USAID | LEBANON
FROM THE AMERICAN PEOPLE

LITANI RIVER BASIN MANAGEMENT SUPPORT PROGRAM

ROVER TRAINING AND QARAOUN DAM INSPECTION

April 2012
This report was produced for review by the United States Agency for International Development (USAID). It was prepared by International Resources Group (IRG) under Contract EPP-I-00-04-00024-00 order no 7.

LITANI RIVER BASIN MANAGEMENT SUPPORT PROGRAM

ROVER TRAINING AND DAM INSPECTION

Contract No.: EPP-I-00-04-00024-00 order no 7.

April 2012

TABLE OF CONTENTS

FOREWORD

This Rover Training and Dam Inspection activity was implemented by SeaTrepid under subcontract with International Resources Group (IRG), the main contractor under the Litani River Basin Management Support (LRBMS) Program, a USAID-funded program in Lebanon (Contract EPP-I-00-04-00024-00 Task Order No.7) under the Integrated Water and Coastal Resources Management Indefinite Quantity Contract (IQC) II.

EXECUTIVE SUMMARY

The Litani River Basin Management Support (LRBMS) Program is a technical assistance program funded by the United States Agency for International Development (USAID) and implemented by International Resources Group (IRG). LRBMS supports the Litani River Authority to improve the management of water resources in the Litani River Basin.

LRBMS sponsored in April 2010 an underwater inspection of Qaraoun Dam to locate leaks in the upstream facing that could jeopardize the dam's stability. Several leaks were indentified and consequently repaired by LRA staff with LRBMS assistance. In order to ensure the sustainability of the monitoring of the dam, LRBMS provided LRA with a remotely operated vehicle (ROV or rover) to routinelty conduct such underwater inspections.

In April 2012, LRA employees were trained in the usage of the Outland 1000 Remotely Operated Vehicle (ROV), and assisted in the completion of an inspection of the Qaraoun Dam in Lebanon. The training and inspection was completed by SeaTrepid International LLC.

A SeaTrepid employee, Alex Kaplan, trained LRBMS employees in two parts. Training was first done in a classroom setting, where employees learned of the components, setup and basic operation of the Outland ROV. The second part consisted of hands on training of ROV operation in the water, and actual inspection of the dam. Employees became familiar with many aspects of ROV operation: setup, configuration, care and maintenance, tether management, and repair.

An inspection was also performed for the purpose of identifying leaks between the joints on the upstream face of the dam. The condition of the joints were recorded on a diagram of the dam face. Additionally, video of the entire inspection was recorded for future reference. No leaks were found during this inspection, even in areas were leaks had been previously detected during the previous inspection in April 2010. This confirms that the repairs carried out end of 2010 by LRA have been very successful while no new leaks have developed since.

The LRA is now capable to conduct its own underwater inspections, and is encouraged to do so on a periodic basis for LRA staff to remain familiar with the process and for the dam to be regularly monitored.

ملخص تنفيذي

يعتبر مشروع دعم حوض الليطاني Litani River Basin Management Support (LRBMS) مشروع مساعدة تقنيّة تموّله الوكالة الأمريكية للتنمية الدولية United States Agency for International Development (USAID) وتنفّذه مجموعة الموارد الدولية International Resources Group (IRG).

ويدعم المشروع هذا المصلحة الوطنية لنهر اللّيطاني بغية تطوير إدارة المياه في حوض النهر.

رعى مشروع دعم حوض اللّيطاني في شهر آبريل/نيسان من العام ٢٠١٠ معاينة لسدّ القرعون جرت تحت الماء بغية تحديد نقاط التسرب في واجهة السدّ الامامية إذ إنّها قد تهدّد سلامة السدّ. وتمّت ملاحظة عدة نقاط تسرّب فأصلحها الفريق الفني في مصلحة اللّيطاني بمساعدة من مشروع دعم حوض اللّيطاني.

ومن أجل تأمين استمرارية العمل على مراقبة السد وصيانته، زوّدَ مشروع دعم حوض الليطاني المصلحةَ الوطنية لنهر الليطاني بغاطس آلي يعمل عن بعد (ROV أو ROVER) وذلك بغية إجراء معاينات مماثلة تحت الماء بشكل دوريّ.

