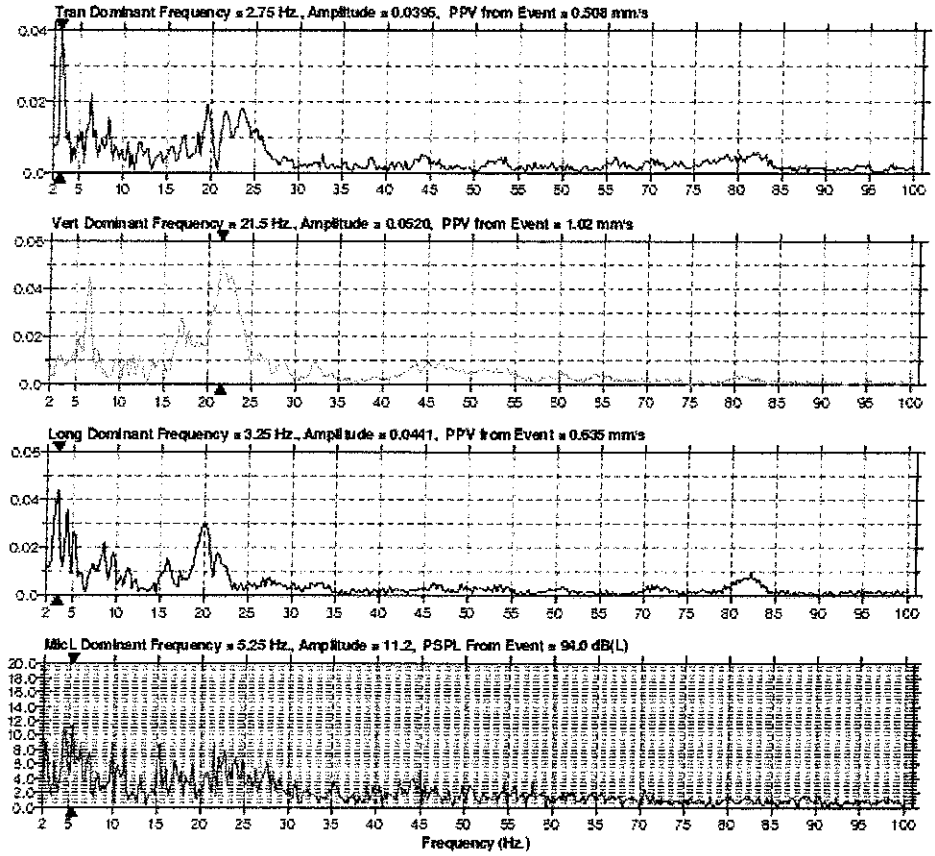
MAXAM

Date/Time	Vert at 17:58:14 April 6, 2009	**Serial Number**	BE14589 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 0.800 mm/s	**Battery Level**	8.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	3.0 sec (Auto=3Sec) at 2048 sps	**File Name**	P589C.NYC.L20
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Sensiblasting / Maxam
General:

Extended Notes

Post Event Notes
Sismograph: MAXAM 698
Point Coordinates: 656988 ; 991415
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 687m



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Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 17:58:09 April 8, 2009	**Serial Number**	BE14572 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	6.3 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.25 sec (Auto-3Sec) at 2048 sps	**File Name**	P572CNYC.K00
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

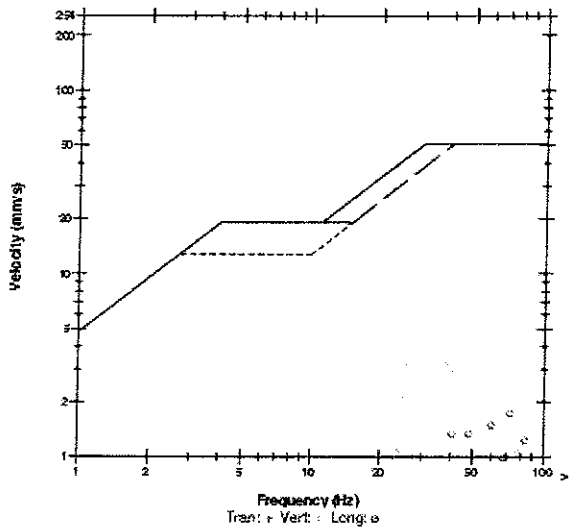
Post Event Notes
Point Coordinates: 658794 ; 991373
Maximum Instantaneous Charge (MIC): 50kg
Minimum Delay: 25ms
Distance to Blast:

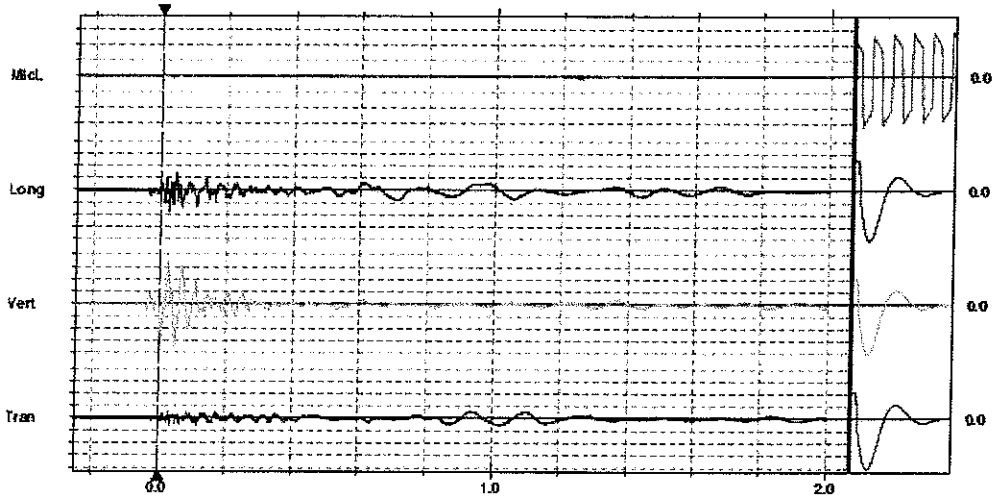
Microphone Linear Weighting
PSPL 97.5 dB(L) at 1.252 sec
ZC Freq 9.4 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 449 mV)

	Tran	Vert	Long	
PPV	0.635	3.56	1.78	mm/s
ZC Freq	114	28	73	Hz
Time (Rel. to Trig)	0.035	0.044	0.025	sec
Peak Acceleration	0.0530	0.108	0.0795	g
Peak Displacement	0.0145	0.0195	0.0199	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.3	7.5	7.5	Hz
Overswing Ratio	3.6	3.8	3.5	

Peak Vector Sum 3.88 mm/s at 0.045 sec

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 10.00 pa.(L)/div
Trigger

Sensorcheck

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Instantel

FFT Report

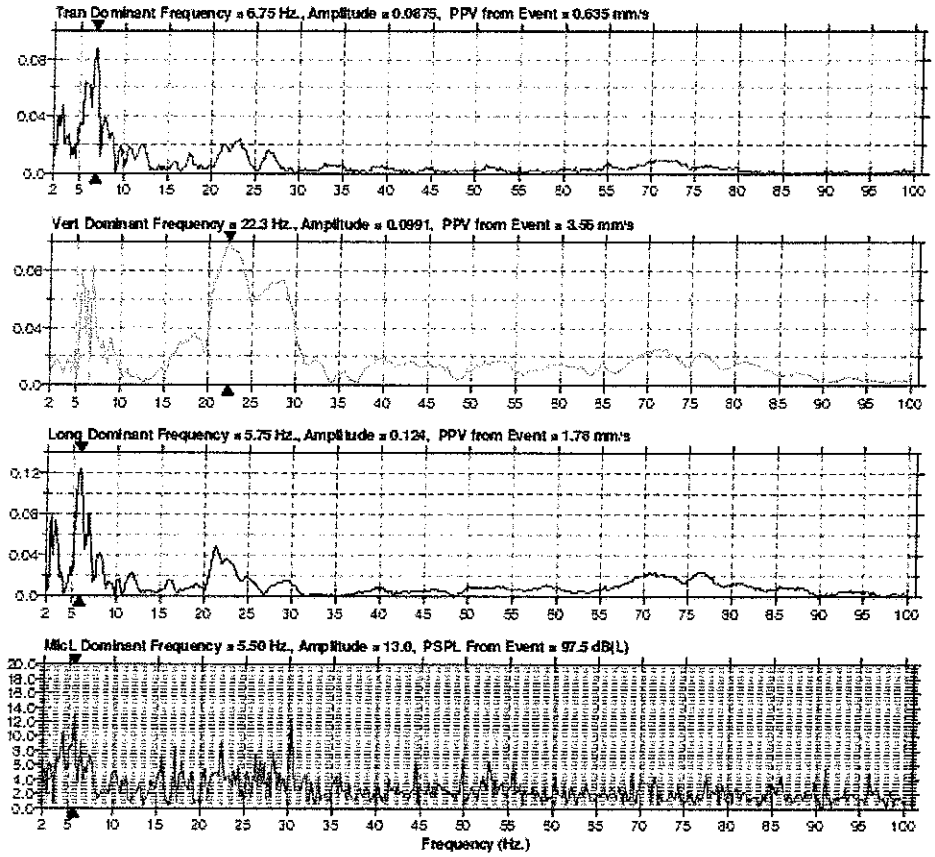
MAXAM

Date/Time	Vert at 17:56:09 April 8, 2009	**Serial Number**	BE14572 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	6.3 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.25 sec (Auto-3Sec) at 2048 sps	**File Name**	P572CNYC.KX0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servibizaing / Maxam
General:

Extended Notes

Post Event Notes
Point Coordinates: 658794 : 991373
Maximum Instantaneous Charge (MIC): 50kg
Minimum Delay: 25ms
Distance to Blast:



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Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 17:58:20 April 6, 2009	**Serial Number**	BE14574 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	6.3 Volts
Range	Geo :254 mm/s	**Calibration**	January 6, 2009 by Instantel Inc.
Record Time	3.25 sec (Auto-3Sec) at 2048 sps	**File Name**	P574CNYC.L80
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

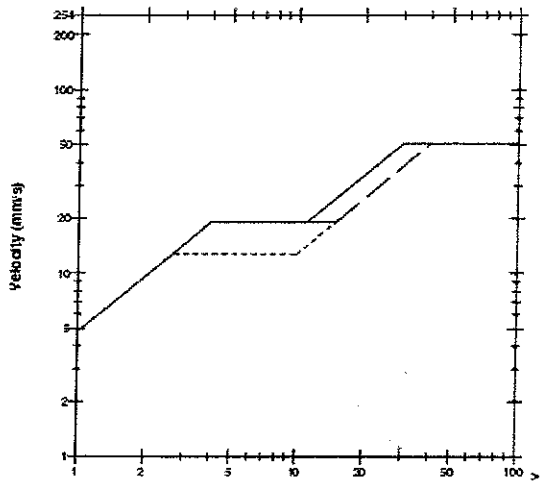
Post Event Notes
Sismographs: MAXAM 874
Point Coordinates: 658848 ; 911500
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 571m

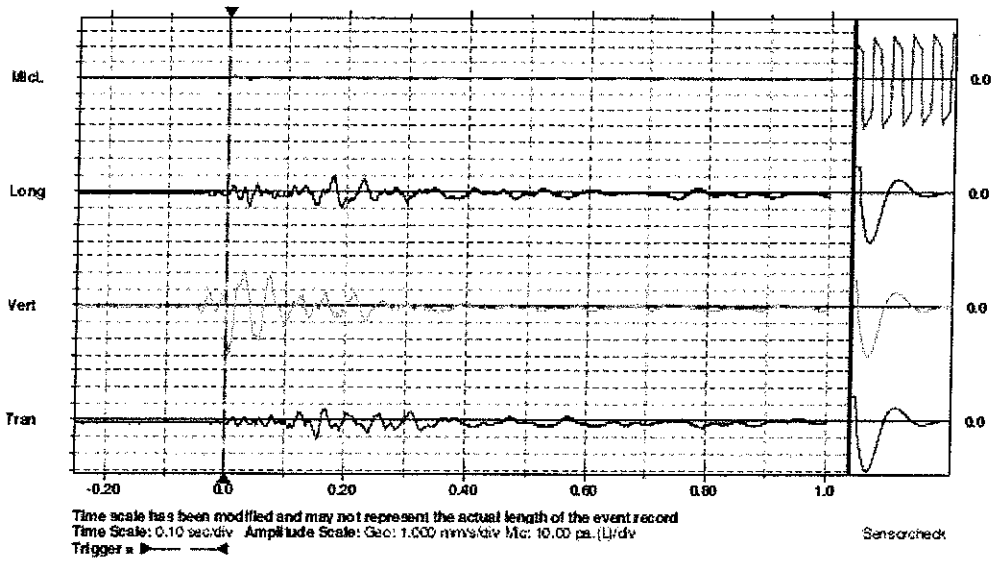
Microphone Linear Weighting
PSPL 97.5 dB(L) at 1.396 sec
ZC Freq 7.7 Hz
Channel Test Passed (Freq = 20.1 Hz Amp = 471 mv)

	Tran	Vert	Long	
PPV	1.14	2.92	0.889	mm/s
ZC Freq	30	32	45	Hz
Time (Rel. to Trig)	0.154	0.005	0.035	sec
Peak Acceleration	0.0530	0.0795	0.0530	g
Peak Displacement	0.0120	0.0168	0.00815	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.3	7.5	7.4	Hz
Overswing Ratio	3.7	3.5	3.9	

Peak Vector Sum 2.92 mm/s at 0.005 sec

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.10 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 10.00 pa. (L)/div
Trigger = ▶—— ——◀

Sensorcheck

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Instantel

FFT Report

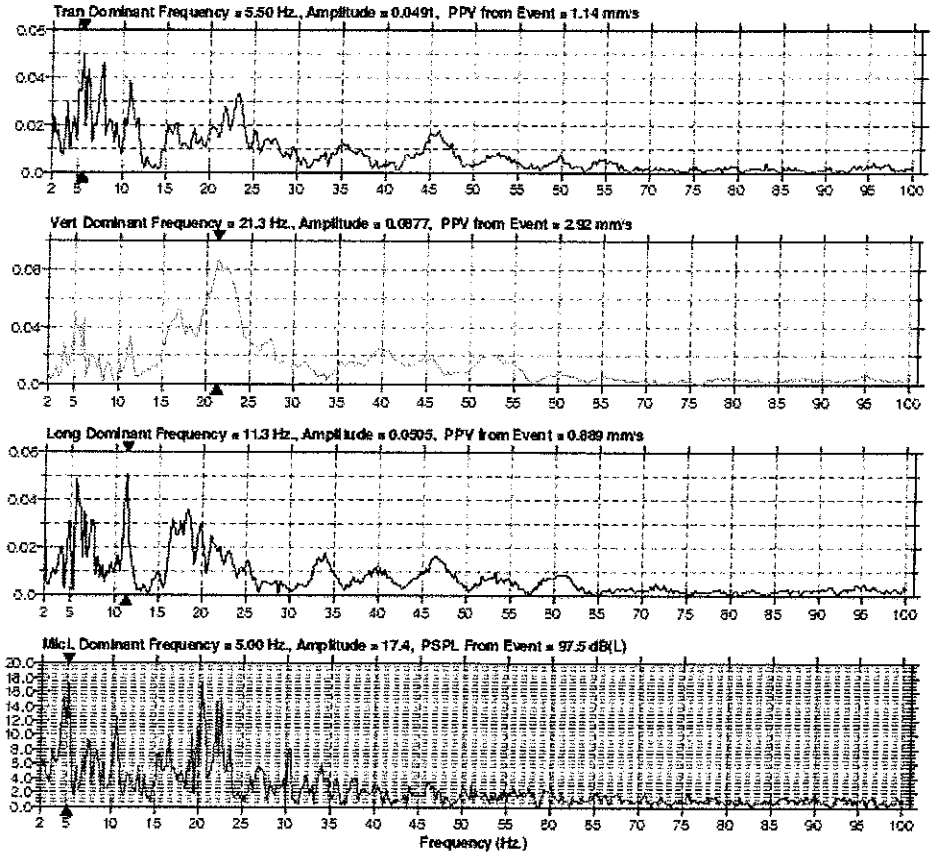
MAXAM

Date/Time	Vert at 17:56:20 April 8, 2009	**Serial Number**	BE14574 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	6.3 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	9.25 sec (Auto-3Sec) at 2048 sps	**File Name**	P574CNYC.L80
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Sensibleshing / Maxam
General:

Extended Notes

Post Event Notes
Sismographs: MAXAM 874
Point Coordinates: 656848 ; 911500
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 571m



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Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 17:58:14 April 8, 2009	**Serial Number**	BE14553 V 8.12-8.0 MiniMate Plus
Trigger Source	Geo: 0.800 mm/s	**Battery Level**	5.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.0 sec (Auto=3Sec) at 2048 sps	**File Name**	P553C NYC.L20
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting
General:

Extended Notes

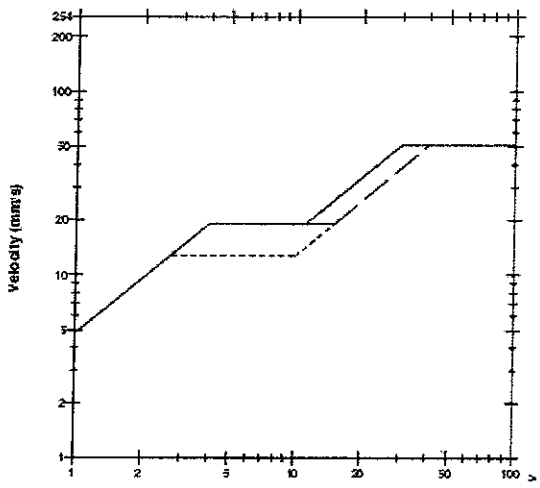
Post Event Notes
Sismograph: MAXAM P53
Point Coordinates: 657004 : 991156
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 770m

Microphone	Linear Weighting
PSPL	97.5 dB(L) at 1.853 sec
ZC Freq	12.8 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 455 mV)

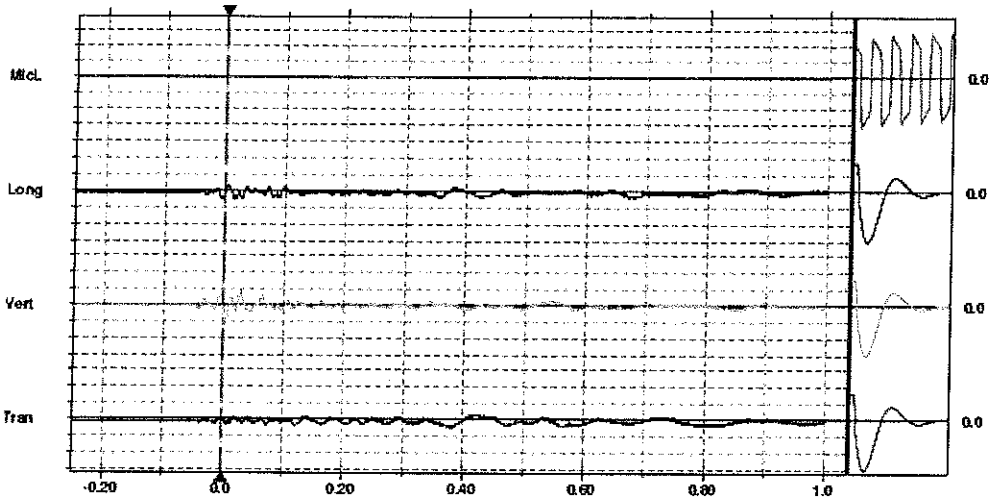
	Tran	Vert	Long	
PPV	0.508	1.14	0.508	mm/s
ZC Freq	15.3	49	64	Hz
Time (Rel. to Trig)	0.374	0.003	-0.008	sec
Peak Acceleration	0.0530	0.0530	0.0530	g
Peak Displacement	0.00974	0.00384	0.00353	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.5	7.4	7.5	Hz
Overswing Ratio	3.7	3.6	3.6	

Peak Vector Sum 1.18 mm/s at 0.003 sec

USBM RI8507 And OSMRE



Tran: + Vert: - Long: o



Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.10 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 10.00 pa.(L)/div
Sensorcheck
Trigger =

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Instantel

FFT Report

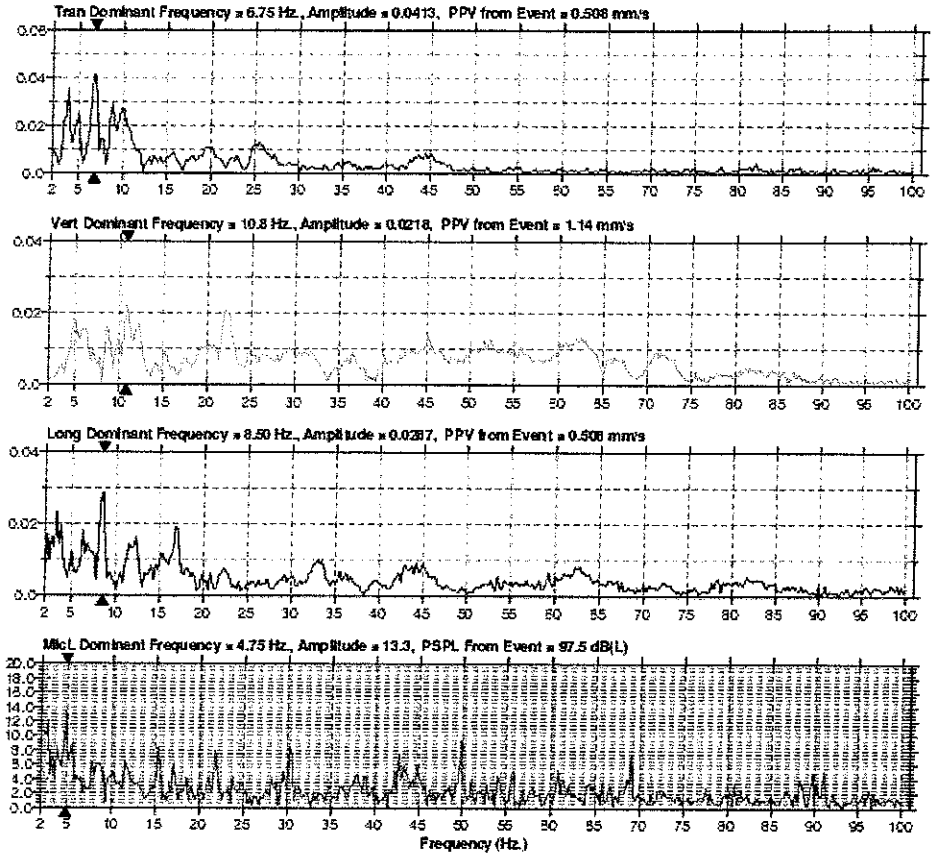
MAXAM

Date/Time	Vert at 17:55:14 April 8, 2009	**Serial Number**	BE14553 V 8.12-8.0 MiniMate Plus
Trigger Source	Geo: 0.800 mm/s	**Battery Level**	8.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.0 sec (Auto=3Sec) at 2048 sps	**File Name**	P553C.NYC.L20
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servibazting
General:

Extended Notes

Post Event Notes
Sismograph: MAXAM P53
Point Coordinates: 657004 : 991158
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 770m



Printed: April 10, 2009 (V 8.12 - 8.12)

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Serviblasting - Panama Canal

MAXAM

Date/Time	Vert at 17:56:09 April 8, 2009	**Serial Number**	BE14573 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 0.500 mm/s	**Battery Level**	8.4 Volts
Range	Geo: 254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	3.25 sec (Auto-3Sec) at 1024 sps	**File Name**	P573CNYC.K00
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

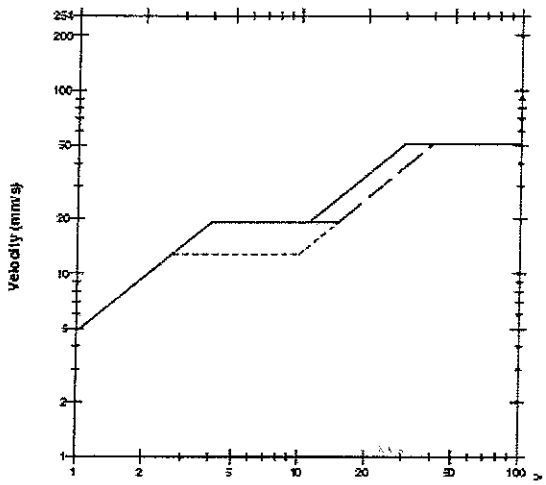
Post Event Notes
Seismograph: MAXAM 573
Point Coordinates: 658918 : 991413
Max Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 1015m

Microphone	Linear Weighting
PSPL	94.0 dB(L) at 2.472 sec
ZC Freq	10 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 450 mV)

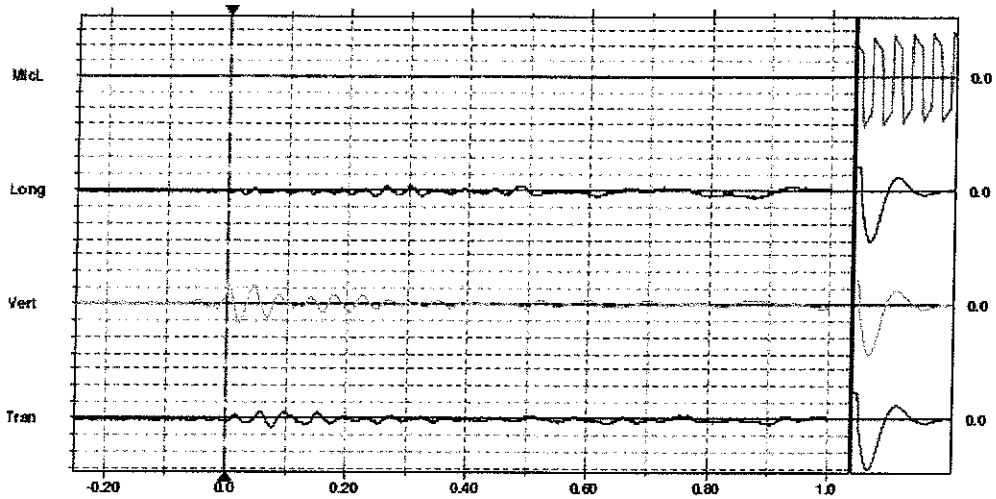
	Tran	Vert	Long	
PPV	0.508	1.14	0.508	mm/s
ZC Freq	28	30	8.4	Hz
Time (Rel. to Trig)	0.071	0.002	0.871	sec
Peak Acceleration	0.0133	0.0265	0.0255	g
Peak Displacement	0.00335	0.00757	0.0110	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.3	7.5	7.6	Hz
Overswing Ratio	3.7	3.4	3.8	

Peak Vector Sum 1.18 mm/s at 0.002 sec

USBM RI8507 And OSMRE



Tran: + Vert: ○ Long: ⊕



Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.10 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 10.00 pa.(L)/div
Sensorcheck
Trigger = ▶—— ——◀

Printed: April 10, 2009 (V 8.12 - 8.12)

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Instantel

FFT Report

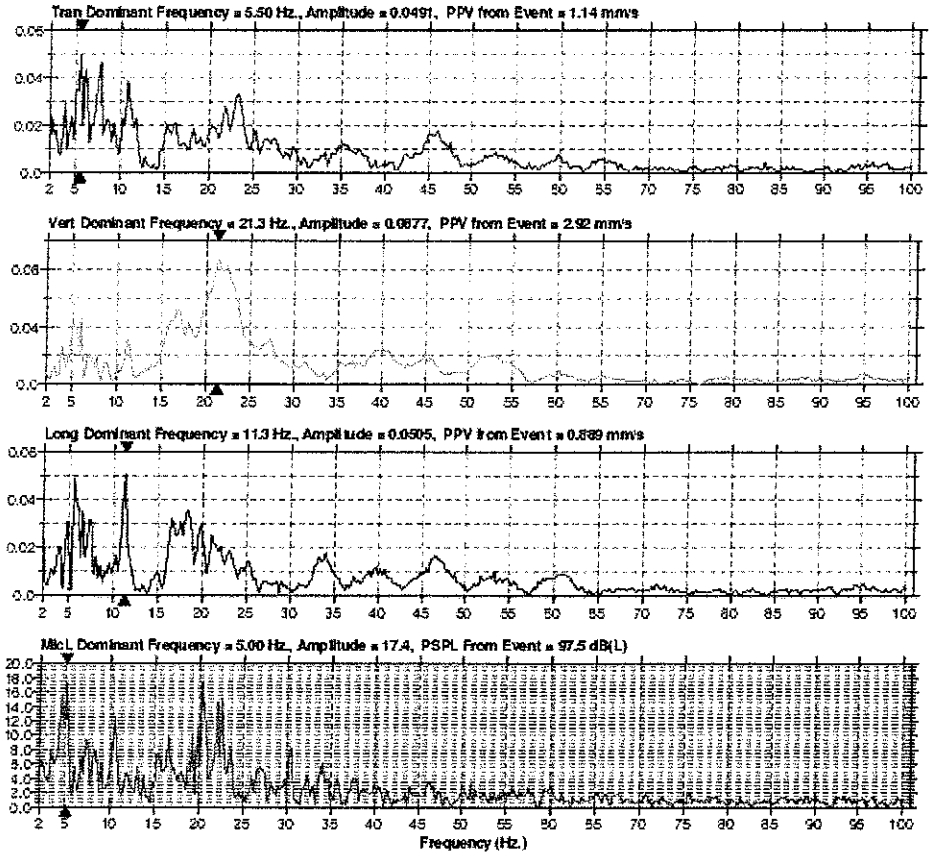
MAXAM

Date/Time	Vert at 17:55:30 April 6, 2009	**Serial Number**	BE14574 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 1.00 mm/s	**Battery Level**	6.3 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	3.25 sec (Auto-3Sec) at 2048 sps	**File Name**	P574CNYC.L80
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servibla sting / Maxam
General:

Extended Notes

Post Event Notes
Sismographs: MAXAM 574
Point Coordinates: 656848 ; 911900
Max. Instantaneous Charge (MIC): 50kg / Minimum Delay: 25ms
Distance to Blast: 571m



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TEST BLAST 3

Instantel

Serviblasting - Panama Canal

MAXAM

Date/Time	Long at 14:24:51 April 9, 2009	**Serial Number**	BE14571 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 0.800 mm/s	**Battery Level**	8.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel Inc.
Record Time	3.25 sec (Auto=3Sec) at 2048 sps	**File Name**	P571CNZX.DF0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

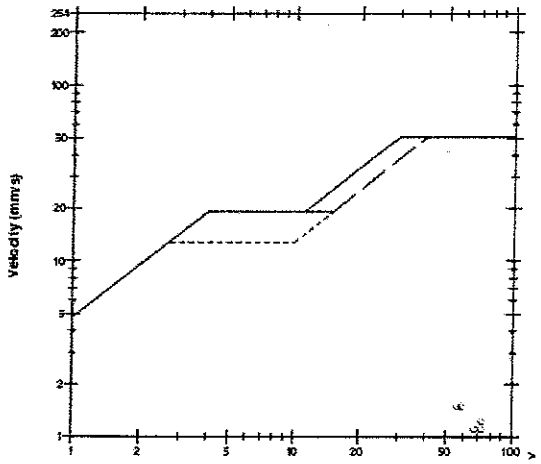
Post Event Notes
Sismograph: MAXAM 871
Position Coordinates: 658711 ; 991501
Max. Instantaneous Charge (MIC): 50kg
Distance to blast: 454m

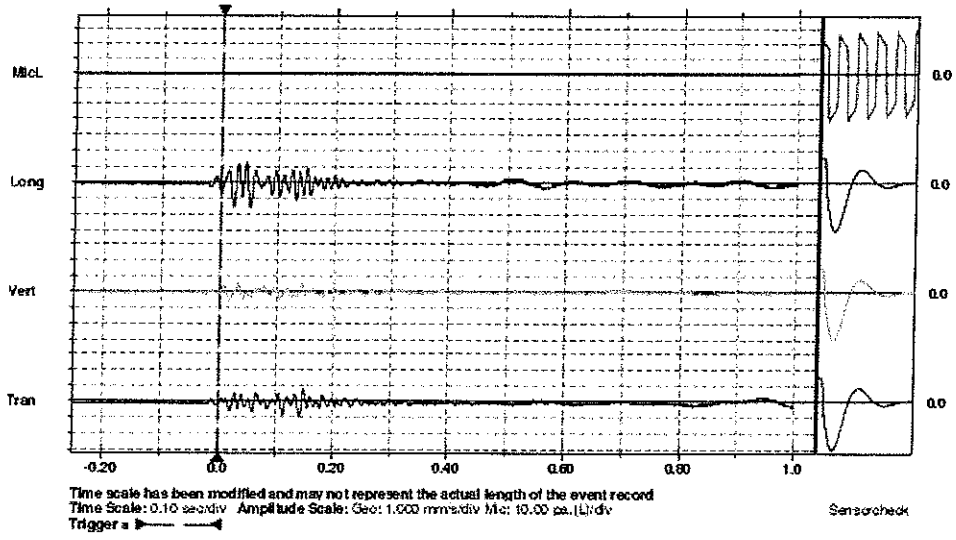
Microphone Linear Weighting
PSPL 91.5 dB(L) at 0.008 sec
ZC Freq 85 Hz
Channel Test Passed (Freq = 20.1 Hz Amp = 478 mV)

	Tran	Vert	Long	
PPV	0.889	0.635	1.52	mm/s
ZC Freq	68	45	57	Hz
Time (Rel. to Trig)	0.113	0.015	0.021	sec
Peak Acceleration	0.0530	0.0530	0.0795	g
Peak Displacement	0.0129	0.00233	0.00437	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.5	7.4	7.8	Hz
Overswing Ratio	3.6	3.8	3.6	

Peak Vector Sum 1.53 mm/s at 0.021 sec

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.10 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 10.00 pa.(L)/div
Trigger ▶ ◀

Sensorcheck

Printed: April 10, 2009 (V 8.12 - 8.12)

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Instantel

FFT Report

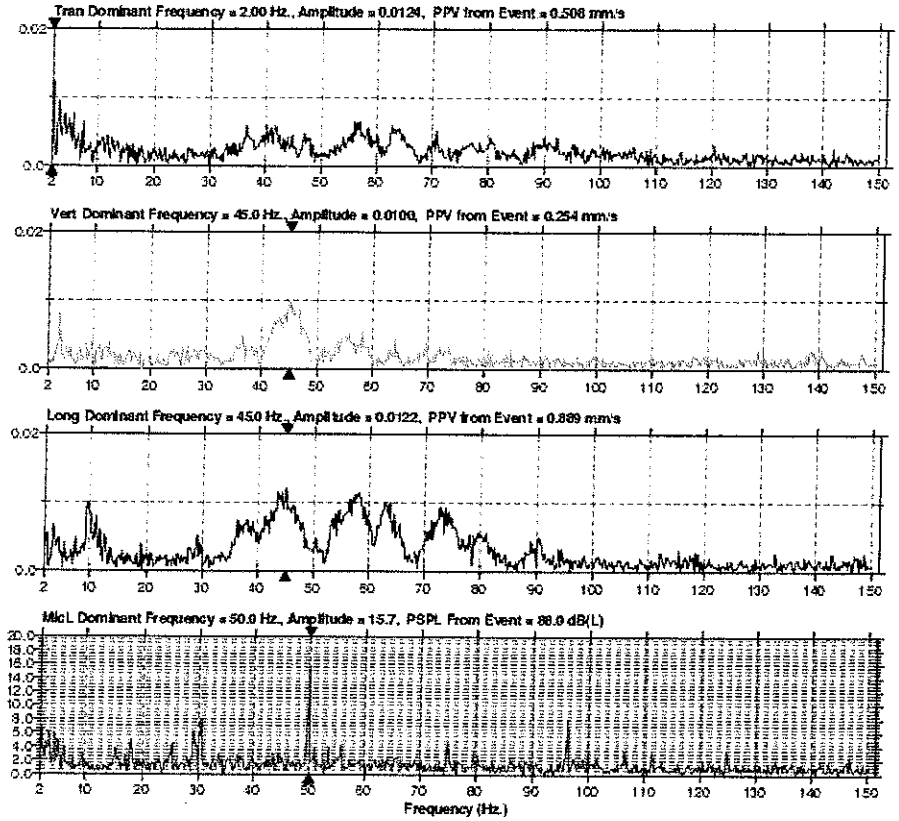
MAXAM

Date/Time	Long at 14:26:00 April 9, 2009	**Serial Number**	BE14571 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 0.800 mm/s	**Battery Level**	5.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.0 sec (Auto=3Sec) at 2048 sps	**File Name**	P571GNZX.FC0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Servibla sting / Maxam
General:

Extended Notes

Post Event Notes
Sismograph: MAXAM 871
Position Coordinates: 656711 : 991501
Max. Instantaneous Charge (MIC): 15kg
Distance to Blast: 454m



Printed: April 10, 2009 (V 8.12 - 8.12)

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Instantel

Serviblasting - Panama Canal

MAXAM

Date/Time	Long at 14:28:00 April 9, 2009	**Serial Number**	BE14571 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 0.800 mm/s	**Battery Level**	5.4 Volts
Range	Geo :254 mm/s	**Calibration**	January 3, 2009 by Instantel inc.
Record Time	3.0 sec (Auto=3Sec) at 2048 sps	**File Name**	P571CNZX.FC0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

Post Event Notes
Seismograph: MAXAM B71
Position Coordinates: 656711 ; 991501
Max Instantaneous Charge (MIC): 15kg
Distance to blast: 454m

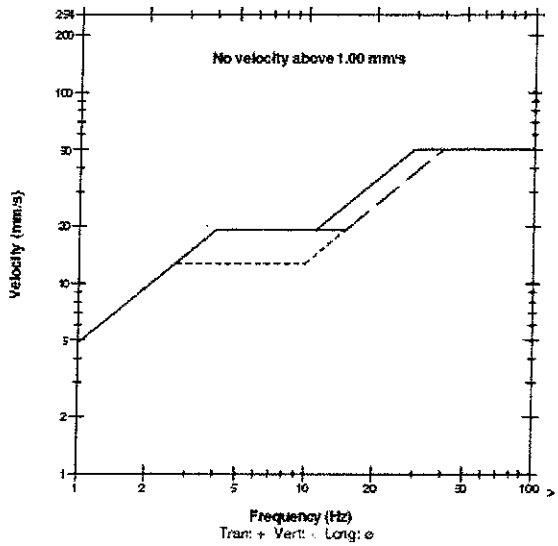
Microphone	Linear Weighting
PSPL	<88 dB(L) at 0.007 sec
ZC Freq	N/A
Channel Test	Passed (Freq = 20.1 Hz Amp = 478 mv)

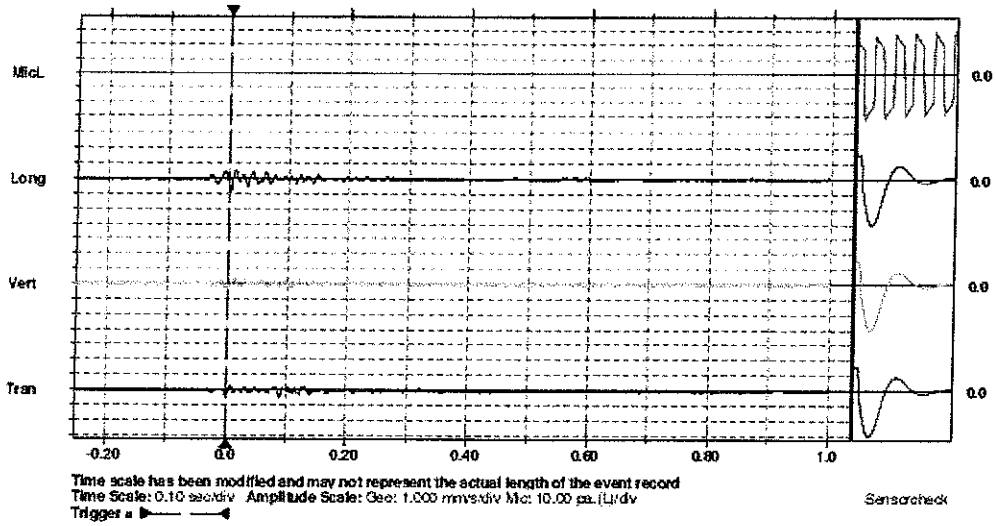
	Tran	Vert	Long	
PPV	0.508	0.254	0.889	mm/s
ZC Freq	73	54	57	Hz
Time (Rel. to Trig)	0.088	-0.008	0.001	sec
Peak Acceleration	0.0530	0.0530	0.0530	g
Peak Displacement	0.00124	0.00112	0.00242	mm
Sensorcheck	Passed	Passed	Passed	
Frequency	7.5	7.4	7.8	Hz
Overswing Ratio	3.6	3.8	3.8	

Peak Vector Sum 0.959 mm/s at 0.001 sec

N/A: Not Applicable

USBM RI8507 And OSMRE





Time scale has been modified and may not represent the actual length of the event record
Time Scale: 0.10 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 10.00 pa.(L)/div
Trigger ▸ ▶—— ——◀

Sensorcheck

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Instantel

FFT Report

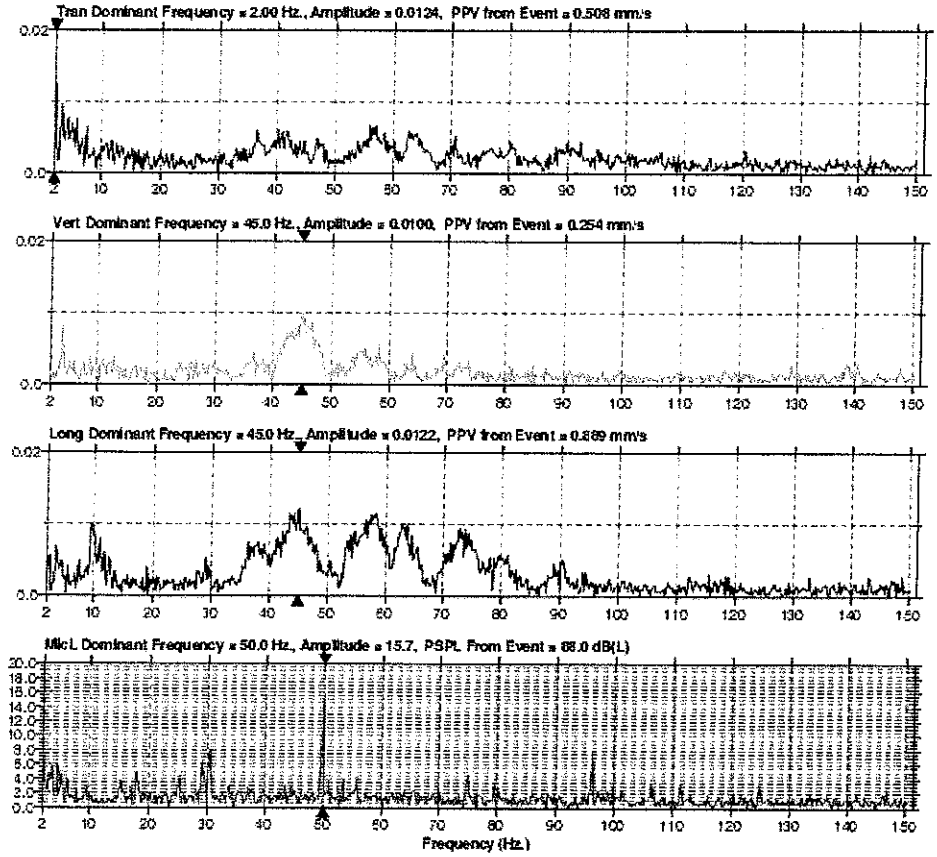
MAXAM

Date/Time	Long at 14:28:00 April 9, 2009	**Serial Number**	BE14571 V 8.12-1.0 Minimate Blaster
Trigger Source	Geo: 0.800 mm/s	**Battery Level**	5.4 Volts
Range	Geo: 254 mm/s	**Calibration**	January 8, 2009 by Instantel inc.
Record Time	3.0 sec (Auto+3Sec) at 2048 spa	**File Name**	P571CNZX.FC0
Job Number:	1		

Notes
Location: Panama Canal
Client: Dredging International
User Name: Serviblasting / Maxam
General:

Extended Notes

Post Event Notes
Seismograph: MAXAM 571
Position Coordinates: 658711 ; 991501
Max. Instantaneous Charge (MIC): 15kg
Distance to blast: 454m



Printed: April 10, 2009 (V 8.12 - 8.12)
Format Copyrighted 2004-2005 Instantel Inc.

9) RESULTS

MAIN LINE	1	B71	656711 ; 991501	Trans (mm/s)	432	1.78	3.94	5.21	437	4.95	454	0.89	0.51	-
				Vert (mm/s)		2.41	5.46	5.08		4.83		0.64	0.25	-
				Long (mm/s)		2.41	5.33	8.13		6.98		1.52	0.89	-
				Mic (dB)		-	-	112		100		92	-	-
	2	P54	650837 ; 991438	Trans (mm/s)	552	-	0.63	1.02	558	1.02	574	-	-	-
				Vert (mm/s)		-	1.27	4.83		3.68		-	-	-
				Long (mm/s)		-	0.63	1.52		1.02		-	-	-
				Mic (dB)		-	-	110		102		-	-	-
	3	B69	656968 ; 991415	Trans (mm/s)	683	-	-	0.51	687	0.51	703	-	-	-
				Vert (mm/s)		-	-	1.27		1.02		-	-	-
				Long (mm/s)		-	-	0.76		0.64		-	-	-
				Mic (dB)		-	-	107		94		-	-	-
CROSS LINE	4	B72	656794 ; 991373	Trans (mm/s)	512	-	0.76	1.02	515	0.64	533	-	-	-
				Vert (mm/s)		-	1.78	4.06		3.56		-	-	-
				Long (mm/s)		-	0.89	1.65		1.78		-	-	-
				Mic (dB)		-	-	112		98		-	-	-
	5	B74	656848 ; 991500	Trans (mm/s)	567	0.63	0.89	1.52	571	1.14	588	-	-	-
				Vert (mm/s)		1.65	1.90	3.56		2.92		-	-	-
				Long (mm/s)		0.51	0.76	1.14		0.89		-	-	-
				Mic (dB)		-	-	108		98		-	-	-
CONTROL	DIABLO DOCKS	P53	657004 ; 991156	Trans (mm/s)	770	-	-	0.64	770	0.51	788	-	-	-
				Vert (mm/s)		-	-	1.40		1.14		-	-	-
				Long (mm/s)		-	-	0.89		0.51		-	-	-
				Mic (dB)		-	-	110		98		-	-	-
	DIABLO TOWN	B73	657267 ; 991178	Trans (mm/s)	1014	-	-	0.76	1015	0.51	1034	-	-	-
				Vert (mm/s)		-	-	1.52		1.14		-	-	-
				Long (mm/s)		-	-	0.84		0.51		-	-	-
				Mic (dB)		-	-	106		94		-	-	-
	DREDGING INTERNATIONAL	B70	658243 ; 990873	Trans (mm/s)	574	-	0.51		552	-	554	-	-	-
				Vert (mm/s)		-	0.89					-	-	-
				Long (mm/s)		-	1.14					-	-	-
				Mic (dB)		-	108					-	-	-

Weaker than expected detonation was perceived for Charge 3 in Test Blast 3. None of the sismographs registered vibration levels above the trigger value of 0.80mm/s. It is believed the reason behind it was loose and fractured rock around the borehole.

10) CONCLUSIONS

Vibration test blasts are a way to get quantitative control and design tools to be applied during the production blast period. With the actual level on vibrations and the maximum instant charge (MIC), it would be recommended to initiate the production blast increasing the MIC of the Test Blast up to 65 kg.

On the consecutive days, depending on the vibration levels, it would be recommended to increase the MIC on 10 kg, on consecutive blasts until limit is reach, bearing in mind that the seed boreholes were under higher confinement compared with expected conditions once production blast starts.

Depending on the distance to the closest structure it would be recommended to evaluate any other changes.

Appendix P

Structural Study of Properties Near the Pacific Entrance Channel Project Area

Dredging International | PANAMA
Marine & Waterway Contractor

Dredging International de Panama, S.A.
Member of the DEME Group
Plaza Albrook,
Panama, Rep. de Panama
T +507 340 30 04
F +507 340 30 05
dredging @cwpanama.net
www.deme.be

Dredging International de Panama, S.A.
CMCA-202791-CCP

Ref. n°: CMCA-202791-CCP/T/DB/0658

Date: 02/04/2009

TRANSMITTAL

Addressed to: **AUTORIDAD DEL CANAL DE PANAMA**

Name: Mr. Roderick Lee
Contracting Officer Representative

Item n°	Document n°	Rev.	Description	Issue Code*	Qty
1	-	01	SRA (Structural Response Analysis) and ACP buildings survey – Rev 01	7	2

* Issue Code :
1. for signature
2. for approval
3. request for issue
4. issued for review and return
5. as agreed
6. at your request
7. information
8. for investigation
9. checked
10. as noted
11. to supply us with add. info
12. for construction
13. as built
14. your controlled copy
15. ID Cards
16.

in reference to:
1.
2.
3.

note: Information asked by e-mail with copy in attachment.

signed on behalf of: Dredging International
name:
date:
sign: .....

please acknowledge receipt by returning this document signed and dated (fax n° : +.....)
name: RODERICK E LEE
date / sign: 02/IV/09

Girardeaux Cyril

From: MChin [MChin@pancanal.com]
Sent: Wednesday, March 25, 2009 12:15 PM
To: Lay Johana; Girardeaux Cyril
Cc: RLee; MGranados
Subject: FW: T-DB-619_StructuralAnalysis_Survey Building

Dear Cyril:

Please find attached some remarks of the Structural Analysis Survey Building. We will send the official note.

Best Regards,

Melita Chin
Ingeniera Civil
Proyecto de Dragado del Pacífico
Div.de Administración de Proyectos
Depto. de Ingeniería y Administración de Programas
Autoridad del Canal de Panamá
Tel.276-2118 Fax 276-2121 e-mail mchin@pancanal.com

From: MMolina
Sent: Martes, 24 de Marzo de 2009 03:10 p.m.
To: MChin
Subject: FW: T-DB-619_StructuralAnalysis_Survey Building

Melita: Te adjunto mis comentarios

1.- Para el muelle en la página 102 revisar los diagramas de momento y cortante para carga muerta.

2.-Para otras estructuras los diagramas de momentos para carga uniforme están formados por líneas rectas (revisar).

3.- En la parte "Visual Inspection Reports....."
3.1 Cambiar el nombre de Mario Molina por Máximo Molina
3.2 El reporte del edificio 6004 quedó en español

M. Molina

From: GusGonzalez
Sent: Monday, March 23, 2009 12:49 PM
To: MMolina
Cc: EST-CVasquez; EVargas; MChin; MGranados; RLee; SDiaz
Subject: T-DB-619_StructuralAnalysis_Survey Building

Buenas tardes Sr. Maximo Molina.

Le adjunto el link del transmittal T-DB-619_StructuralAnalysis_Survey Building, para su revision.

Favor confirmar si tiene acceso al link, también se le estará enviando copia del mismo.

Saludos.

T:\DB-SRA-001\27_202791_T-DB-619_StructuralAnalysis_SurveyBuild.pdf

Gustavo .O. González Saavedra
Proyecto Dragado del Pacífico
División de Administración de Proyectos
TEL: 276-2115
FAX:276-2121

Please don't print this e-mail unless you really need to.Por favor no imprima este papel al menos que sea realmente necesario. Ayudemos a nuestro planeta.

Arquinde, S.A.
Arquitectura e Ingenieria Civil

Panamá, March 30, 2009

Mr. Gert De Smet
General Manager
Dredging International
Panama City, PANAMA

Dear Sir:

Hereby we are answering the questions and remarks stated on the e-mail of March 25, 2009, in reference to the Structural response Analysis (SRA) done by us.

Requested clarification:

- The dock superstructure was modeled as a ribbed slab acting in one direction, which transmits the gravity loads as concentrated ones to the main beams. That is the reason why the shear diagrams appear as horizontal lines and the bending moment diagrams appear as straight lines for the gravity loading case in the main beams. In **Fig. Nº 1** we can schematically appreciate the application points of the concentrated loads of the ribbed slab on the main beam.

- The structural analysis results are shown for the weak direction of the structure (most critical condition due to less lateral rigidity). In some buildings, such as 5864 and 6007b, the gravity loads were modeled as concentrated reactions on the main beams which generate straight lines bending moment diagrams.

- For optimization reasons in the analysis process, it was defined a minima of three intermediate points for the internal shear and bending moment calculations. When the variations within the diagram are small (or the results of the analysis are small) normally are shown three intermediate points in same, giving the impression of been straight lines when, in fact they are curved. Nevertheless, when the diagrams

Tel. /Fax: (507) 260-1665 E-Mail: arquinde@cableonda.net Apdo.: 0819-06234, El Dorado, PANAMÁ

- variations are substantial (or the analysis results are of greater magnitude) there are used more intermediate points in order to define with a higher resolution the diagram curves. **Fig. 2 & 3** show the bending moment diagrams for gravity loads using three and ten intermediate points respectively. We can observe in both diagrams that the difference is in the diagrams resolution due to the fact that the critical values remain the same.

We remain at your service for further clarifications or doubts that may come up from the interpretations of Structural response Analysis (SRA) done by our firm.

Very Truly Yours

Ing. – Arg. Martin Isaac Donderis
Arquinde, S.A.

Copy: Cyril Girardeaux; Johana Lay

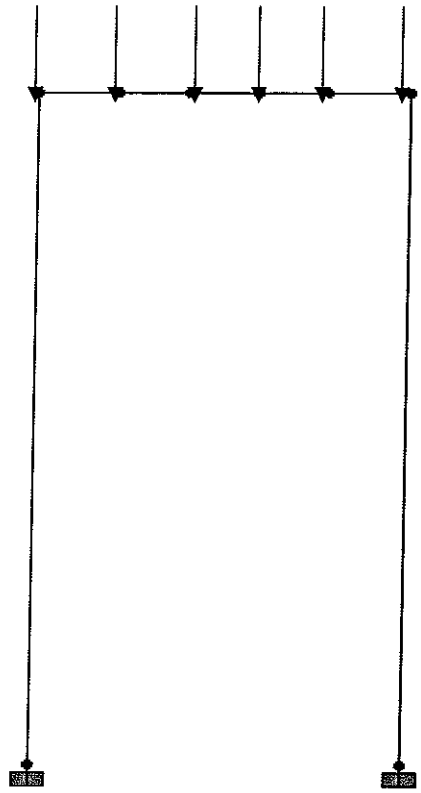


Fig.1. Application points (schematically) on the main beams

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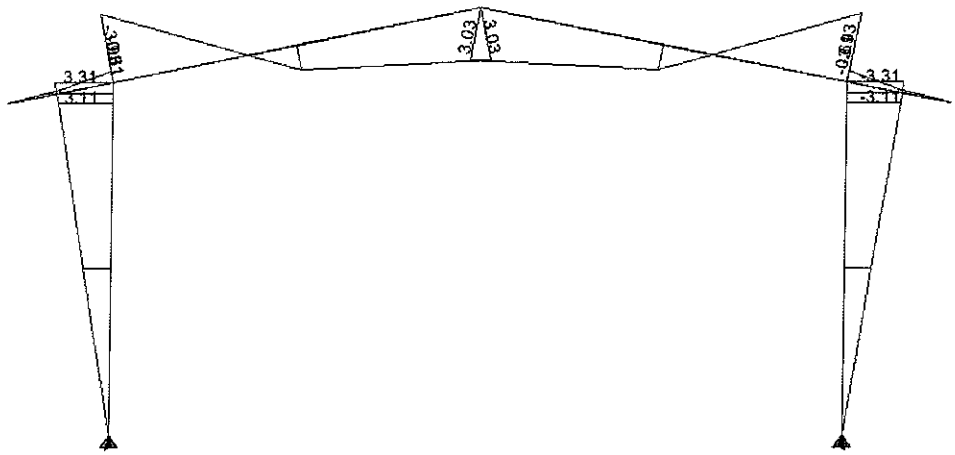


Fig. 2. Bending moment diagram for gravity loading using three intermediate points (kip-ft)

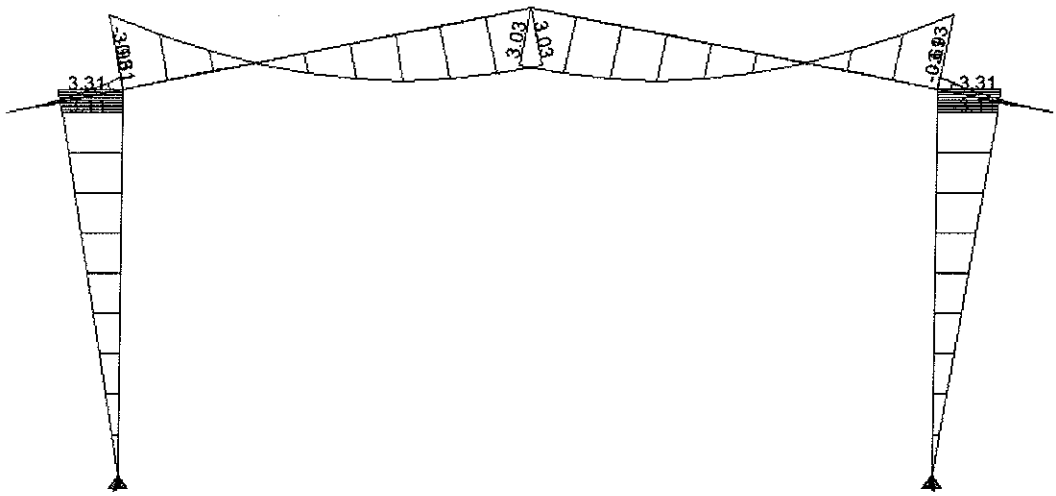


Fig. 3. Bending moment diagram for gravity loading using ten intermediate points (kip-ft)

ASESORES EN CONCRETO, S.A.

APARTADO 0819-04681
EL DORADO, PANAMÁ.

TEL/FAX: (507)269-6903.
Zela02@cableonda.net ó Hotmail.com

March 14, 2009.

EVALUATION REPORT ON THE GENERAL CONDITIONS OF THE A.C.P. BUILDINGS LOCATED IN DIABLO

Since March 2nd and 3rd of 2009, 13 buildings of THE PANAMA CANAL AUTHORITY, located in Ancón, were checked. This was in presence of Ing. Máximo Molina from A.C.P. and representatives from Dredging International of Panama.

The following buildings were analyzed:

6010	6000	6002	DOCKS
6004 X	6001	ADJ 6007	
6004	6000 X	6007	
B 204 14	6005 X	M & H28	

By the notes and photos taken for each building visited (list provided by A.C.P), we could determine that in general terms the cracks observed are superficial. Nevertheless, there are special cases, such as buildings 6000X, 6004X and the Docks.

In the case of building 6000X, we found vertical cracks in the base of the beams in the roof.

Building 6004X, Operations Division, Fleet and Equipment Maintenance Division: We found cracks getting through the walls in the kitchen area. This situation was also found in the Training room. This was the building with the greatest amount of crack problems found.

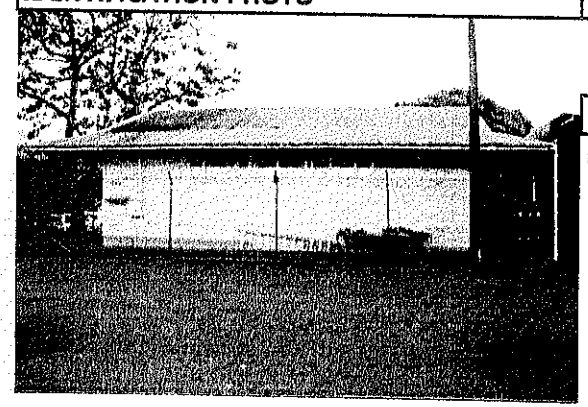
The other case was the Docks. All beams supported over the pillars present a horizontal crack. In the same way, we could observe that these cracks are caused by the presence of bars affected by the surrounding environment. It could be observed that the beams of

APARTADO 0819-04681
EL DORADO, PANAMÁ.

TEL/FAX: (507)269-6903.
Zela02@cableonda.net ó Hotmail.com

the slabs were previously repaired and most ot these repairs are already damaged and cracked.

DATE: 3/2/2009					
BUILDING/HOUSE:					
BUILDING: 6004					
IDENTIFICATION PHOTO	**TRAILER HOUSE**	**WOOD**	**CONCRETE**		



WOOD BUILDING

CRACK OR FISSURE	COMMENTS
FLOOR	CRACKS IN THE JOINTS CAN BE SEEN

ARQUINDE, S.A.

Date:				**Page Nº: 1**
PROJECT: 2/3/09				
BUILDING / HOUSE:	6004 madera			
DAMAGE AND BUILDING PERFORMANCE LEVEL				
	Collapse	Life Safety	Imm. Ocupancy	Operational
Damage	Severe	Moderate	Light	Very light
General:				
Non Struct.				
Comparison				

Notes:

Grietas en el Piso — Juntas.
Paredes de Madera.

Nelson R. Leonardo

CGI

Appendix Q

Water and Marine Sediment Analytical Results for the Pacific Entrance Channel Project Area

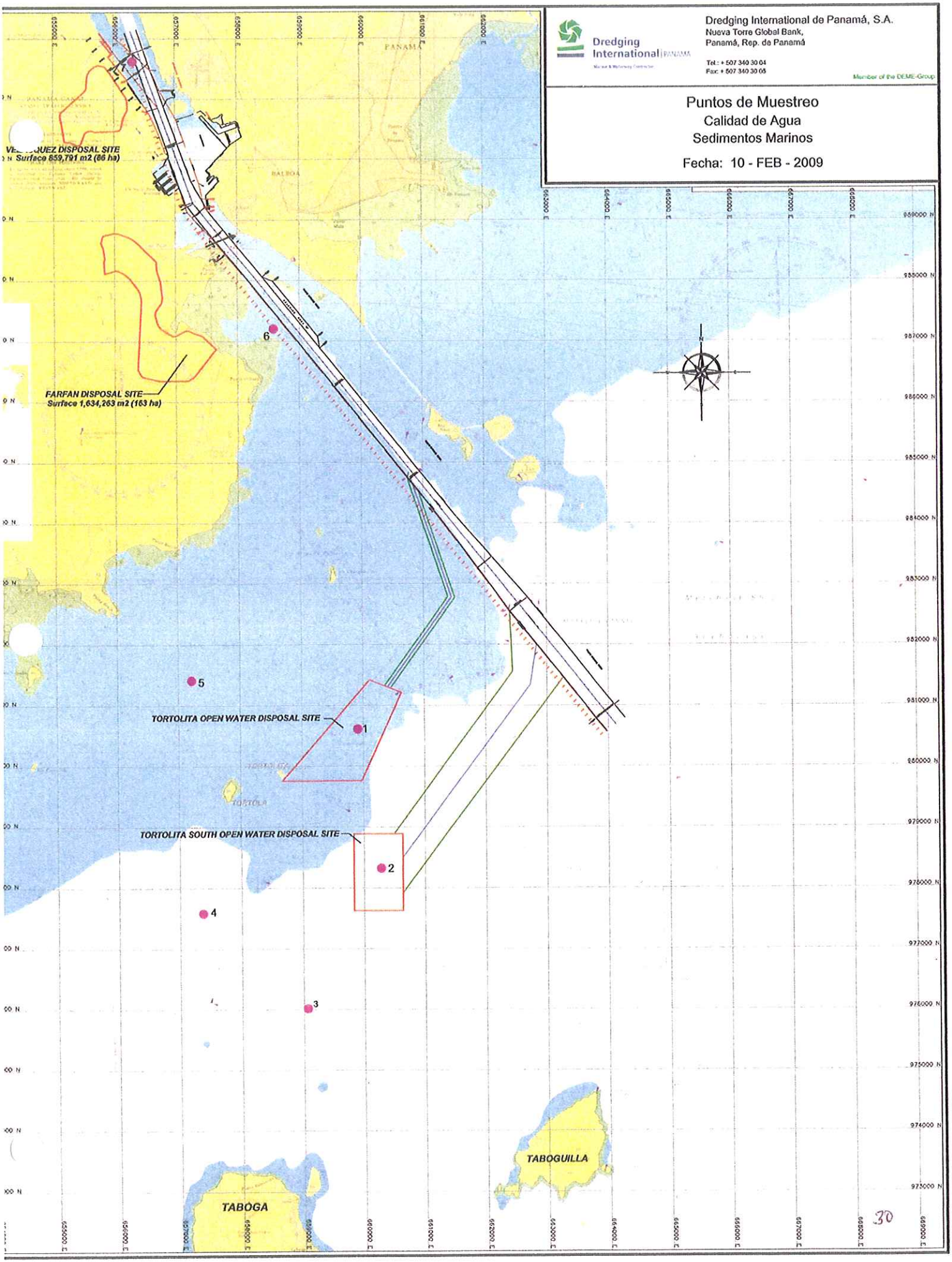
ANNEX 1

WATER AND SEDIMENT SAMPLING POINTS HELD DURING FEBRUARY TO MARCH 2009.

Dredging International de Panamá, S.A.
Nueva Torre Global Bank,
Panamá, Rep. de Panamá
Tel.: + 507 340 30 04
Fax: + 507 340 30 05
Member of the DEME-Group

Puntos de Muestreo
Calidad de Agua
Sedimentos Marinos

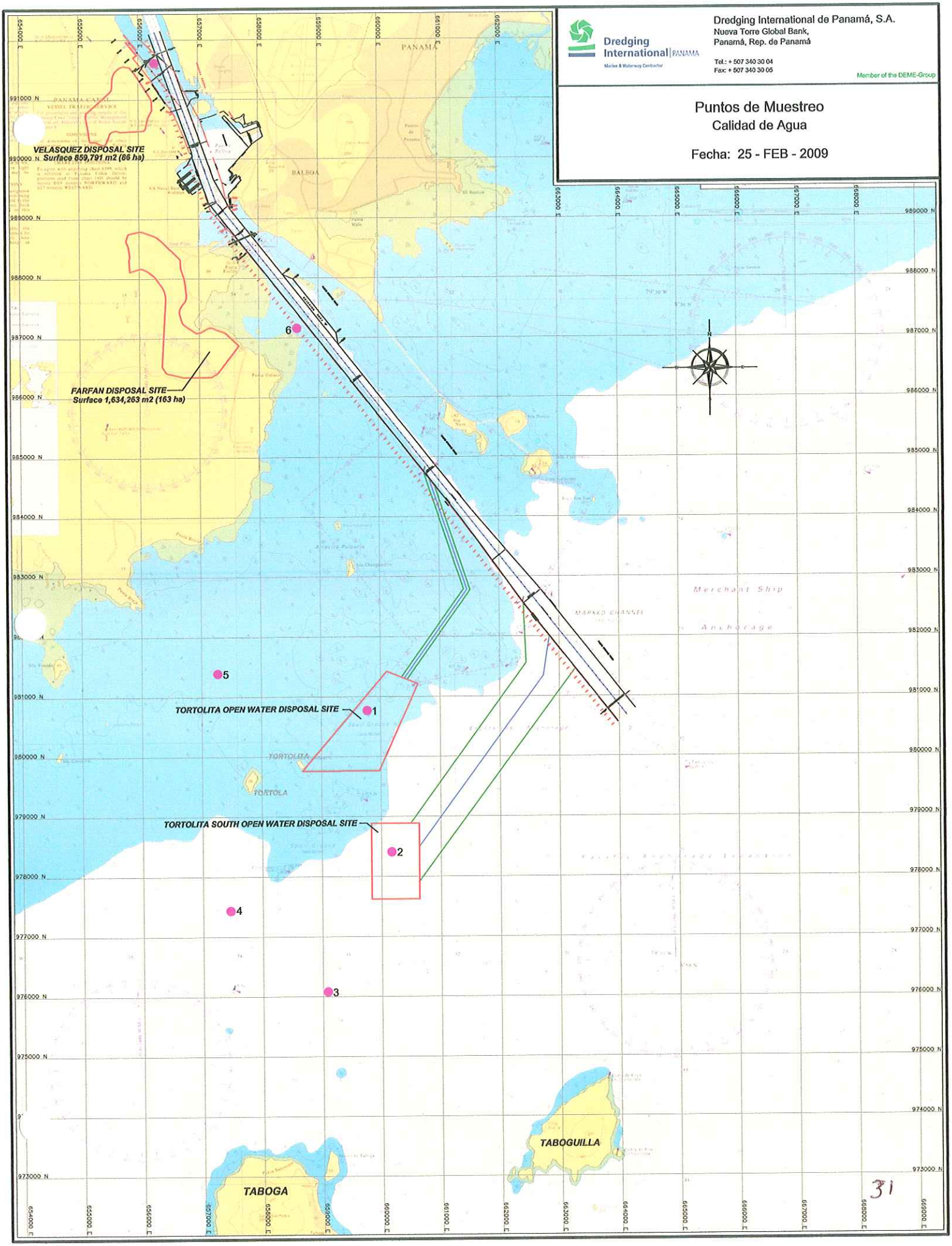
Fecha: 10 - FEB - 2009

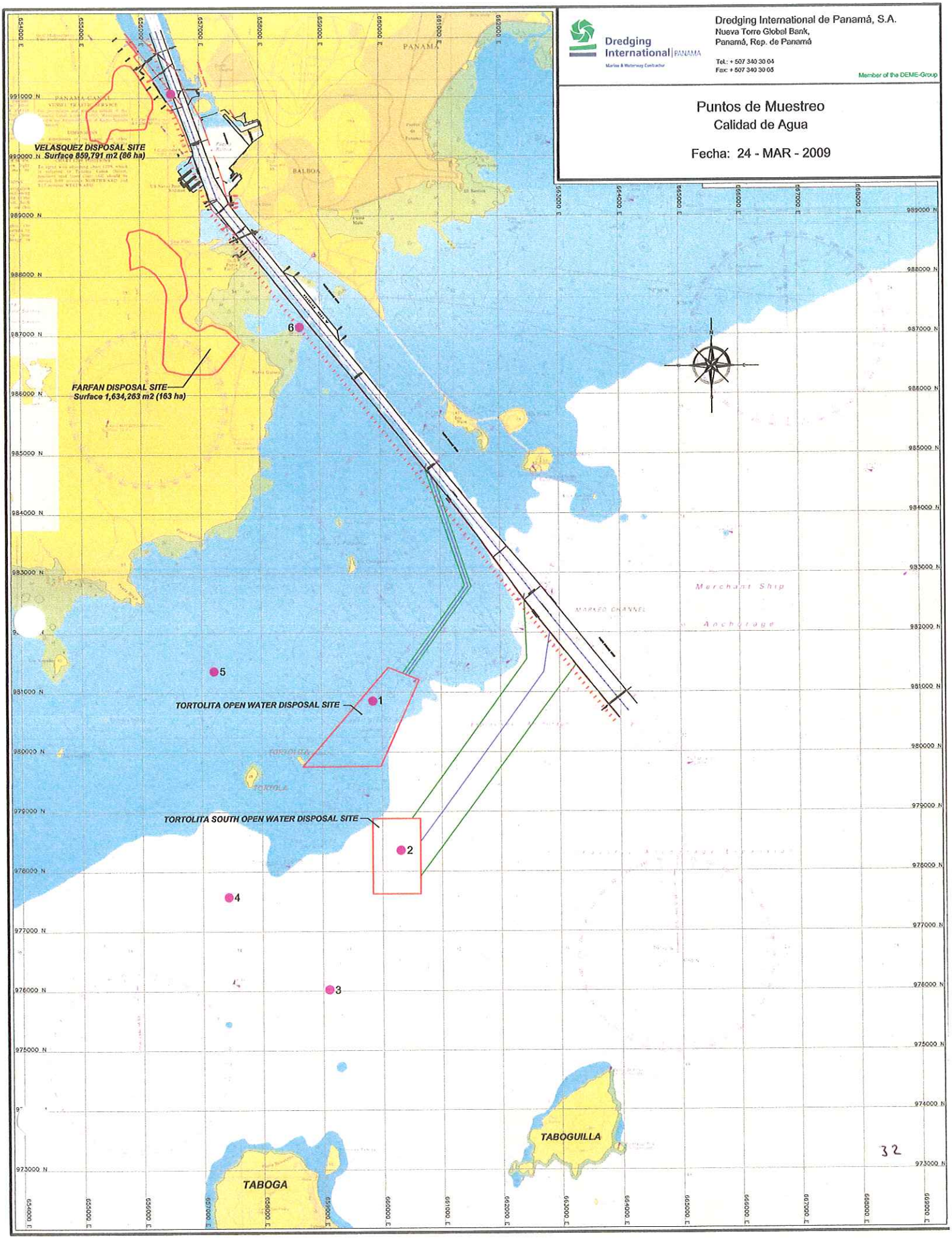


Dredging International de Panamá, S.A.
Nueva Torre Global Bank,
Panamá, Rep. de Panamá
Tel.: + 507 340 30 04
Fax: + 507 340 30 05
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Puntos de Muestreo
Calidad de Agua

Fecha: 25 - FEB - 2009




Dredging International | PANAMA
Marine & Waterway Contractor
Dredging International de Panamá, S.A.
Nueva Torre Global Bank,
Panamá, Rep. de Panamá
Tel.: + 507 340 30 04
Fax: + 507 340 30 05
Member of the DEME-Group
Puntos de Muestreo
Calidad de Agua
Fecha: 24 - MAR - 2009
VELASQUEZ DISPOSAL SITE
Surface 859,791 m2 (86 ha)
FARFAN DISPOSAL SITE
Surface 1,634,263 m2 (163 ha)
TORTOLITA OPEN WATER DISPOSAL SITE
TORTOLITA SOUTH OPEN WATER DISPOSAL SITE
7
6
5
1
2
4
3
PANAMA
BALBOA
Merchant Ship
Anchorage
MARKED CHANNEL
TABOGA
TABOGUILLA
32

ANNEX 2

WATER QUALITY RESULTS ANALYSIS

HELD ON JANUARY TO MARCH 2009.

WATER QUALITY ON TOP - FEB 10th, 2009

Parámetros físico químicos

	Unidad	Method	1WT	2WT	3WT	4WT	5WT	6WT	7WT
pH		SM	8.1	8.1	8.1	8.1	8.1	8.0	8.1
Temperature	C°	SM	25	25	27	27	26	25	26
Suspended solids	mg/L	SM 2540-D	4.0	5.0	6.0	3.0	4.0	6.0	5.0
Disolve oxygen	mg/L	SM 500 O-G	5.6	5.6	5.6	5.5	5.1	5.3	4.7
Turbidity	NTU	SM 2130-B	0.3	0.1	0.1	0.1	0.1	1.1	6.1

Nutrientes

	Unidad	Method	1WT	2WT	3WT	4WT	5WT	6WT	7WT
Amonium	mg/L	SM 4500-NH_3	2.6	2.8	1.3	1.2	1.7	0.7	1.1
Nitrates	mg/L	SM 4500-NO_3^--B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrites	mg/L	SM 4500 NO_2^--B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phosphates	mg/L	SM 4500-P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfates	mg/L	SM 4500 SO_4^{2-} -E	2600.0	2250.0	2400.0	2600.0	2400.0	2250.0	1750.0
Silicates	mg/L	SM 4500-SiO_2-D	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Parámetros orgánicos

	Unidad	Method	1WT	2WT	3WT	4WT	5WT	6WT	7WT
Total Hidrocarbons	mg/L	SM 5520	<0.001	<00.1	<00.1	<0.001	<0.001	<0.001	<0.001
Disolve and suspended halogenated hidrocarbons	mg/L	SM 6630	<0.001	<00.1	<00.1	<0.001	<0.001	<0.001	<0.001
Halogenated pesticides	mg/L	SM 6630	<0.001	<00.1	<00.1	<0.001	<0.001	<0.001	<0.001
Phosforated pesticides	mg/L	EPA 614	<0.001	<00.1	<00.1	<0.001	<0.001	<0.001	<0.001
Total Organic Carbon	mg/L	SM 5310	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Particulated Organic Carbon	mg/L	Oxidación	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Metales

	Unidad	Method	1WT	2WT	3WT	4WT	5WT	6WT	7WT
Ferrum	mg/L	SM 3500 Fe	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	SM 3500 Mn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	SM 3500 As	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/L	SM 3500 Ni	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	mg/L	SM 3500 Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	mg/L	SM 3500 Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	mg/L	SM 3500 Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium	mg/L	SM 3500 Mg	1110.0	950.0	1010.0	1110.0	970.0	950.0	1200.0
Molybdenum	mg/L	SM 3500 Mo	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	mg/L	SM 3500 se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/L	SM 3500 V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	SM 3500 Zn	0.05	0.04	0.05	0.02	0.50	0.03	0.05

WATER QUALITY IN MIDDLE - FEB 10th, 2009

Parámetros físico químicos									
	Unidad	Method	1WM	2WM	3WM	4WM	5WM	6WM	7WM
pH		SM	8.1	8.1	8.1	8.2	8.1	8.0	8.0
Temperature	C°	SM	25	24	25	26.5	25	24.5	24.0
Suspended solids	mg/L	SM 2540-D	3.0	3.0	4.0	3.0	3.0	2.0	3.0
Disolve oxygen	mg/L	SM 500 O-G	5.1	5.0	5.4	5.1	4.7	5.3	4.3
Turbidity	NTU	SM 2130-B	0.1	0.1	0.1	0.1	1.5	1.8	5.1
Nutrientes									
	Unidad	Method	1WM	2WM	3WM	4WM	5WM	6WM	7WM
Amonium	mg/L	SM 4500-NH_3	1.9	2.8	1.5	1.0	1.1	1.5	1.1
Nitrates	mg/L	SM 4500-NO_3^--B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrites	mg/L	SM 4500 NO_2^--B	<0.00	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phosphates	mg/L	SM 4500-P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfates	mg/L	SM 4500 SO_4^{2-} -E	3200.0	2350.0	2650.0	2600.0	2350.0	2250.0	2150.0
Silicates	mg/L	SM 4500-SiO_2-D	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Parámetros orgánicos									
	Unidad	Method	1WM	2WM	3WM	4WM	5WM	6WM	7WM
Total Hidrocarbons	mg/L	SM 5520	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Disolve and suspended halogenated hidrocarbons	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Halogenated pesticides	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Phosforated pesticides	mg/L	EPA 614	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Organic Carbon	mg/L	SM 5310	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Particulated Organic Carbon	mg/L	Oxidación	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Metales									
	Unidad	Method	1WM	2WM	3WM	4WM	5WM	6WM	7WM
Ferrum	mg/L	SM 3500 Fe	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	SM 3500 Mn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	SM 3500 As	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/L	SM 3500 Ni	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	mg/L	SM 3500 Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	mg/L	SM 3500 Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	mg/L	SM 3500 Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium	mg/L	SM 3500 Mg	970.0	900.0	1080.0	1100.0	960.0	950.0	1180.0
Molybdenum	mg/L	SM 3500 Mo	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	mg/L	SM 3500 se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/L	SM 3500 V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	SM 3500 Zn	0.05	0.03	0.05	0.03	0.04	0.02	0.06

WATER QUALITY ON BOTTOM - FEB 10th, 2009

Parámetros físico químicos									
	Unidad	Method	1WB	2WB	3WB	4WB	5WB	6WB	7WB
pH		SM	8.0	8.1	8.1	8.2	8.1	8.0	7.9
Temperature	C°	SM	23.0	23.4	24.0	24.0	25.0	23.5	24.0
Suspended solids	mg/L	SM 2540-D	3.0	2.0	4.0	2.0	3.0	3.0	1.0
Disolve oxygen	mg/L	SM 500 O-G	5.0	4.9	5.2	5.5	5.4	4.4	4.1
Turbidity	NTU	SM 2130-B	0.1	0.1	0.1	0.1	0.1	1.3	15.4
Nutrientes									
	Unidad	Method	1WB	2WB	3WB	4WB	5WB	6WB	7WB
Amonium	mg/L	SM 4500-NH_3	1.5	1.8	2.0	0.8	1.0	1.2	1.5
Nitrates	mg/L	SM 4500-NO_3^--B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrites	mg/L	SM 4500 NO_2^--B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phosphates	mg/L	SM 4500-P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfates	mg/L	SM 4500 SO_4^{2-}-E	2650.0	2350.0	2550.0	2350.0	2300.0	2200.0	2400.0
Silicates	mg/L	SM 4500-SiO_2-D	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Parámetros orgánicos									
	Unidad	Method	1WB	2WB	3WB	4WB	5WB	6WB	7WB
Total Hidrocarbons	mg/L	SM 5520	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Disolve and suspended halogenated hidrocarbons	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Halogenated pesticides	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Phosforated pesticides	mg/L	EPA 614	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Organic Carbon	mg/L	SM 5310	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Particulated Organic Carbon	mg/L	Oxidación	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Metales									
	Unidad	Method	1WB	2WB	3WB	4WB	5WB	6WB	7WB
Ferrum	mg/L	SM 3500 Fe	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	SM 3500 Mn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	SM 3500 As	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/L	SM 3500 Ni	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	mg/L	SM 3500 Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	mg/L	SM 3500 Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	mg/L	SM 3500 Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium	mg/L	SM 3500 Mg	950.0	910.0	1010.0	980.0	980.0	940.0	1200.0
Molybdenum	mg/L	SM 3500 Mo	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	mg/L	SM 3500 se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/L	SM 3500 V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	SM 3500 Zn	0.04	0.01	0.04	0.02	0.04	0.30	0.05

WATER QUALITY AVERAGE - FEB 10th, 2009

Parámetros físico químicos

	Unidad	Method	TOP	MIDDLE	BOTTOM	GLOBAL AVG
pH		SM	8.09	8.09	8.06	8.08
Temperature	C°	SM	25.86	24.86	23.84	24.9
Suspended solids	mg/L	SM 2540-D	4.71	3.00	2.57	3.43
Disolve oxygen	mg/L	SM 500 O-G	5.34	4.99	4.93	5.09
Turbidity	NTU	SM 2130-B	1.13	1.26	2.46	1.61

Nutrientes

	Unidad	Method	TOP	MIDDLE	BOTTOM	AVG
Amonium	mg/L	SM 4500-NH_3	1.63	1.56	1.40	1.5
Nitrates	mg/L	SM 4500-NO_3^--B	<0.1	<0.1	<0.1	<0.1
Nitrites	mg/L	SM 4500 NO_2^--B	<0.01	<0.01	<0.01	<0.01
Phosphates	mg/L	SM 4500-P	<0.1	<0.1	<0.1	<0.1
Sulfates	mg/L	SM 4500 SO_4^{2-}-E	2321.43	2507.14	2400.00	2409.5
Silicates	mg/L	SM 4500-SiO_2-D	<0.1	<0.1	<0.1	<0.1

Parámetros orgánicos

	Unidad	Method	TOP	MIDDLE	BOTTOM	AVG
Total Hidrocarbons	mg/L	SM 5520	<0.001	<0.001	<0.001	<0.001
Disolve and suspended halogenated hidrocarbons	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001
Halogenated pesticides	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001
Phosforated pesticides	mg/L	EPA 614	<0.001	<0.001	<0.001	<0.001
Total Organic Carbon	mg/L	SM 5310	<0.1	<0.1	<0.1	<0.1
Particulated Organic Carbon	mg/L	Oxidación	<0.1	<0.1	<0.1	<0.1

Metales

	Unidad	Method	TOP	MIDDLE	BOTTOM	AVG
Ferrum	mg/L	SM 3500 Fe	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	SM 3500 Mn	0.11	0.04	<0.1	<0.01
Arsenic	mg/L	SM 3500 As	0.00	0.00	<0.1	<0.01
Nickel	mg/L	SM 3500 Ni	0.00	0.00	<0.1	<0.01
Chromium	mg/L	SM 3500 Cr	0.00	0.00	<0.1	<0.01
Copper	mg/L	SM 3500 Cu	0.00	0.00	<0.1	<0.01
Cobalt	mg/L	SM 3500 Co	0.00	0.00	<0.1	<0.01
Magnesium	mg/L	SM 3500 Mg	1042.86	1020.00	995.71	1019.5
Molybdenum	mg/L	SM 3500 Mo	0.00	0.00	<0.1	<0.01
Selenium	mg/L	SM 3500 se	0.00	0.00	<0.1	<0.01
Vanadium	mg/L	SM 3500 V	0.00	0.00	<0.1	<0.01
Zinc	mg/L	SM 3500 Zn	0.11	0.04	0.07	0.07

SECCHI DISK RESULTS - NOV. 26th, 2008 TO FEB 10th, 2009

			Puntos de muestreo							
Fecha	Unidad	Method	1SD	2SD	3SD	4SD	5SD	6SD	7SD	AVG
10-Feb-09	m	Secchi disk	5.5	4.5	6.0	5.0	4.0	2.5	1.5	4.1

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 1WT, 1WM, 1WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 1W**		
			Top Lab # 101-09	**Medium** Lab # 102-09	**Bottom** Lab # 103-09
Sólidos Suspendidos	mg/L	SM 2540-D	4,0	3,0	3,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	5,6	5,1	5,0
Turbiedad	NTU	SM 2130-B	0,3	0,1	0,1

Nutrientes		**Method No.**	**Muestra de agua de mar 1W**		
			Top Lab # 101-09	**Medium** Lab # 102-09	**Bottom** Lab # 103-09
Amonia	mg/L	SM 4500-NH_3	2,6	1,9	1,5
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0, 01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	2600,0	3200,0	2650,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 1W**		
			Top Lab # 101-09	**Medium** Lab # 102-09	**Bottom** Lab # 103-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method

IAQ-45-2009

Profesor Sergio Quintero
Químico

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 1WT, 1WM, 1WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 1W**		
			Top Lab # 101-09	**Medium** Lab # 102-09	**Bottom** Lab # 103-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidación	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 1W**		
			Top Lab # 101-09	**Medium** Lab # 102-09	**Bottom** Lab # 103-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 101-09	Muestra agua de Mar 1WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659907 E 980615 N
Lab # 102-09	Muestra agua de Mar 1WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659907 E 980615 N
Lab # 103-09	Muestra agua de Mar 1WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659907 E 980615 N

SM: Standard Method

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

IAQ 45-2009

Profesor Sergio Quintero
Químico

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 2WT, 2WM, 2WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 104-09	**Medium** Lab # 105-09	**Bottom** Lab # 106-09
Sólidos Suspendidos	mg/L	SM 2540-D	5,0	3,0	2,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	5,6	5,0	4,9
Turbiedad	NTU	SM 2130-B	0,1	0,1	0,1

Nutrientes		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 104-09	**Medium** Lab # 105-09	**Bottom** Lab # 106-09
Amonia	mg/L	SM 4500-NH_3	2,8	2,1	1,8
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	2250,0	2350,0	2350,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 104-09	**Medium** Lab # 105-09	**Bottom** Lab # 106-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method

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INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 2WT, 2WM, 2WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 104-09	**Medium** Lab # 105-09	**Bottom** Lab # 106-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidación	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 104-09	**Medium** Lab # 105-09	**Bottom** Lab # 106-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 104-09	Muestra agua de Mar 2WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	660277 E 978324 N
Lab # 105-09	Muestra agua de Mar 2WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	660277 E 978324 N
Lab # 106-09	Muestra agua de Mar 2WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	660277 E 978324 N

SM: Standard Method

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

IAQ 45-2009

Profesor Sergio Quintero
Químico

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 3WT, 3WM, 3WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab # 107-09	**Medium** Lab # 108-09	**Bottom** Lab # 109-09
Sólidos Suspendidos	mg/L	SM 2540-D	6,0	4,0	4,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	5,6	5,4	5,2
Turbiedad	NTU	SM 2130-B	0,1	0,1	0,1

Nutrientes		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab # 107-09	**Medium** Lab # 108-09	**Bottom** Lab # 109-09
Amonia	mg/L	SM 4500-NH_3	1,3	1,5	2,0
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0, 01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	2400,0	2650,0	2550,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab # 107-09	**Medium** Lab # 108-09	**Bottom** Lab # 109-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method

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Químico

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IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
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Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab # 107-09	**Medium** Lab # 108-09	**Bottom** Lab # 109-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidación	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab # 107-09	**Medium** Lab # 108-09	**Bottom** Lab # 109-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 107-09	Muestra agua de Mar 3WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659066 E 976020 N
Lab # 108-09	Muestra agua de Mar 3WM(Medium) ,Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659066 E 976020 N
Lab # 109-09	Muestra agua de Mar 3WB(Bottom) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659066 E 976020 N

SM: Standard Method

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

IAQ 45-2009

Profesor Sergio Quintero
Químico

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 4WT, 4WM, 4WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 110-09	**Medium** Lab # 111-09	**Bottom** Lab # 112-09
Sólidos Suspendidos	mg/L	SM 2540-D	3,0	3,0	2,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	5,5	5,1	5,5
Turbiedad	NTU	SM 2130-B	0,1	0,1	0,1
Nutrientes		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 110-09	**Medium** Lab # 111-09	**Bottom** Lab # 112-09
Amonia	mg/L	SM 4500-NH_3	1,2	1,0	0,8
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0, 01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	2600,0	2350,0	2350,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1
Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 110-09	**Medium** Lab # 111-09	**Bottom** Lab # 112-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method

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Químico

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 4WT, 4WM, 4WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 110-09	**Medium** Lab # 111-09	**Bottom** Lab # 112-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 110-09	**Medium** Lab # 111-09	**Bottom** Lab # 112-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 110-09	Muestra agua de Mar 4WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657377 E 977583 N
Lab # 111-09	Muestra agua de Mar 4WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657377 E 977583 N
Lab # 112-09	Muestra agua de Mar 4WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657377 E 977583 N

SM: Standard Method

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

IAQ 45-2009

Profesor Sergio Quintero
Químico

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 5WT, 5WM, 5WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 113-09	**Medium** Lab # 114-09	**Bottom** Lab # 115-09
Sólidos Suspendidos	mg/L	SM 2540-D	4,0	3,0	3,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	5,1	4,7	5,4
Turbiedad	NTU	SM 2130-B	0,1	1,5	0,1
Nutrientes		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 113-09	**Medium** Lab # 114-09	**Bottom** Lab # 115-09
Amonia	mg/L	SM 4500-NH_3	1,7	1,1	1,0
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0, 01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	2400,0	2350,0	2300,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1
Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 113-09	**Medium** Lab # 114-09	**Bottom** Lab # 115-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method

IAQ 45-2009

Profesor Sergio Quintero
Químico

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 5WT, 5WM, 5WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 113-09	**Medium** Lab # 114-09	**Bottom** Lab # 115-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidación	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 113-09	**Medium** Lab # 114-09	**Bottom** Lab # 115-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 113-09	Muestra agua de Mar 5WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657214 E 981415 N
Lab # 114-09	Muestra agua de Mar 5WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657214 E 981415 N
Lab # 115-09	Muestra agua de Mar 5WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657214 E 981415 N

SM: Standard Method

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

Profesor Sergio Quintero
Químico

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 6WT, 6WM, 6WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 116-09	**Medium** Lab # 117-09	**Bottom** Lab # 118-09
Sólidos Suspendidos	mg/L	SM 2540-D	6,0	2,0	3,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	5,3	5,3	4,4
Turbiedad	NTU	SM 2130-B	1,1	1,8	1,3

Nutrientes		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 116-09	**Medium** Lab # 117-09	**Bottom** Lab # 118-09
Amonia	mg/L	SM 4500-NH_3	0,7	1,5	1,2
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0, 01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	2000,0	2250,0	2200,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 116-09	**Medium** Lab # 117-09	**Bottom** Lab # 118-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method

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Químico

49

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San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 6WT, 6WM, 6WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 116-09	**Medium** Lab # 117-09	**Bottom** Lab # 118-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidación	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 116-09	**Medium** Lab # 117-09	**Bottom** Lab # 118-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab #116-09	Muestra agua de Mar 6WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	658581 E 987206 N
Lab # 117-09	Muestra agua de Mar 6WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	658581 E 987206 N
Lab # 118-09	Muestra agua de Mar 6WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	658581 E 987206 N

SM: Standard Method

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días.

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Profesor Sergio Quintero
Químico

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 7WT, 7WM, 7WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 119-09	**Medium** Lab # 120-09	**Bottom** Lab #121-09
Sólidos Suspendidos	mg/L	SM 2540-D	5,0	3,0	1,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	4,7	4,3	4,1
Turbiedad	NTU	SM 2130-B	6,1	5,1	15,4

Nutrientes		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 119-09	**Medium** Lab # 120-09	**Bottom** Lab #121-09
Amonia	mg/L	SM 4500-NH_3	1,1	1,1	1,5
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0, 01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	1750,0	2150,0	2400,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 119-09	**Medium** Lab # 120-09	**Bottom** Lab #121-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method

IAQ 45-2009

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Químico

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Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 45-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 7WT, 7WM, 7WB
Fecha de Muestreo	10 de febrero de 2009
Fecha de Informe	18 de febrero de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 119-09	**Medium** Lab # 120-09	**Bottom** Lab #121-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidación	<0,1	<0,1	<0,1
Metales		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 119-09	**Medium** Lab # 120-09	**Bottom** Lab #121-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 119-09	Muestra agua de Mar 7WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	656309 E 991623 N
Lab #120-09	Muestra agua de Mar 7WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	656309 E 991623 N
Lab # 121-09	Muestra agua de Mar 7WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	656309 E 991623 N

SM: Standard Method

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días.

IAQ 45-2009

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Químico

WATER QUALITY ON TOP - FEB 25th, 2009

Parámetros físico químicos

	Unidad	Method	1WT	2WT	3WT	4WT	5WT	6WT	7WT
pH		SM	8.4	8.3	8.4	8.2	8.3	8.2	8.2
Temperature	C°	SM	31.5	32	30.2	30.4	30.3	30.3	29.2
Suspended solids	mg/L	SM 2540-D	12.0	8.0	20.0	15.0	18.0	13.0	18.0
Disolve oxygen	mg/L	SM 500 O-G	7.5	6.9	7.4	7.8	10.8	5.6	4.4
Turbidity	NTU	SM 2130-B	0.3	0.1	0.1	0.1	0.1	0.7	0.5

Nutrientes

	Unidad	Method	1WT	2WT	3WT	4WT	5WT	6WT	7WT
Amonium	mg/L	SM 4500-NH_3	2.6	2.5	4.5	0.7	1.2	1.5	1.3
Nitrates	mg/L	SM 4500-NO_3^--B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrites	mg/L	SM 4500 NO_2^--B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phosphates	mg/L	SM 4500-P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfates	mg/L	SM 4500 SO_4^{2-} -E	2450.0	3250.0	3500.0	4000.0	3100.0	1550.0	2900.0
Silicates	mg/L	SM 4500-SiO_2-D	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Parámetros orgánicos

	Unidad	Method	1WT	2WT	3WT	4WT	5WT	6WT	7WT
Total Hidrocarbons	mg/L	SM 5520	<0.001	<00.1	<00.1	<0.001	<0.001	<0.001	<0.001
Disolve and suspended halogenated hidrocarbons	mg/L	SM 6630	<0.001	<00.1	<00.1	<0.001	<0.001	<0.001	<0.001
Halogenated pesticides	mg/L	SM 6630	<0.001	<00.1	<00.1	<0.001	<0.001	<0.001	<0.001
Phosforated pesticides	mg/L	EPA 614	<0.001	<00.1	<00.1	<0.001	<0.001	<0.001	<0.001
Total Organic Carbon	mg/L	SM 5310	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Particulated Organic Carbon	mg/L	Oxidación	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Metales

	Unidad	Method	1WT	2WT	3WT	4WT	5WT	6WT	7WT
Ferrum	mg/L	SM 3500 Fe	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	SM 3500 Mn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	SM 3500 As	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/L	SM 3500 Ni	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	mg/L	SM 3500 Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	mg/L	SM 3500 Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	mg/L	SM 3500 Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium	mg/L	SM 3500 Mg	1308.3	1294.0	1049.7	1428.8	1471.6	1166.4	1234.4
Molybdenum	mg/L	SM 3500 Mo	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	mg/L	SM 3500 se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/L	SM 3500 V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	SM 3500 Zn	0.05	0.03	0.04	0.04	0.04	0.06	0.06

WATER QUALITY IN MIDDLE - FEB 25th, 2009

Parámetros físico químicos									
	Unidad	Method	1WM	2WM	3WM	4WM	5WM	6WM	7WM
pH		SM	8.2	8.3	8.2	8.3	8.3	8.2	8.1
Temperature	C°	SM	30.5	30.7	28.7	28.1	29.2	28.7	27.5
Suspended solids	mg/L	SM 2540-D	16.0	12.0	26.0	6.0	4.0	5.0	8.0
Disolve oxygen	mg/L	SM 500 O-G	5.2	3.9	4.4	2.6	8.6	6.6	2.0
Turbidity	NTU	SM 2130-B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nutrientes									
	Unidad	Method	1WM	2WM	3WM	4WM	5WM	6WM	7WM
Amonium	mg/L	SM 4500-NH_3	2.9	3.5	0.8	0.8	1.5	1.6	1.6
Nitrates	mg/L	SM 4500-NO_3^--B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrites	mg/L	SM 4500 NO_2^--B	<0.00	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phosphates	mg/L	SM 4500-P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfates	mg/L	SM 4500 SO_4^{2-} -E	2450.0	4000.0	4000.0	2100.0	2750.0	1450.0	3650.0
Silicates	mg/L	SM 4500-SiO_2-D	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Parámetros orgánicos									
	Unidad	Method	1WM	2WM	3WM	4WM	5WM	6WM	7WM
Total Hidrocarbons	mg/L	SM 5520	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Disolve and suspended halogenated hidrocarbons	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Halogenated pesticides	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Phosforated pesticides	mg/L	EPA 614	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Organic Carbon	mg/L	SM 5310	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Particulated Organic Carbon	mg/L	Oxidación	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Metales									
	Unidad	Method	1WM	2WM	3WM	4WM	5WM	6WM	7WM
Ferrum	mg/L	SM 3500 Fe	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	SM 3500 Mn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	SM 3500 As	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/L	SM 3500 Ni	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	mg/L	SM 3500 Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	mg/L	SM 3500 Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	mg/L	SM 3500 Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium	mg/L	SM 3500 Mg	1300.6	1370.6	1100.2	1451.2	1485.4	1180.1	1259.8
Molybdenum	mg/L	SM 3500 Mo	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	mg/L	SM 3500 se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/L	SM 3500 V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	SM 3500 Zn	0.05	0.03	0.05	0.03	0.05	0.05	0.06

WATER QUALITY ON BOTTOM - FEB 25th, 2009

Parámetros físico químicos									
	Unidad	Method	1WB	2WB	3WB	4WB	5WB	6WB	7WB
pH		SM	8.1	8.3	8.3	8.3	8.3	8.1	8.1
Temperature	C°	SM	33.1	28.5	28.1	27.2	28.8	27.7	27.4
Suspended solids	mg/L	SM 2540-D	10.0	14.0	16.0	10.0	21.0	8.0	7.0
Disolve oxygen	mg/L	SM 500 O-G	4.8	1.3	1.8	2.5	6.8	5.6	1.6
Turbidity	NTU	SM 2130-B	0.1	0.1	0.1	0.1	0.1	1.5	0.1
Nutrientes									
	Unidad	Method	1WB	2WB	3WB	4WB	5WB	6WB	7WB
Amonium	mg/L	SM 4500-NH_3	2.2	3.5	0.7	1.6	0.6	1.2	1.2
Nitrates	mg/L	SM 4500-NO_3^--B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrites	mg/L	SM 4500 NO_2^--B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phosphates	mg/L	SM 4500-P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfates	mg/L	SM 4500 SO_4^{2-} -E	3750.0	3000.0	3750.0	3400.0	2300.0	2200.0	3300.0
Silicates	mg/L	SM 4500-SiO_2-D	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Parámetros orgánicos									
	Unidad	Method	1WB	2WB	3WB	4WB	5WB	6WB	7WB
Total Hidrocarbons	mg/L	SM 5520	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Disolve and suspended halogenated hidrocarbons	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Halogenated pesticides	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Phosforated pesticides	mg/L	EPA 614	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Organic Carbon	mg/L	SM 5310	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Particulated Organic Carbon	mg/L	Oxidación	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Metales									
	Unidad	Method	1WB	2WB	3WB	4WB	5WB	6WB	7WB
Ferrum	mg/L	SM 3500 Fe	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	SM 3500 Mn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	SM 3500 As	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/L	SM 3500 Ni	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	mg/L	SM 3500 Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	mg/L	SM 3500 Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	mg/L	SM 3500 Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium	mg/L	SM 3500 Mg	1325.7	1325.8	1125.0	1481.9	1496.6	1195.5	1286.9
Molybdenum	mg/L	SM 3500 Mo	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	mg/L	SM 3500 se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/L	SM 3500 V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	SM 3500 Zn	0.05	0.03	0.05	0.03	0.04	0.05	0.06

55

WATER QUALITY AVERAGE - FEB 25th, 2009

Parámetros físico químicos						
	Unidad	Method	TOP	MIDDLE	BOTTOM	GLOBAL AVG
pH		SM	8.29	8.23	8.21	8.24
Temperature	C°	SM	30.56	29.06	28.69	29.4
Suspended solids	mg/L	SM 2540-D	14.86	11.00	12.29	12.71
Disolve oxygen	mg/L	SM 500 O-G	7.20	4.76	3.49	5.15
Turbidity	NTU	SM 2130-B	0.27	0.10	0.30	0.22

Nutrientes						
	Unidad	Method	TOP	MIDDLE	BOTTOM	AVG
Amonium	mg/L	SM 4500-NH_3	2.04	1.81	1.57	1.8
Nitrates	mg/L	SM 4500-NO_3^--B	<0.1	<0.1	<0.1	<0.1
Nitrites	mg/L	SM 4500 NO_2^--B	<0.01	<0.01	<0.01	<0.01
Phosphates	mg/L	SM 4500-P	<0.1	<0.1	<0.1	<0.1
Sulfates	mg/L	SM 4500 SO_4^{2-} -E	2964.29	2914.29	3100.00	2992.9
Silicates	mg/L	SM 4500-SiO_2-D	<0.1	<0.1	<0.1	<0.1

Parámetros orgánicos						
	Unidad	Method	TOP	MIDDLE	BOTTOM	AVG
Total Hidrocarbons	mg/L	SM 5520	<0.001	<0.001	<0.001	<0.001
Disolve and suspended halogenated hidrocarbons	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001
Halogenated pesticides	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001
Phosforated pesticides	mg/L	EPA 614	<0.001	<0.001	<0.001	<0.001
Total Organic Carbon	mg/L	SM 5310	<0.1	<0.1	<0.1	<0.1
Particulated Organic Carbon	mg/L	Oxidación	<0.1	<0.1	<0.1	<0.1

Metales						
	Unidad	Method	TOP	MIDDLE	BOTTOM	AVG
Ferrum	mg/L	SM 3500 Fe	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	SM 3500 Mn	0.05	0.05	<0.1	<0.01
Arsenic	mg/L	SM 3500 As	0.00	0.00	<0.1	<0.01
Nickel	mg/L	SM 3500 Ni	0.00	0.00	<0.1	<0.01
Chromium	mg/L	SM 3500 Cr	0.00	0.00	<0.1	<0.01
Copper	mg/L	SM 3500 Cu	0.00	0.00	<0.1	<0.01
Cobalt	mg/L	SM 3500 Co	0.00	0.00	<0.1	<0.01
Magnesium	mg/L	SM 3500 Mg	1279.03	1306.84	1319.63	1301.8
Molybdenum	mg/L	SM 3500 Mo	0.00	0.00	<0.1	<0.01
Selenium	mg/L	SM 3500 se	0.00	0.00	<0.1	<0.01
Vanadium	mg/L	SM 3500 V	0.00	0.00	<0.1	<0.01
Zinc	mg/L	SM 3500 Zn	0.05	0.05	0.04	0.05

25

SECCHI DISK RESULTS - NOV. 26th, 2008 TO FEB 25th, 2009

			Puntos de muestreo							
Fecha	**Unidad**	**Method**	**1SD**	**2SD**	**3SD**	**4SD**	**5SD**	**6SD**	**7SD**	**AVG**
25-Feb-09	m	Secchi disk	2.0	2.0	2.0	2.0	2.0	1.5	2.0	1.9

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Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 1WT, 1WM, 1WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 1W**		
			Top Lab # 229-09	**Medium** Lab # 230-09	**Bottom** Lab # 231-09
Sólidos Suspendidos	mg/L	SM 2540-D	12,0	16,0	10,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	7,5	5,2	4,8
Turbiedad	NTU	SM 2130-B	0,3	0,1	0,1

Nutrientes		**Method No.**	**Muestra de agua de mar 1W**		
			Top Lab # 229-09	**Medium** Lab # 230-09	**Bottom** Lab # 231-09
Amonia	mg/L	SM 4500-NH_3	2,6	2,9	2,2
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0.01	<0.01	<0.01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	2450,0	4000,0	3750,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 1W**		
			Top Lab # 229-09	**Medium** Lab # 230-09	**Bottom** Lab # 231-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

NMP: Número Más Probable **SM:** Standard Method

IAQ 69-2009

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Químico

5 8

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Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 1WT, 1WM, 1WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 1W**		
			Top Lab # 229-09	**Medium** Lab # 230-09	**Bottom** Lab # 231-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidación	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 1W**		
			Top Lab # 229-09	**Medium** Lab # 230-09	**Bottom** Lab # 231-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,01	<0,01
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1308,3	1300,6	1325,7
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,05	0,05	0,05

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 229-09	Muestra agua de Mar 1WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659768E 980772N
Lab # 230-09	Muestra agua de Mar 1WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659768E 980772N
Lab # 231-09	Muestra agua de Mar 1WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659768E 980772N

SM: Standard Method

IAQ 69-2009

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Químico

59

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Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 2WT, 2WM, 2WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 232-09	**Medium** Lab # 233-09	**Bottom** Lab # 234-09
Sólidos Suspendidos	mg/L	SM 2540-D	8,0	12,0	14,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	6,8	3,9	1,3
Turbiedad	NTU	SM 2130-B	0,1	0,1	0,1

Nutrientes		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 232-09	**Medium** Lab # 233-09	**Bottom** Lab # 234-09
Amonia	mg/L	SM 4500-NH_3	2,5	3,5	3,2
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	3250,0	4000,0	3000,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 232-09	**Medium** Lab # 233-09	**Bottom** Lab # 234-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

NMP: Número Más Probable **SM:** Standard Method

IAQ 69-2009

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Químico

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Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 2WT, 2WM, 2WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 232-09	**Medium** Lab # 233-09	**Bottom** Lab # 234-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 232-09	**Medium** Lab # 233-09	**Bottom** Lab # 234-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1294,0	1370,6	1325,8
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,03	0,03	0,03

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 232-09	Muestra agua de Mar 2WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	660167E 978412N
Lab # 233-09	Muestra agua de Mar 2WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	660167E 978412N
Lab # 234-09	Muestra agua de Mar 2WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	660167E 978412N

SM: Standard Method

IAQ 69-2009

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Químico

61

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Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 3WT, 3WM, 3WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab #235-09	**Medium** Lab # 236-09	**Bottom** Lab # 237-09
Sólidos Suspendidos	mg/L	SM 2540-D	20,0	26,0	16,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	7,4	4,4	1,8
Turbiedad	NTU	SM 2130-B	0,1	0,1	0,1

Nutrientes		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab #235-09	**Medium** Lab # 236-09	**Bottom** Lab # 237-09
Amonia	mg/L	SM 4500-NH_3	4,5	0,8	0,7
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	3500,0	4000.0	3750,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab #235-09	**Medium** Lab # 236-09	**Bottom** Lab # 237-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

NMP: Número Más Probable **SM:** Standard Method

IAQ 69-2009

Profesor Sergio Quintero
Químico

62

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.
Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 3WT, 3WM, 3WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab #235-09	**Medium** Lab # 236-09	**Bottom** Lab # 237-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab #235-09	**Medium** Lab # 236-09	**Bottom** Lab # 237-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1049,7	1100,2	1125,0
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,04	0,05	0,04

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 235-09	Muestra agua de Mar 3WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659077E 976084N
Lab # 236-09	Muestra agua de Mar 3WM(Medium) ,Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659077E 976084N
Lab # 237-09	Muestra agua de Mar 3WB(Bottom) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659077E 976084N

SM: Standard Metho

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Químico

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 4WT, 4WM, 4WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 238-09	**Medium** Lab # 239-09	**Bottom** Lab # 240-09
Sólidos Suspendidos	mg/L	SM 2540-D	15,0	6,0	10,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	7,8	2,6	2,5
Turbiedad	NTU	SM 2130-B	0,1	0,1	0,1
Nutrientes		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 238-09	**Medium** Lab # 239-09	**Bottom** Lab # 240-09
Amonia	mg/L	SM 4500-NH_3	0,7	0,8	1,6
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	4000,0	2100,0	3400,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1
Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 238-09	**Medium** Lab # 239-09	**Bottom** Lab # 240-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

NMP: Número Más Probable **SM:** Standard Method

IAQ-69-2009

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Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 4WT, 4WM, 4WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 238-09	**Medium** Lab # 239-09	**Bottom** Lab # 240-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 238-09	**Medium** Lab # 239-09	**Bottom** Lab # 240-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1428,8	1451,2	1481,9
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,04	0,03	0,03

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 238-09	Muestra agua de Mar 4WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657453N 977435E
Lab # 239-09	Muestra agua de Mar 4WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657453N 977435E
Lab # 240-09	Muestra agua de Mar 4WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657453N 977435E

SM: Standard Method

IAQ 69-2009

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Químico

65

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Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 5WT, 5WM, 5WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 241-09	**Medium** Lab # 242-09	**Bottom** Lab # 243-09
Sólidos Suspendidos	mg/L	SM 2540-D	18,0	4,0	21,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	10,8	8,6	6,8
Turbiedad	NTU	SM 2130-B	0,1	0,1	0,1
Nutrientes		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 241-09	**Medium** Lab # 242-09	**Bottom** Lab # 243-09
Amonia	mg/L	SM 4500-NH_3	1,2	1,5	0,6
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	3100,0	2750,0	2300,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1
Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 241-09	**Medium** Lab # 242-09	**Bottom** Lab # 243-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

NMP: Número Más Probable **SM:** Standard Method

IAQ 69-2009

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Químico

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Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 5WT, 5WM, 5WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 241-09	**Medium** Lab # 242-09	**Bottom** Lab # 243-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,01	<0,01	<0,01

Metales		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 241-09	**Medium** Lab # 242-09	**Bottom** Lab # 243-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1471,6	1485,4	1496,6
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,04	0,05	0,04

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 241-09	Muestra agua de Mar 5WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657264E 981392N
Lab # 242-09	Muestra agua de Mar 5WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657264E 981392N
Lab # 243-09	Muestra agua de Mar 5WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657264E 981392N

SM: Standard Method

IAQ69-2009

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Químico

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 6WT, 6WM, 6WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 244-09	**Medium** Lab # 245-09	**Bottom** Lab # 246-09
Sólidos Suspendidos	mg/L	SM 2540-D	13,0	5,0	8,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	5,6	6,6	5,6
Turbiedad	NTU	SM 2130-B	0,7	0,1	1,5
Nutrientes		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 244-09	**Medium** Lab # 245-09	**Bottom** Lab # 246-09
Amonia	mg/L	SM 4500-NH_3	1,5	1,6	1,2
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	1550,0	1450,0	2200,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1
Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 244-09	**Medium** Lab # 245-09	**Bottom** Lab # 246-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

NMP: Número Más Probable **SM:** Standard Method

IAQ 69-2009

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Químico

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 6WT, 6WM, 6WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 244-09	**Medium** Lab # 245-09	**Bottom** Lab # 246-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,01	<0,01	<0,01

Metales		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 244-09	**Medium** Lab # 245-09	**Bottom** Lab # 246-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1166,4	1180,1	1195,5
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,06	0,05	0,05

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 244-09	Muestra agua de Mar 6WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	658629E 987163N
Lab # 245-09	Muestra agua de Mar 6WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	658629E 987163N
Lab # 246-09	Muestra agua de Mar 6WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	658629E 987163N

SM: Standard Method

IAQ 69-2009

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Químico

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 7WT, 7WM, 7WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 247-09	**Medium** Lab # 248-09	**Bottom** Lab # 249-09
Sólidos Suspendidos	mg/L	SM 2540-D	18,0	8,0	7,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	4,4	2,0	1,6
Turbiedad	NTU	SM 2130-B	0,5	0,1	0,1
Nutrientes		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 247-09	**Medium** Lab # 248-09	**Bottom** Lab # 249-09
Amonia	mg/L	SM 4500-NH_3	1,3	1,6	1,2
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	2900,0	3650,0	3300,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	0,1	<0,1
Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 247-09	**Medium** Lab # 248-09	**Bottom** Lab # 249-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

NMP: Número Más Probable **SM:** Standard Method

IAQ 69-2009

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Químico

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS DE AGUA

IAQ 69-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Muestra	Tres muestras de agua de mar 7WT, 7WM, 7WB
Fecha de Muestreo	25 de febrero de 2009
Fecha de Informe	3 de marzo de 2009
Lugar	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 247-09	**Medium** Lab # 248-09	**Bottom** Lab # 249-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 247-09	**Medium** Lab # 248-09	**Bottom** Lab # 249-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1234,4	1259,8	1286,9
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,06	0,06	0,06

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 247-09	Muestra agua de Mar 7WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	656267E 991612N
Lab # 248-09	Muestra agua de Mar 7WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	656267E 991612N
Lab # 249-09	Muestra agua de Mar 7WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	656267E 991612N

SM: Standard Method

IAQ 69-2009

Profesor Sergio Quintero
Químico

71

WATER QUALITY ON TOP - MAR 24th, 2009

Parámetros físico químicos									
	Unidad	Method	1WT	2WT	3WT	4WT	5WT	6WT	7WT
pH		SM	8.00	8.00	8.10	8.10	8.10	7.90	7.90
Temperature	C°	SM	25.40	28.60	27.50	26.40	27.10	26.90	27.30
Suspended solids	mg/L	SM 2540-D	17.00	3.00	32.00	8.00	20.00	10.00	20.00
Disolve oxygen	mg/L	SM 500 O-G	5.07	4.93	5.90	6.24	5.61	3.88	3.82
Turbidity	NTU	SM 2130-B	1.20	1.00	0.90	0.10	1.10	4.40	5.50
Nutrientes									
	Unidad	Method	1WT	2WT	3WT	4WT	5WT	6WT	7WT
Amonium	mg/L	SM 4500-NH_3	2.3	1.6	2.9	1.2	2.0	2.5	2.8
Nitrates	mg/L	SM 4500-NO_3^--B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrites	mg/L	SM 4500 NO_2^--B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phosphates	mg/L	SM 4500-P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfates	mg/L	SM 4500 SO_4^{2-} -E	3450.0	3250.0	3450.0	2600.0	2250.0	2350.0	2150.0
Silicates	mg/L	SM 4500-SiO_2-D	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Parámetros orgánicos									
	Unidad	Method	1WT	2WT	3WT	4WT	5WT	6WT	7WT
Total Hidrocarbons	mg/L	SM 5520	<0.001	<00.1	<00.1	<0.001	<0.001	<0.001	<0.001
Disolve and suspended halogenated hidrocarbons	mg/L	SM 6630	<0.001	<00.1	<00.1	<0.001	<0.001	<0.001	<0.001
Halogenated pesticides	mg/L	SM 6630	<0.001	<00.1	<00.1	<0.001	<0.001	<0.001	<0.001
Phosforated pesticides	mg/L	EPA 614	<0.001	<00.1	<00.1	<0.001	<0.001	<0.001	<0.001
Total Organic Carbon	mg/L	SM 5310	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Particulated Organic Carbon	mg/L	Oxidación	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Metales									
	Unidad	Method	1WT	2WT	3WT	4WT	5WT	6WT	7WT
Ferrum	mg/L	SM 3500 Fe	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	SM 3500 Mn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	SM 3500 As	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/L	SM 3500 Ni	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	mg/L	SM 3500 Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	mg/L	SM 3500 Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	mg/L	SM 3500 Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium	mg/L	SM 3500 Mg	1399.6	1234.4	1108.1	1156.7	1185.8	1040.0	923.4
Molybdenum	mg/L	SM 3500 Mo	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	mg/L	SM 3500 se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/L	SM 3500 V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	SM 3500 Zn	0.04	0.03	0.04	0.03	0.05	0.05	0.06

WATER QUALITY ON MIDDLE - MAR 24th, 2009

Parámetros físico químicos									
	Unidad	Method	1WM	2WM	3WM	4WM	5WM	6WM	7WM
pH		SM	8.00	8.00	8.00	8.10	8.00	7.90	7.90
Temperature	C°	SM	25.10	26.20	24.50	24.90	25.10	25.30	24.60
Suspended solids	mg/L	SM 2540-D	11.00	7.00	28.00	19.00	5.00	34.00	2.00
Disolve oxygen	mg/L	SM 500 O-G	5.03	4.84	3.73	5.37	4.95	3.55	2.28
Turbidity	NTU	SM 2130-B	1.20	0.10	0.20	0.10	0.10	2.60	3.60
Nutrientes									
	Unidad	Method	1WM	2WM	3WM	4WM	5WM	6WM	7WM
Amonium	mg/L	SM 4500-NH_3	2.0	2.0	2.5	0.8	1.2	1.8	1.4
Nitrates	mg/L	SM 4500-NO_3^--B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrites	mg/L	SM 4500 NO_2^--B	<0.00	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phosphates	mg/L	SM 4500-P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfates	mg/L	SM 4500 SO_4^{2-} -E	2750.0	2750.0	2550.0	2700.0	2700.0	2650.0	2150.0
Silicates	mg/L	SM 4500-SiO_2-D	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Parámetros orgánicos									
	Unidad	Method	1WM	2WM	3WM	4WM	5WM	6WM	7WM
Total Hidrocarbons	mg/L	SM 5520	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Disolve and suspended halogenated hidrocarbons	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Halogenated pesticides	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Phosforated pesticides	mg/L	EPA 614	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Organic Carbon	mg/L	SM 5310	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Particulated Organic Carbon	mg/L	Oxidación	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Metales									
	Unidad	Method	1WM	2WM	3WM	4WM	5WM	6WM	7WM
Ferrum	mg/L	SM 3500 Fe	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	SM 3500 Mn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	SM 3500 As	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/L	SM 3500 Ni	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	mg/L	SM 3500 Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	mg/L	SM 3500 Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	mg/L	SM 3500 Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium	mg/L	SM 3500 Mg	1335.5	1200.0	1100.0	1200.0	1155.7	1132.5	1050.4
Molybdenum	mg/L	SM 3500 Mo	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	mg/L	SM 3500 se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/L	SM 3500 V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	SM 3500 Zn	0.05	0.04	0.04	0.03	0.05	0.04	0.05

WATER QUALITY ON BOTTOM - MAR 24th, 2009

Parámetros físico químicos									
	Unidad	Method	1WB	2WB	3WB	4WB	5WB	6WB	7WB
pH		SM	7.90	7.90	7.90	7.90	7.90	7.80	7.80
Temperature	C°	SM	23.90	24.00	22.90	23.60	23.90	23.90	23.60
Suspended solids	mg/L	SM 2540-D	9.00	11.00	20.00	26.00	28.00	14.00	25.00
Disolve oxygen	mg/L	SM 500 O-G	3.45	3.01	2.17	2.69	3.21	3.13	2.52
Turbidity	NTU	SM 2130-B	0.50	0.50	1.20	2.50	0.50	2.00	3.40
Nutrientes									
	Unidad	Method	1WB	2WB	3WB	4WB	5WB	6WB	7WB
Amonium	mg/L	SM 4500-NH_3	2.1	1.7	1.0	1.5	0.9	1.8	2.0
Nitrates	mg/L	SM 4500-NO_3^--B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrites	mg/L	SM 4500 NO_2^--B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phosphates	mg/L	SM 4500-P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfates	mg/L	SM 4500 SO_4^{2-} -E	2850.0	2800.0	2000.0	2700.0	2950.0	2500.0	2100.0
Silicates	mg/L	SM 4500-SiO_2-D	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Parámetros orgánicos									
	Unidad	Method	1WB	2WB	3WB	4WB	5WB	6WB	7WB
Total Hidrocarbons	mg/L	SM 5520	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Disolve and suspended halogenated hidrocarbons	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Halogenated pesticides	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Phosforated pesticides	mg/L	EPA 614	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Organic Carbon	mg/L	SM 5310	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Particulated Organic Carbon	mg/L	Oxidación	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Metales									
	Unidad	Method	1WB	2WB	3WB	4WB	5WB	6WB	7WB
Ferrum	mg/L	SM 3500 Fe	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	SM 3500 Mn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	SM 3500 As	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/L	SM 3500 Ni	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	mg/L	SM 3500 Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	mg/L	SM 3500 Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	mg/L	SM 3500 Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium	mg/L	SM 3500 Mg	1400.0	1250.0	1180.0	1192.5	1225.6	1250.0	1050.4
Molybdenum	mg/L	SM 3500 Mo	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	mg/L	SM 3500 se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/L	SM 3500 V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	SM 3500 Zn	0.04	0.03	0.05	0.03	0.04	0.04	0.05

WATER QUALITY AVERAGE - MAR 24th, 2009

Parámetros físico químicos						
	Unidad	Method	TOP	MIDDLE	BOTTOM	GLOBAL AVG
pH		SM	8.01	7.99	7.87	7.96
Temperature	C°	SM	27.03	25.10	23.69	25.3
Suspended solids	mg/L	SM 2540-D	15.71	15.14	19.00	16.62
Disolve oxygen	mg/L	SM 500 O-G	5.06	4.25	2.88	4.07
Turbidity	NTU	SM 2130-B	2.03	1.13	1.51	1.56

Nutrientes						
	Unidad	Method	TOP	MIDDLE	BOTTOM	AVG
Amonium	mg/L	SM 4500-NH_3	2.19	1.67	1.57	1.8
Nitrates	mg/L	SM 4500-NO_3^--B	<0.1	<0.1	<0.1	<0.1
Nitrites	mg/L	SM 4500 NO_2^--B	<0.01	<0.01	<0.01	<0.01
Phosphates	mg/L	SM 4500-P	<0.1	<0.1	<0.1	<0.1
Sulfates	mg/L	SM 4500 SO_4^{2-}-E	2785.71	2607.14	2557.14	2650.0
Silicates	mg/L	SM 4500-SiO_2-D	<0.1	<0.1	<0.1	<0.1

Parámetros orgánicos						
	Unidad	Method	TOP	MIDDLE	BOTTOM	AVG
Total Hidrocarbons	mg/L	SM 5520	<0.001	<0.001	<0.001	<0.001
Disolve and suspended halogenated hidrocarbons	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001
Halogenated pesticides	mg/L	SM 6630	<0.001	<0.001	<0.001	<0.001
Phosforated pesticides	mg/L	EPA 614	<0.001	<0.001	<0.001	<0.001
Total Organic Carbon	mg/L	SM 5310	<0.1	<0.1	<0.1	<0.1
Particulated Organic Carbon	mg/L	Oxidación	<0.1	<0.1	<0.1	<0.1

Metales						
	Unidad	Method	TOP	MIDDLE	BOTTOM	AVG
Ferrum	mg/L	SM 3500 Fe	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	SM 3500 Mn	0.04	0.04	<0.1	<0.01
Arsenic	mg/L	SM 3500 As	0.00	0.00	<0.1	<0.01
Nickel	mg/L	SM 3500 Ni	0.00	0.00	<0.1	<0.01
Chromium	mg/L	SM 3500 Cr	0.00	0.00	<0.1	<0.01
Copper	mg/L	SM 3500 Cu	0.00	0.00	<0.1	<0.01
Cobalt	mg/L	SM 3500 Co	0.00	0.00	<0.1	<0.01
Magnesium	mg/L	SM 3500 Mg	1149.71	1167.73	1221.21	1179.6
Molybdenum	mg/L	SM 3500 Mo	0.00	0.00	<0.1	<0.01
Selenium	mg/L	SM 3500 se	0.00	0.00	<0.1	<0.01
Vanadium	mg/L	SM 3500 V	0.00	0.00	<0.1	<0.01
Zinc	mg/L	SM 3500 Zn	0.04	0.04	0.04	0.04

SECCHI DISK RESULTS - FEB. 10th TO MAR 24th, 2009

			Puntos de muestreo							
Fecha	Unidad	Method	1SD	2SD	3SD	4SD	5SD	6SD	7SD	AVG
10-Feb-09	m	Secchi disk	3.0	3.5	3.5	3.5	2.5	2.0	1.0	2.7
25-Feb-09	m	Secchi disk	2.0	2.0	2.0	2.0	2.0	1.5	2.0	1.9
24-Mar-09	m	Secchi disk	2.5	2.5	3.0	2.5	2.5	1.5	1.0	2.2

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá		
Proyecto	Proyecto de Ampliación del Canal de Panamá		
Fecha de Informe	31 de marzo de 2009		
Fecha de Muestreo	24 de marzo de 2009		
Muestras	Tres muestras de agua de mar 1WT, 1WM, 1WB		
Procedimiento de Muestreo Utilizado	---		
Muestreo realizado por	---		
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá		
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia		
Condiciones Ambientales del Laboratorio	**T°**=22,9°C	**H**=49,0%	

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 1W**		
			Top Lab # 364-09	**Medium** Lab # 365-09	**Bottom** Lab # 366-09
Sólidos Suspendidos	mg/L	SM 2540-D	17,0	11,0	9,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	*	*	*
Turbiedad	NTU	SM 2130-B	1,2	1,3	0,5
Nutrientes		**Method No.**	**Top** Lab # 364-09	**Medium** Lab # 365-09	**Bottom** Lab #366-09
Amonia	mg/L	SM 4500-NH_3	2,3	2,0	2,1
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	3450,0	2750,0	2850,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1
Parámetros Orgánicos		**Method No.**	**Top** Lab # 364-09	**Medium** Lab # 365-09	**Bottom** Lab # 366-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method *Datos tomados en campo

IAQ 112-2009

Profesor Sergio Quintero
Químico

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá
Proyecto	Proyecto de Ampliación del Canal de Panamá
Fecha de Informe	31 de marzo de 2009
Fecha de Muestreo	24 de marzo de 2009
Muestras	Tres muestras de agua de mar 1WT, 1WM, 1WB
Procedimiento de Muestreo Utilizado	---
Muestreo realizado por	---
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia
Condiciones Ambientales del Laboratorio	T°=22,9°C H=49,0%

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 1W**		
			Top Lab # 364-09	**Medium** Lab # 365-09	**Bottom** Lab # 366-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidación	<0,1	<0,1	<0,1
Metales		**Method No.**	**Muestra de agua de mar 1 W**		
			Top Lab # 364-09	**Medium** Lab # 365-09	**Bottom** Lab # 366-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1399,6	1335,5	1400,0
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,04	0,05	0,04

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 364-09	Muestra agua de Mar 1WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659842 980861
Lab # 365-09	Muestra agua de Mar 1WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659842 980861
Lab # 366-09	Muestra agua de Mar 1WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659842 980861

SM: Standard Method **NMP:** Número Más Probable

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

SM: Standard Method

IAQ 112-2009

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Químico

78

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá		
Proyecto	Proyecto de Ampliación del Canal de Panamá		
Fecha de Informe	31 de marzo de 2009		
Fecha de Muestreo	24 de marzo de 2009		
Muestra	Tres muestras de agua de mar 2WT, 2WM, 2WB		
Procedimiento de Muestreo Utilizado	---		
Muestreo realizado por	---		
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá		
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia		
Condiciones Ambientales del Laboratorio	**T°**=22,9°C	**H**=49,0%	

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 367-09	**Medium** Lab # 368-09	**Bottom** Lab # 369-09
Sólidos Suspendidos	mg/L	SM 2540-D	3,0	7,0	11,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	*	*	*
Turbiedad	NTU	SM 2130-B	1,0	0,1	0,5
Nutrientes		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 367-09	**Medium** Lab # 368-09	**Bottom** Lab # 369-09
Amonia	mg/L	SM 4500-NH_3	1,6	2,0	1,7
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	3250,0	2750,0	2800,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1
Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 367-09	**Medium** Lab # 368-09	**Bottom** Lab # 369-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method *Datos tomados en campo

IAQ 112-2009

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Químico

79

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Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá
Proyecto	Proyecto de Ampliación del Canal de Panamá
Fecha de Informe	31 de marzo de 2009
Fecha de Muestreo	24 de marzo de 2009
Muestras	Tres muestras de agua de mar 2WT, 2WM, 2WB
Procedimiento de Muestreo Utilizado	---
Muestreo realizado por	---
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia
Condiciones Ambientales del Laboratorio	**T°**=22,9°C **H**=49,0%

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 367-09	**Medium** Lab # 368-09	**Bottom** Lab # 369-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 2W**		
			Top Lab # 367-09	**Medium** Lab # 368-09	**Bottom** Lab # 369-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1234,4	1200,0	1250,0
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,03	0,04	0,03

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 367-09	Muestra agua de Mar 2WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	660300 978356
Lab # 368-09	Muestra agua de Mar 2WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	660300 978356
Lab # 369-09	Muestra agua de Mar 2WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	660300 978356

SM: Standard Method **NMP:** Número Más Probable

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

IAQ 112-2009

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Químico

80

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Fecha de Informe	31 de marzo de 2009
Fecha de Muestreo	24 de marzo de 2009
Muestra	Tres muestras de agua de mar 3WT, 3WM, 3WB
Procedimiento de Muestreo Utilizado	---
Muestreo realizado por	---
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia
Condiciones Ambientales del Laboratorio	T°=22,9°C H=49,0%

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab # 370-09	**Medium** Lab # 371-09	**Bottom** Lab # 372-09
Sólidos Suspendidos	mg/L	SM 2540-D	32,0	28,0	20,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	*	*	*
Turbiedad	NTU	SM 2130-B	0,9	0,2	1,2

Nutrientes		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab # 370-09	**Medium** Lab # 371-09	**Bottom** Lab # 372-09
Amonia	mg/L	SM 4500-NH_3	2,9	2,5	1,0
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	3450,0	2550,0	2000,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab # 370-09	**Medium** Lab # 371-09	**Bottom** Lab # 372-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method *Datos tomados en campo

IAQ 112-2009

Profesor Sergio Quintero
Químico

81

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Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá, S, A,		
Proyecto	Proyecto de Ampliación del Canal de Panamá		
Fecha de Informe	31 de marzo de 2009		
Fecha de Muestreo	24 de marzo de 2009		
Muestra	Tres muestras de agua de mar 3WT, 3WM, 3WB		
Procedimiento de Muestreo Utilizado	---		
Muestreo realizado por	---		
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá		
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia		
Condiciones Ambientales del Laboratorio	T°=22,9°C	H=49,0%	

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab # 370-09	**Medium** Lab # 371-09	**Bottom** Lab # 372-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 3W**		
			Top Lab # 370-09	**Medium** Lab # 371-09	**Bottom** Lab # 372-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1108,1	1100,0	1180,0
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,04	0,04	0,05

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 370-09	Muestra agua de Mar 3WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659096 976026
Lab # 371-09	Muestra agua de Mar 3WM(Medium) ,Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659096 976026
Lab # 372-09	Muestra agua de Mar 3WB(Bottom) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	659096 976026

SM: Standard Method **NMP:** Número Más Probable

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

IAQ 112-2009

Profesor Sergio Quintero
Químico

92

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá, S, A,	
Proyecto	Proyecto de Ampliación del Canal de Panamá	
Fecha de Informe	31 de marzo de 2009	
Fecha de Muestreo	24 de marzo de 2009	
Muestras	Tres muestras de agua de mar 4WT, 4WM, 4WB3	
Procedimiento de Muestreo Utilizado	---	
Muestreo realizado por	---	
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia	
Condiciones Ambientales del Laboratorio	**T°**=22,9°C	**H**=49,0%

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 373-09	**Medium** Lab # 374-09	**Bottom** Lab # 375-09
Sólidos Suspendidos	mg/L	SM 2540-D	8,0	19,0	26,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	*	*	*
Turbiedad	NTU	SM 2130-B	0,1	0,1	2,5

Nutrientes		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 373-09	**Medium** Lab # 374-09	**Bottom** Lab # 375-09
Amonia	mg/L	SM 4500-NH_3	1,2	0,8	1,5
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	2600,0	2700,0	2700,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 373-09	**Medium** Lab # 374-09	**Bottom** Lab # 375-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method *Datos tomados en campo

IAQ-112-2009

Profesor Sergio Quintero
Químico

83

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Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Fecha de Informe	31 de marzo de 2009
Fecha de Muestreo	24 de marzo de 2009
Muestras	Tres muestras de agua de mar 4WT, 4WM, 4WB
Procedimiento de Muestreo Utilizado	---
Muestreo realizado por	---
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia
Condiciones Ambientales del Laboratorio	T°=22,9°C H=49,0%

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 373-09	**Medium** Lab # 374-09	**Bottom** Lab # 375-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 4W**		
			Top Lab # 373-09	**Medium** Lab # 374-09	**Bottom** Lab # 375-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1156,7	1200,0	1192,5
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,03	0,03	0,03

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 373-09	Muestra agua de Mar 4WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657425 977572
Lab # 374-09	Muestra agua de Mar 4WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657425 977572
Lab # 375-09	Muestra agua de Mar 4WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657425 977572

SM: Standard Method **NMP:** Número Más Probable

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

IAQ-112-2009

Profesor Sergio Quintero
Químico

84

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá, S, A,		
Proyecto	Proyecto de Ampliación del Canal de Panamá		
Fecha de Informe	31 de marzo de 2009		
Fecha de Muestreo	24 de marzo de 2009		
Muestra	Tres muestras de agua de mar 5WT, 5WM, 5WB		
Procedimiento de Muestreo Utilizado	---		
Muestreo realizado por	---		
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá		
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia		
Condiciones Ambientales del Laboratorio	**T°**=22,9°C	**H**=49,0%	

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 376-09	**Medium** Lab # 377-09	**Bottom** Lab # 378-09
Sólidos Suspendidos	mg/L	SM 2540-D	20,0	5,0	28,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	*	*	*
Turbiedad	NTU	SM 2130-B	1,1	0,1	0,5
Nutrientes		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 376-09	**Medium** Lab # 377-09	**Bottom** Lab # 378-09
Amonia	mg/L	SM 4500-NH_3	2,0	1,2	0,9
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	2250,0	2700,0	2950,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1
Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 376-09	**Medium** Lab # 377-09	**Bottom** Lab # 378-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method *Datos tomados en campo

IAQ 112-2009

Profesor Sergio Quintero
Químico

85

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Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Fecha de Informe	31 de marzo de 2009
Fecha de Muestreo	24 de marzo de 2009
Muestras	Tres muestras de agua de mar 5WT, 5WM, 5WB
Procedimiento de Muestreo Utilizado	---
Muestreo realizado por	---
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia
Condiciones Ambientales del Laboratorio	T°=22,9°C H=49,0%

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 5W**		
			Top Lab # 376-09	**Medium** Lab # 377-09	**Bottom** Lab # 378-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,1	<0,1	<0,1

Metales		**Method No.**	**Müestra de agua de mar 5W**		
			Top Lab # 376-09	**Medium** Lab # 377-09	**Bottom** Lab # 378-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1185,8	1155,7	1225,6
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,05	0.05	0,04

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 376-09	Muestra agua de Mar 5WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657197 981363
Lab # 377-09	Muestra agua de Mar 5WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657197 981363
Lab # 378-09	Muestra agua de Mar 5WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	657197 981363

SM: Standard Method **NMP:** Número Más Probable

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

IAQ112-2009

Profesor Sergio Quintero
Químico

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá, S, A,		
Proyecto	Proyecto de Ampliación del Canal de Panamá		
Fecha de Informe	31 de marzo de 2009		
Fecha de Muestreo	24 de marzo de 2009		
Muestras	Tres muestras de agua de mar 6WT, 6WM, 6WB		
Procedimiento de Muestreo Utilizado	---		
Muestreo realizado por	---		
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá		
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia		
Condiciones Ambientales del Laboratorio	**T°**=22,9°C	**H**=49,0%	

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 379-09	**Medium** Lab # 380-09	**Bottom** Lab # 381-09
Sólidos Suspendidos	mg/L	SM 2540-D	10,0	34,0	14,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	*	*	*
Turbiedad	NTU	SM 2130-B	4,4	2,6	2,0
Nutrientes		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 379-09	**Medium** Lab # 380-09	**Bottom** Lab # 381-09
Amonia	mg/L	SM 4500-NH_3	2,5	1,8	1,8
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	2350,0	2650,0	2500,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1
Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 379-09	**Medium** Lab # 380-09	**Bottom** Lab # 381-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method *Datos tomados en campo

IAQ 112-2009
Profesor Sergio Quintero
Químico

87

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Fecha de Informe	31 de marzo de 2009
Fecha de Muestreo	24 de marzo de 2009
Muestras	Tres muestras de agua de mar 6WT, 6WM, 6WB
Procedimiento de Muestreo Utilizado	---
Muestreo realizado por	---
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia
Condiciones Ambientales del Laboratorio	T°=22,9°C H=49,0%

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 379-09	**Medium** Lab # 380-09	**Bottom** Lab # 381-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 6W**		
			Top Lab # 379-09	**Medium** Lab # 380-09	**Bottom** Lab # 381-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	1040,0	1132,5	1250,0
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,05	0,04	0,04

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 379-09	Muestra agua de Mar 6WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	658662 987138
Lab # 380-09	Muestra agua de Mar 6WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	658662 987138
Lab # 381-09	Muestra agua de Mar 6WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	658662 987138

SM: Standard Method **NMP:** Número Más Probable

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

IAQ 112-2009

Profesor Sergio Quintero
Químico

88

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá, S, A,	
Proyecto	Proyecto de Ampliación del Canal de Panamá	
Fecha de Informe	31 de marzo de 2009	
Fecha de Muestreo	24 de marzo de 2009	
Muestras	Tres muestras de agua de mar 7WT, 7WM, 7WB	
Procedimiento de Muestreo Utilizado	---	
Muestreo realizado por	---	
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia	
Condiciones Ambientales del Laboratorio	**T°**=22,9°C	**H**=49,0%

Parámetros Físico Químicos		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 382-09	**Medium** Lab # 383-09	**Bottom** Lab # 384-09
Sólidos Suspendidos	mg/L	SM 2540-D	20,0	2,0	25,0
Oxígeno Disuelto	mg/L	SM 4500 O-G	*	*	*
Turbiedad	NTU	SM 2130-B	5,5	3,6	3,4
Nutrientes		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 382-09	**Medium** Lab # 383-09	**Bottom** Lab # 384-09
Amonia	mg/L	SM 4500-NH_3	2,8	1,4	2,0
Nitratos	mg/L	SM 4500NO_3^--B	<0,1	<0,1	<0,1
Nitritos	mg/L	SM 4500NO_2^--B	<0,01	<0,01	<0,01
Fosfatos	mg/L	SM 4500-P	<0,1	<0,1	<0,1
Sulfatos	mg/L	SM 4500SO_4^{2-}-E	2150,0	2150,0	2100,0
Silicato	mg/L	SM 4500-SiO_2-D	<0,1	<0,1	<0,1
Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 382-09	**Medium** Lab # 383-09	**Bottom** Lab # 384-09
Hidrocarburos Totales	mg/L	SM 5520	<0,001	<0,001	<0,001
Hidrocarburos Halogenados Suspendidos y Disueltos	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Halogenados	mg/L	SM 6630	<0,001	<0,001	<0,001
Plaguicidas Fosforados	mg/L	EPA 614	<0,001	<0,001	<0,001

SM: Standard Method *Datos tomados en campo

IAQ 112-2009

Profesor Sergio Quintero
Químico

89

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS
Agua de Mar

IAQ 112-2009

Usuario	Dredging International de Panamá, S, A,
Proyecto	Proyecto de Ampliación del Canal de Panamá
Fecha de Informe	31 de marzo de 2009
Fecha de Muestreo	24 de marzo de 2009
Muestras	Tres muestras de agua de mar 7WT, 7WM, 7WB
Procedimiento de Muestreo Utilizado	---
Muestreo realizado por	---
Lugar de Muestreo	Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá
Analistas	Prof. Alexander Arosemena- Lic. Enzo De Gracia
Condiciones Ambientales del Laboratorio	T°=22,9°C H=49,0%

Parámetros Orgánicos		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 382-09	**Medium** Lab # 383-09	**Bottom** Lab # 384-09
Carbono Orgánico Total	mg/L	SM 5310	<0,1	<0,1	<0,1
Carbono Orgánico Particulado	mg/L	Oxidacion	<0,1	<0,1	<0,1

Metales		**Method No.**	**Muestra de agua de mar 7W**		
			Top Lab # 382-09	**Medium** Lab # 383-09	**Bottom** Lab # 384-09
Hierro	mg/L	SM3500 Fe	<0,1	<0,1	<0,1
Manganeso	mg/L	SM 3500 Mn	<0,01	<0,01	<0,01
Arsénico	mg/L	SM 3500 As	<0,01	<0,01	<0,01
Níquel	mg/L	SM 3500 Ni	<0,01	<0,01	<0,01
Cromo	mg/L	SM 3500 Cr	<0,01	<0,01	<0,01
Cobre	mg/L	SM 3500 Cu	<0,01	<0,01	<0,01
Cobalto	mg/L	SM 3500 Co	<0,01	<0,01	<0,01
Magnesio	mg/L	SM 3500 Mg	923,4	1100,0	1050,4
Molibdeno	mg/L	SM 3500 Mo	<0,01	<0,01	<0,01
Selenio	mg/L	SM 3500 Se	<0,01	<0,01	<0,01
Vanadio	mg/L	SM 3500 V	<0,01	<0,01	<0,01
Zinc	mg/L	SM 3500 Zn	0,06	0,05	0,05

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 382-09	Muestra agua de Mar 7WT (Top) Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	656529 991069
Lab # 383-09	Muestra agua de Mar 7WM(Medium), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	656529 991069
Lab # 384-09	Muestra agua de Mar 7WB(Bottom), Ampliación del Canal, Pacífico, Provincia de Panamá, República de Panamá	656529 991069

SM: Standard Method **NMP:** Número Más Probable

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días.

IAQ 112-2009

Profesor Sergio Quintero
Químico

90

CADENA DE CUSTODIA

USUARIO:	Dredging International
DIRECCIÓN:	Ave. Brujas - Velásquez
CONTACTO:	Virgilio Flores
TELÉFONO:	832 2914 FAX: 832 2918
PROYECTO:	Ensanche del canal de Panamá.
UBICACIÓN:	Canal de Panamá.
FECHA:	24 de marzo 2009.

Centro de Investigaciones Químicas, S.A.
Calle Andrés Mojica y
Calle 78 San Francisco # 15
Tel.: 226-5936
Fax: 270-1339
email:soquib@sinfo.net

ANALISIS REQUERIDO

PAG._____DE _____

Nº 1658

CIQSA DOCUMENTO ORIGINAL

Numero de informe: 109-12-09

Fecha de emisión: 1-10

CIQSTADM

PARA USO DE LABORATORIO

PARA USO DE LABORATORIO	IDENTIFICACION DE LA MUESTRA	FECHA / HORA MUESTRA D	M	A		MATRIZ	NOTAS
	1 W T	24	03	09	11:15 AM PM	Agua	
	1 W M	24	03	09	11:19 AM PM	Agua	
	1 W B	24	03	09	11:26 AM PM	Agua	
					:__ AM PM		
	2 W T	24	03	09	11:45 AM PM	Agua	
	2 W M	24	03	09	11:47 AM PM	Agua	
	2 W B	24	03	09	11:50 AM PM	Agua	
					:__ AM PM		
	3 W T	24	03	09	12:10 AM PM	Agua	
	3 W M	24	03	09	12:13 AM PM	Agua	
	3 W B	24	03	09	12:16 AM PM	Agua	
					:__ AM PM		
	4 W T	24	03	09	12:28 AM PM	Agua	
	4 W M	24	03	09	12:30 AM PM	Agua	
	4 W B	24	03	09	12:24 AM PM	Agua	
					:__ AM PM		
	5 W T	24	03	09	12:50 AM PM	Agua	
	5 W M	24	03	09	12:54 AM PM	Agua	
	5 W B	24	03	09	12:58 AM PM	Agua	
					:__ AM PM		

COMENTARIOS ADICIONALES:

16

CONDICION DE LA MUESTRA
- ☐ CONGELADA
- ☑ FRIA
- ☐ TEMPERATURA AMBIENTAL

ENTREGADA:	FECHA:	RECIBIDO:	FECHA:
Virgilio Flores	24/03/09	SOQUIB	24-III-09
	HORA: 16:10		HORA: 4:10 PM.

CADENA DE CUSTODIA

USUARIO:	Dredging International
DIRECCIÓN:	Ave. Brija - Vulanzy
CONTACTO:	Virgilio Flores
TELÉFONO:	832 2914 FAX: 832 2918
PROYECTO:	Ensanche del Canal de Panamá
UBICACIÓN:	Canal de Panamá.
FECHA:	24 de marzo.

Centro de Investigaciones Químicas, S.A.
Calle Andrés Mojica y
Calle 78 San Francisco # 15
Tel.: 226-5936
Fax: 270-1339
email:soquib@sinfo.net

ANALISIS REQUERIDO

PAG._____DE _____

Nº 1659

Solidos Suspendidos

Solidos Totales

COPIA DOCUMENTO ORIGINAL

Numero de Informe: 1044-2009

Fecha de emisión: 1-4-09

PARA USO DE LABORATORIO

PARA USO DE LABORATORIO	IDENTIFICACION DE LA MUESTRA	FECHA / HORA MUESTRA D	M	A		MATRIZ			NOTAS
	6WT	24	03	09	13:40 AM PM	Agua			
	6WM	24	03	09	12:41 AM PM	Agua			
	6WB	24	03	09	13:41 AM PM	Agua			
					:__ AM PM				
	7WT	24	03	09	14:14 AM PM	Agua			
	7WM	24	03	09	14:19 AM PM	Agua			
	7WB	24	03	09	14:24 AM PM	Agua			
					:__ AM PM				
#1	Salida de Tubería de dragado	24	03	09	15:03 AM PM	Agua	✓	✓	
#2	Salida al mar	24	03	09	15:40 AM PM	Agua	✓	✓	
					:__ AM PM				
					:__ AM PM				
					:__ AM PM				
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					:__ AM PM				

COMENTARIOS ADICIONALES:

26

CONDICION DE LA MUESTRA
- ☐ CONGELADA
- ☑ FRIA
- ☐ TEMPERATURA AMBIENTAL

ENTREGADA:	FECHA:	RECIBIDO:	FECHA:
	24/03/09	SOQB	24-III-09
	HORA: 16:10		HORA: 4:10 PM

CIQ - 001A - LAB

ANNEX 3

FARFAN DISPOSAL SITE WATER QUALITY MONITORING

Laboratorio de Análisis Industriales, S.A.

CERTIFICADO № 663-C.T / MINISTERIO DE SALUD

Laboratorio Autorizado por ANAM
Gaceta Oficial No.25, 059 del jueves 27 de Mayo de 2004
Análisis Químicos, Físicos y Bacteriológico
En Diversas Matrices

FORMATO LAISA 006 / 14-12-06

INFORME DE ANÁLISIS QUÍMICO №. 96-2009

MUESTRA: Dos (2) muestras de **AGUA**, traída al laboratorio por el interesado y rotuladas:

1. **#1. SALIDA AL MAR (26-02-09 - 9:25 A.M.)** **M# 306**
2. **#2. EN LA SALIDA DE LA TUBERIA (26-02-09- 9:50 A.M.** **M# 307**

SOLICITADO POR: **DREDGING INTERNATIONAL**

FECHA DE ENTRADA: 26 de febrero del 2009

FECHA DE SALIDA: 03 de marzo del 2009

RESULTADOS:

PARAMETROS	EXPRESION	UNIDAD	METODO	1	2
SÒLIDOS TOTALES	S.T	mg/L	2540-B	38066	46766
SÒLIDOS SUSPENDIDOS	S. S	mg/L	2540-D	786	6896

METODO: A.W.W.A. STANDARD METHODS 20th EDITION

LAISA
Tel.: 261-8457 Fax: 261-1610
e-mail: laisa04@cwpanama.net
Apartado 0819-06749 El Dorado
Edif. Camilo Porras, Ave. Herbruger,
Panamá, Rep. De Panamá

ISAÍAS CAMACHO CALDERÓN
QUÍMICO
CÉDULA: 8-297-669 IDONEIDAD: 0210

Prof. Isaías Camacho C.
Director

CADENA DE CUSTODIA

ANÁLISIS REQUERIDO

U' RIO: DREDGING INTERNATIONAL
L :CCIÓN: COCOLÍ
CONTACTO: DIRK DE TAVERNIER
TELÉFONO: 832 2912 FAX: 832 2917
PROYECTO: MONITOREO DE AGUA
UBICACIÓN: FARFAN
FECHA: 26 FEBRERO 2009

Para uso de laboratorio	IDENTIFICACIÓN DE LA MUESTRA	FECHA / HORA DE LA MUESTRA D	M	A	___:___ AM PM	MATRIZ	Sólidos suspendidos	Sólidos Totales						NOTAS
	#1 Salida al mar	26	02	09	9:25 (AM) PM	Agua Salada	✓	✓						
	#2 En la salida de la tubería.	26	02	09	9:50 (AM) PM	Agua Salada	✓	✓						
					___:___ AM PM									
					___:___ AM PM									
					___:___ AM PM									
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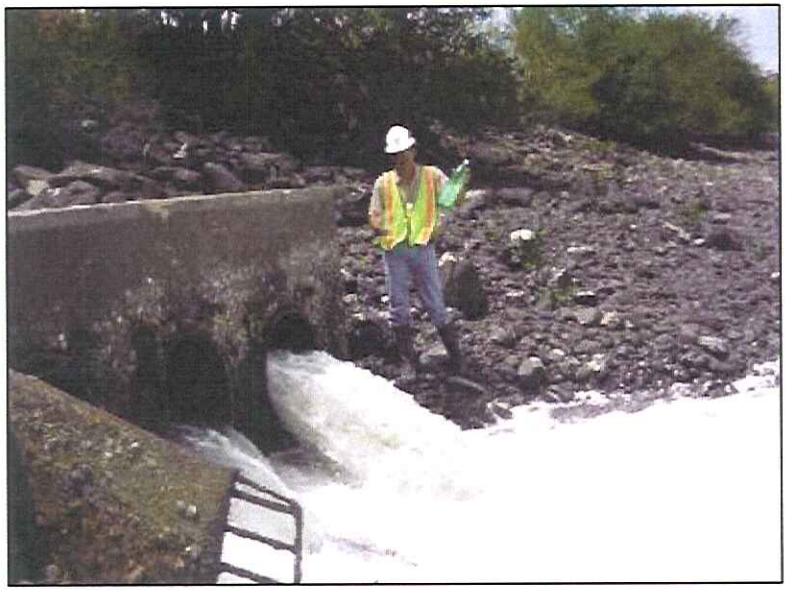
Comentarios adicionales:	Condición de la muestra: ☐ Congelada ☑ Fría ☐ Temperatura ambiente	Entregada:	Fecha: 26/Feb/09	Recibido:	Fecha: 26/02/0
			Hora: 12:15		Hora: 12:30 PM

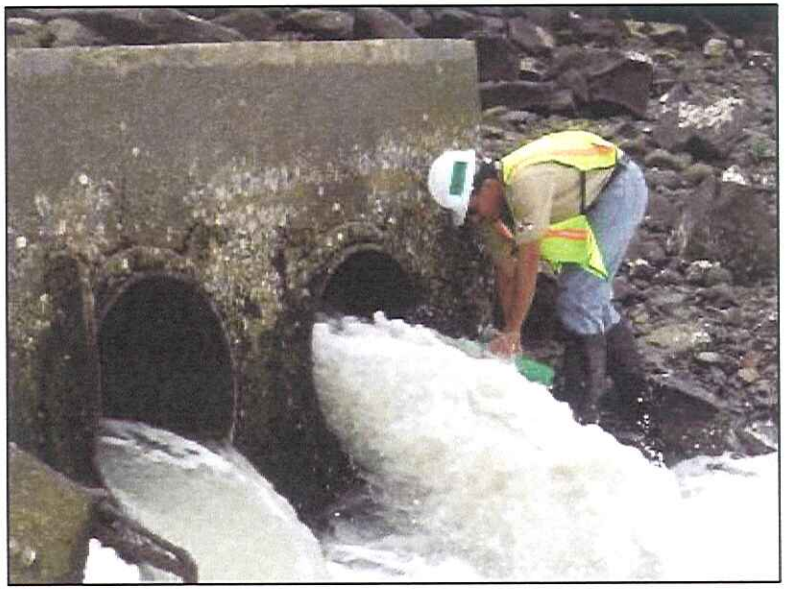
Muestras de agua de Farfán - Febrero 16, 2009





Punto 1: En la salida de la tubería de dragado





Punto 2: En la salida de Farfán al mar

INFORME DE ANÁLISIS QUÍMICO №. 96-2009

MUESTRA: Dos (2) muestras de **AGUA**, traída al laboratorio por el interesado y rotuladas:

1. **#1. SALIDA AL MAR (26-02-09 - 9:25 A.M.)** **M# 306**
2. **#2. EN LA SALIDA DE LA TUBERIA (26-02-09- 9:50 A.M.** **M# 307**

SOLICITADO POR: **DREDGING INTERNATIONAL**

FECHA DE ENTRADA: 26 de febrero del 2009

FECHA DE SALIDA: 03 de marzo del 2009

RESULTADOS:

PARAMETROS	EXPRESION	UNIDAD	METODO	1	2
SÒLIDOS TOTALES	S.T	mg/L	2540-B	38066	46766
SÒLIDOS SUSPENDIDOS	S. S	mg/L	2540-D	786	6896

METODO: A.W.W.A. STANDARD METHODS 20th EDITION

LAISA
Tel.: 261-8457 Fax: 261-1610
e-mail: laisa04@cwpanama.net
Apartado 0819-06749 El Dorado
Edif. Camilo Porras, Ave. Herbrugor,
Panamá, Rep. De Panamá

ISAÍAS CAMACHO CALDERÓN
QUÍMICO
CÉDULA: 8-297-669 IDONEIDAD: 0210

Prof. Isaìas Camacho C.
Director

CADENA DE CUSTODIA

U[illegible]RIO: DREDGING INTERNATIONAL
D[illegible]ECCIÓN: COCOLÍ
CONTACTO: DIRK DE TAVERNIER
TELÉFONO: 832 2912 FAX: 832 2917
PROYECTO: MONITOREO DE AGUA
UBICACIÓN: FARFAN
FECHA: 26 FEBRERO 2009

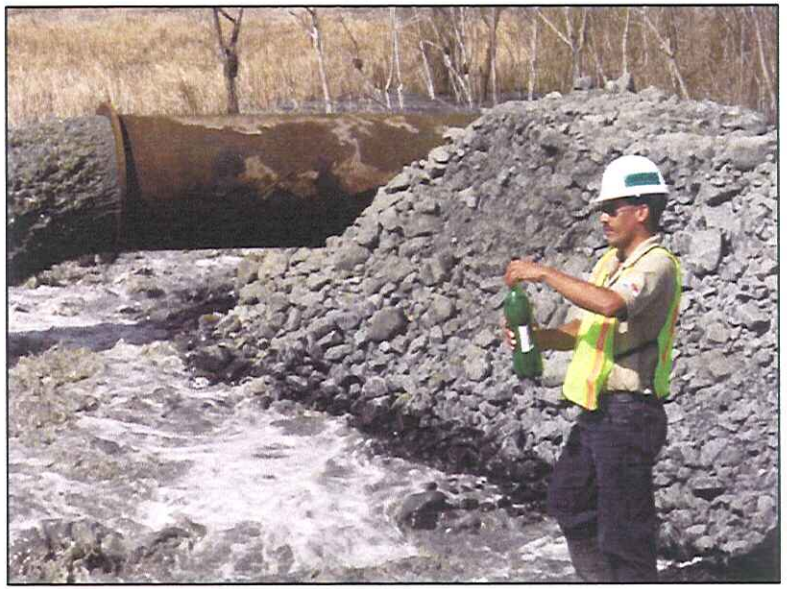
ANÁLISIS REQUERIDO

Para uso de laboratorio	IDENTIFICACIÓN DE LA MUESTRA	FECHA / HORA DE LA MUESTRA D	M	A	___:___ AM PM	MATRIZ	Sólidos suspendidos	Sólidos Totales						NOTAS
	#1 Salida al mar	26	02	09	9:25 (AM) PM	Agua Salada	✓	✓						
	#2 En la salida de la tubería.	26	02	09	9:50 (AM) PM	Agua Salada	✓	✓						
					___:___ AM PM									
					___:___ AM PM									
					___:___ AM PM									
					___:___ AM PM									
					___:___ AM PM									
					___:___ AM PM									
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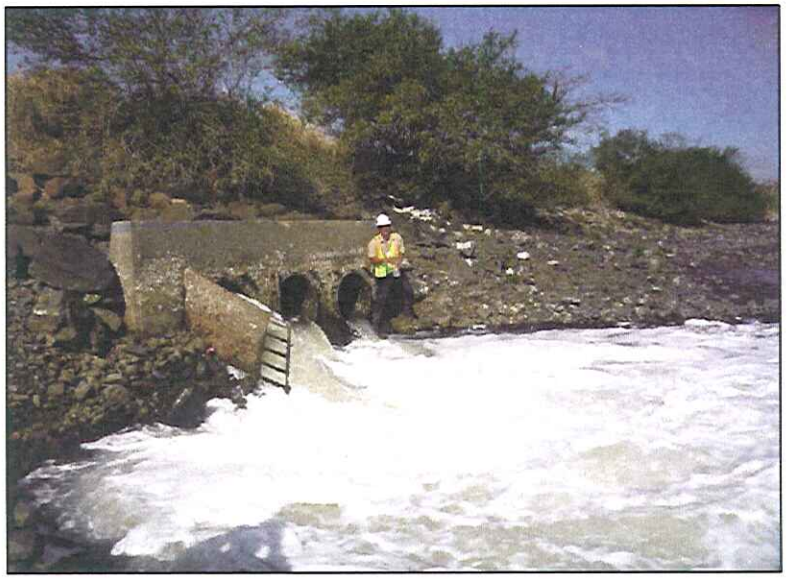
Comentarios adicionales:	Condición de la muestra: ☐ Congelada ☑ Fría ☐ Temperatura ambiente	Entregada: Dirk de Tavernier	Fecha: 26/Feb/09	Recibido: J. C. Peralta	Fecha: 26/02/09
			Hora: 12:15		Hora: 12:30 PM

Muestras de agua de Farfán - Febrero 26, 2009





Punto 1: En la salida de la tubería de dragado





Punto 2: En la salida de Farfán al mar

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS

IAQ 113-2009

Usuario	Dredging International de Panamá, S.A.
Proyecto	Monitoreo de Calidad de Agua
Fecha de Informe	26 de marzo de 2009
Fecha de Muestreo	25 de marzo de 2009
Muestra	Muestra de agua Tubería de Dragado
Procedimiento de Muestreo Utilizado	Manual de calidad de CIQSA PL-034 A. Plan de muestreo B. Procedimiento de muestreo y tratamiento de muestras.
Muestreo realizado por	Personal de Dredging International Panamá, S.A.
Lugar de Muestreo	Rodman, Provincia de Panamá, República de Panamá.
Analistas	Prof. Alexander Arosemena
Condiciones Ambientales del Laboratorio	**T°**= 22.9°C **H**= 49.0%

Parámetros Físico Químicos	**Unidad de Medida**	**Standard Method No.**	**Muestra de agua Tubería de Dragado Lab. #: 385-09**
Sólidos Suspendidos Totales	mg/L	SM 2540-D	16446,0
Sólidos Totales	mg/L	SM 2540-B	55836,0
Sólidos Sedimentables	mm	SM 2540-F	60,0

Identificación de Muestra

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 385-09	Muestra de agua Tubería de Dragado. Farfán, Provincia de Panamá, República de Panamá	17P0656436 UTM 0988703 N08°56′29.9″ 079°34′37.6″

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

IAQ 113-2009

Profesor Sergio Quintero
Químico

Centro de Investigaciones Químicas, S. A.
Laboratorio C.I.Q.S.A.

Calle Andrés Mojica
San Fco. Panamá
Tel.: 226-5936

INFORME DE ANÁLISIS

IAQ 113-2009

Usuario	Dredging International de Panamá, S.A.
Proyecto	Monitoreo de Calidad de Agua
Fecha de Informe	26 de marzo de 2009
Fecha de Muestreo	25 de marzo de 2009
Muestra	Muestra de agua Salida al mar
Procedimiento de Muestreo Utilizado	Manual de calidad de CIQSA PL-034 A. Plan de muestreo B. Procedimiento de muestreo y tratamiento de muestras.
Muestreo realizado por	Personal de Dredging International Panamá, S.A.
Lugar de Muestreo	Rodman, Provincia de Panamá, República de Panamá.
Analistas	Prof. Alexander Arosemena
Condiciones Ambientales del Laboratorio	**T°= 22.9°C** / **H= 49.0%**

Parámetros Físico Químicos	**Unidad de Medida**	**Standard Method No.**	**Muestra de agua Salida al Mar Lab. #: 386-09**
Sólidos Suspendidos Totales	mg/L	SM 2540-D	722,0
Sólidos Totales	mg/L	SM 2540-B	40088,0

Identificación de Muestra

Identificación de Laboratorio	**Identificación**	**Ubicación Satelital**
Lab # 386-09	Muestra de agua salida al mar. Farfán, Provincia de Panamá, República de Panamá	17P06577732 UTM 0987039 N08°55'35.6'' 079°33'55.4''

Importante: Los resultados de este informe se refieren únicamente a las muestras analizadas por el Laboratorio. Las muestras se retienen en el laboratorio por un período de 30 días

IAQ 113-2009

Profesor Sergio Quintero
Químico

CADENA DE CUSTODIA

Centro de Investigaciones Químicas, S.A.
Calle Andrés Mojica y
Calle 78 San Francisco # 15
Tel.: 226-5936
Fax: 270-1339
email:soquib@sinfo.net

ANALISIS REQUERIDO

PAG. 1 DE 1

Nº 1673

USUARIO:	Dredging International.
DIRECCIÓN:	Ave. J. Broja - Velásquez
CONTACTO:	Virgilio Flores.
TELÉFONO:	832 2914 FAX: 832 2918
PROYECTO:	Ensanche del Canal de Panamá.
UBICACIÓN:	Canal de Panamá.
FECHA:	24 de Marzo de 2009.

PARA USO DE LABORATORIO	IDENTIFICACION DE LA MUESTRA	FECHA / HORA MUESTRA D	M	A	Hora	MATRIZ	Sólidos Suspendidos.	Sólidos Totales.	NOTAS
#1	Salida de Tubería de dragado	24	03	09	15:03 PM	Agua	✓	✓	
#2	Salida al Mar	24	03	09	15:40 PM	Agua	✓	✓	

CIQSA DOCUMENTO ORIGINAL
Número de Informe: 110 13-CW
Fecha de emisión: Marzo 09
CIQ SA ADM

COMENTARIOS ADICIONALES:

102

CONDICION DE LA MUESTRA
- ☐ CONGELADA
- ☑ FRIA
- ☐ TEMPERATURA AMBIENTAL

ENTREGADA:	FECHA:	RECIBIDO:	FECHA:
V.F.	24-03-09	SOQB	24-3-09
	HORA: 16.10		HORA: 16:10

Appendix R

Resolution AG-0250-2009 Authorizing Change in Schedule of Blasting Activities

REPÚBLICA DE PANAMÁ
AUTORIDAD NACIONAL DEL AMBIENTE

RESOLUCIÓN AG No-0134-2009

La Suscrita Ministra en Asuntos Relacionados con la Conservación del Ambiente y Administradora General de la Autoridad Nacional del Ambiente (ANAM), en uso de sus facultades legales, y

C O N S I D E R A N D O:

Que mediante Resolución DIEORA IA-632-2007, de 9 de noviembre de 2007, se aprobó el Estudio de Impacto Ambiental Categoría III, correspondiente al proyecto "AMPLIACIÓN DEL CANAL DE PANAMÁ – TERCER JUEGO DE ESCLUSAS", presentado por la Autoridad del Canal de Panamá (visible en fojas de la 270 a la 279 del expediente administrativo correspondiente).

Que mediante notas s/n, recibidas el 14 y 27 de octubre de 2008, el promotor del referido proyecto a través de su apoderado legal Daniel Muschett, informa de la propuesta de modificación del Estudio de Impacto Ambiental en las siguientes actividades, contempladas en el Plan de Manejo Ambiental del denominado proyecto (visible en fojas de la 287 a la 292 del expediente administrativo correspondiente), a saber:

- Sustitución de las estaciones de monitoreo de la calidad de aire de Pedro Miguel y Clayton por la de Miraflores.
- Excluir algunos parámetros de monitoreo como plomo (Pb), monóxido de carbono (CO) y el ajustar el parámetro de medición del material particulado por PM_{10} y $PM_{2.5}$
- Incorporar áreas adicionales como sitios de deposito y préstamo de arcilla en un área próxima al sitio de deposito No. 13, denominado Cocoli Sur 1/T7, con una superficie de 71 hectáreas, ubicadas en el área patrimonial de ACP.
- Realizar voladuras durante los días sábados de 8:00 a.m. a 6:00p.m. y los domingos en horario de 10:00a.m a 6:.00 p.m.

Que mediante MEMORANDUM DIPROCA-DCCA-1130-08, DIPOCRA-DCCA-116-09, recibidos el 6 de noviembre de 2008, y 6 de febrero de 2009, la Dirección de Protección de la Calidad Ambiental remite las siguientes consideraciones:

- Parámetro Pb (Plomo): se podría desestimar la medición del mismo, ya que la ley No.36 de 1996 en su artículo 9 estipula que a partir del año 2002, se usaría gasolina sin plomo; sin embargo la ACP debe presentar el tipo de combustible y volumen utilizado.
- Parámetro CO (Monóxido de Carbono): este parámetro se encuentra normado en la Norma de Calidad de Aire, esto debido a que la combustión de los hidrocarburos no se da de manera

completa, formándose a partir de los compuestos que quedan sin quemar. No obstante, a partir de la liberación a la atmósfera de del mismo, se forma también el CO_2, el cual ocasiona un problema de mucho cuidado como lo es el efecto de invernadero.

- Parámetro MP (Material Particulado): dentro de la Resolución DIEORA IA-632-2007, del 9 de noviembre de 2007, se estableció el monitoreo de MP y PM_{10}, no obstante, a pesar que la ACP realice monitoreos de PM_{10} y $PM_{2.5}$, el MP debe mantenerse en su monitoreo, esto por las circunstancias que se comportan como partículas.
- No existe objeción alguna para la incorporación de las áreas solicitadas como sitios de deposito y de préstamo de arcilla, siempre y cuando cumplan con todos los permisos establecidos en la Resolución DIEORA-IA-632-2007,y sus respectivas medidas de mitigacion; además deberá presentar evidencias del tipo de material a depositar; señalar si el sitio será utilizado como área de confinamiento, si el material a dispones en este sitio será reutilizado y presentar las caracterizaciones que garanticen que el material a depositar no será foco de contaminación al suelo, aire, y fuentes superficiales y subterráneas de agua.
- No debe ser modificado el horario de voladuras ya que el mismo representa una medida de mitigación para evitar el incremento en los niveles de ruido, vibraciones y establecer y preservar límites en los horarios de voladuras y la calidad del ambiente

Que luego de revisar la documentación presentada, la Autoridad Nacional del Ambiente considera que los argumentos técnicos presentados por la Autoridad del Canal de Panamá (según notas s/n, del 14 y 27 de octubre de 2008) son aceptables en parte y que la modificación propuesta no requiere de la presentación de un Estudio de Impacto Ambiental (visible en fojas de la 287 a la 292 del expediente administrativo correspondiente).

Que el informe técnico, de la Dirección de Evaluación y Ordenamiento Ambiental de fecha 10 de febrero de 2009, recomienda admitir parcialmente la solicitud de modificación presentada por la Autoridad del Canal de Panamá (ACP), (visible en fojas 304 a la 307 del expediente administrativo correspondiente).

RESUELVE:

ARTÍCULO 1: MODIFICAR la Resolución DIEORA IA-632-2007, de 9 de noviembre de 2007, en los siguientes aspectos:

1. Sustituir las estaciones de monitoreo de la calidad de aire de Pedro Miguel y Clayton por la de Miraflores.
2. Excluir del monitoreo el parámetro Plomo (Pb).

3. Incorporar áreas adicionales como sitios de depósito y préstamo de arcilla en un área próxima al sitio de depósito No. 13, denominado Cocoli Sur 1/T7, con una superficie de setenta y un hectáreas (71 Has.), ubicadas en el área patrimonial de la ACP. Condicionado a que al inicio de esta actividad deberá presentar a la ANAM y a las Autoridades correspondientes, las evidencias del tipo de material a depositar; señalar si este sitio será utilizado como área de confinamiento, si el material a depositar en este sitio será reutilizado y presentar las características que garanticen que el material a disponer no será foco de contaminación al suelo, aire y fuentes superficiales y subterráneas de agua.

ARTÍCULO 2: Adicional a las medidas establecidas en el Estudio de Impacto Ambiental Categoría III del proyecto titulado "AMPLIACIÓN DEL CANAL DE PANAMA – TERCER JUEGO DE ESCLUSAS" y en la Resolución DIEORA IA-632-2007, de 09 de noviembre de 2007, deberá realizarse lo siguiente, específicamente en el área de setenta y un hectáreas (71 Has):

1. Presentar ante la Administración Regional del Ambiente correspondiente, para su aprobación previo inicio de las actividades, la ampliación del Plan de Rescate y Reubicación de Fauna Silvestre (71 Has).
2. Previo a la tala de algún árbol el promotor deberá tramitar los permisos ante la Administración Regional del Ambiente correspondiente y contar con la Resolución de Indemnización Ecológica No. AG-0235-2003 del 12 de junio de 2003; además deberá presentar para la aprobación de la Administración Regional del Ambiente correspondiente el plan de revegetación (71 Has).
3. El promotor deberá presentar el tipo de combustible que se utiliza en el desarrollo de las actividades y el volumen aproximado del mismo.
4. El promotor deberá presentar ante la ANAM y a las Autoridades correspondientes, al inicio de la actividad propuesta, las evidencias del tipo de material a depositar; señalar si este sitio será utilizado como área de confinamiento, si el material a depositar en este sitio será reutilizado y presentar las características que garanticen que el material a disponer no será foco de contaminación.

ARTÍCULO 3: Mantener el resto de la Resolución DIEORA IA-632-2007, sin afectar las medidas de mitigacion, compensación, indemnización ecológica y económica, y el plan de manejo ambiental contemplado.

ARTÍCULO 4: El promotor deberá tramitar ante las autoridades competentes, los permisos correspondientes inherentes a las actividades a ejecutar en el área del proyecto.

ARTÍCULO 5: Notificar al Representante Legal de la Autoridad del Canal de Panamá (ACP), de la presente Resolución.

ARTÍCULO 6: De conformidad con el artículo 54 y siguientes del Decreto Ejecutivo N° 209, de 5 de septiembre de 2006, el Promotor del proyecto podrá interponer el Recurso de Reconsideración, dentro del plazo de cinco (5) días hábiles contados a partir de su notificación, el cual tendrá efecto devolutivo y agotará la vía gubernativa.

FUNDAMENTO DE DERECHO: Ley No. 41 de 1 de julio de 1998, "General de Ambiente de la República de Panamá" y demás normas concordantes y complementarias.

Dada en la ciudad de Panamá, a los tres (3) días, del mes de marzo del año dos mil nueve (2009).

NOTIFÍQUESE Y CÚMPLASE

autoridad nacional del ambiente
ADMINISTRACIÓN GENERAL
Republica de Panamá

LIGIA CASTRO de DOENS
Ministra en Asuntos Relacionados
con la Conservación del Ambiente
y Administradora General

Hoy 12 de Marzo de 2009
siendo las 3:10 de la tarde
notifique personalmente a [illegible] de la presente
resolución
Notificado
Notificado

Appendix S

Closure of Tucan Case

FINIQUITO

Yo (nosotros) **TUCAN REAL ESTATE HOLDING INC.**, con cédula de identidad personal / RUC. _____, en virtud del pago de B/. **21,799.14** (****** VEINTIUN MIL SETECIENTOS NOVENTA Y NUEVE CON 14/100 ******).

Recibido de la Compañía Internacional de Seguros, S.A., la cual acepto(amos) como indemnización total y definitiva en pago de todos mis derechos en relación al siniestro acaecido el día **2** de **FEBRERO** de **2009** que afecta la póliza de seguro de ****TODO RIESGO CONSTRUCCION**** número **926** de la sucursal **CASA MATRIZ PANAMÁ**.

Renuncio(amos) definitivamente a cualquier reclamo, perjuicio, demanda, acción penal o civil, pretensión penal o civil, querella criminal, indemnización en el presente, o en el futuro contra la Compañía Internacional de Seguros, S.A. y/o Agentes o Representantes.

En virtud del pago arriba indicado que recibí (recibimos) a entera conformidad, igualmente cedemos y traspasamos a la Compañía Internacional de Seguros, S.A., todos los derechos y acciones contra terceros que resulten o puedan resultar como consecuencia de tales hechos.

Para constancia firmo(amos) el presente documento en la ciudad de Panamá, a los **25** días del mes de **MAYO** del año **2009**.

Firma

Cédula No. E-8-73852

Acreedor Hipotecario

Asegurado: CILSA PANAMA, S.A.
Reclamo: 4 - 2009
Ramo: TODO RIESGO CONSTRUCCION
Sucursal: CASA MATRIZ PANAMÁ
Póliza: 926


REPUBLICA DE PANAMA
TRIBUNAL ELECTO
JOSE CARLOS
ANGELL MONTOYA
E-8-73852
EXTRANJERO