تم تدريب فريق من موظفي المصلحة الوطنية لنهر الليطاني في شهر آبريل/نيسان من العام ٢٠١٢ على استخدام الجهاز الغاطس اوت لاند ١٠٠٠ (Outland 1000) اي غاطس آلي يعمل عن بعد وهو جهاز يعمل بمحرك دفع ذاتي ويمكن التحكم به عن بعد، حيث قام الفريق مع المدرب بالكشف على فواصل سد القرعون. ونفّذت شركة Sea Trepid International ذات المسؤولية المحدودة التدريب وعمليّة المعاينة.

درّب موظّف شركة Sea Trepid آليكس كابلان موظفي المصلحة الوطنية لنهر الليطاني على مرحلتين. قضت المرحلة الأولى على تدريب الموظّفين على الأمور النظرية في غرفة صف حيث اكتشفوا عناصر جهاز الأوت لاند وتعرّفوا إلى طريقة عمله ووظائفه الأساسية. وشملت المرحلة الثانية التدريب على الأمور التّطبيقية عبر تشغيل

الجهاز في المياه الأمر الذي مكّن المدرب والمتدربين من الكشف الفعلي على فواصل السّد. فأصبح الموظّفون على دراية بكافة نواحي عمل هذا الجهاز الذي يعمل عن بعد بدءًا من طريقة تشغيله وتثبيته والعناية به وصيانته وإدارة التحكم به إلى إصلاحه.

فضلاً عن ذلك، تم إجراء معاينة أخرى بغية الكشف عن نقاط التسرّب في فواصل واجهة السدّ الأمامية المحاكية للمياه. وتمّ تصوير عمليّة المعاينة هذه بواسطة الفيديو من أجل مرجعيّة للمستقبل. لم تُظهر المعاينة أيّ نقاط تسرب ولا حتّى في الأماكن التي كانت تسرّب الماء عندما أجريبت معاينة أبريل/نيسان من العام ٢٠١٠، ما يعني أنّ الإصلاحات التي اعتمدتها المصلحة الوطنية لنهر الليطاني العام ٢٠١٠ كانت ناجحةً إذ لم تطرأ أي تسريبات جديدة.

باتت المصلحة الوطنية لنهر اللّيطاني اليوم قادرةً وحدها على إجراء معاينات تحت الماء، ولا بدّ لها أن تقوم بذلك بشكل دوريّ حتّى تبقى هذه المعاينات مألوفة لدى فريق عملها ويخضعَ السدّ لمراقبة منتظمة.

1. METHODOLOGY

1.1. ADVANTAGES OF ROV INSPECTION

Remotely Operated Vehicles are only one option for dam inspection. Divers are commonly used for dam inspections and offer a few advantages. However, ROVs have become a preferred option for many dams.

- Cost: ROVs offer an excellent long-term cost savings. ROV inspections often take less time to deploy and perform the inspection, and have lower long-term equipment costs.

- Availability: If a company owns their own ROV, and trains their employees to operate it (as is the case for LRBMS), the ROV can be deployed for inspection at any time, without planning ahead for divers or an ROV service company to visit the dam. This is especially useful for companies who wish to implement a regular inspection schedule.

- Conditions:
  - Visibility can be very low near the surface (sometimes less than 10 centimeters), which would force the diver to move slowly, and may make it impossible for them to see the joint at all. The ROV is able to follow the joint at very close range while still moving at a steady pace.
  - ROVs can operate in a very wide range of temperatures without additional equipment. Divers often will not work at very cold temperatures and other weather conditions, or may require additional equipment.

- Safety: One of the most important advantages of ROVs is safety. In the case of the Qaraoun Lake Dam, there are several safety concerns.
  - Debris and protrusions on the dam are a risk to both ROVs and divers, but damage to the ROV is much less serious, and ROV repairs can be performed at comparably minimal cost.
  - Leaks also pose a very large hazard to divers. During the 2010 inspection, the ROV tether was sucked into one of the leaking joints and became stuck. It took hours for LRBMS employees to free the ROV tether from the leak. This hazard can cause damage to the ROV, but could cause injury or death to a diver.
  - The poor visibility near the surface only adds to the risk of the hazards above.

1.2. INSPECTION PROCESS USED

The primary inspection was visual. The ROV was placed at the top of a vertical joint, and visually inspected the joint to the bottom. The ROV would then be brought to the surface and moved to the next vertical joint. After several vertical joints were inspected, the ROV would visually inspect the horizontal joints spanning the vertical joints.

Leak detection was done by watching the movement of the horse hair attached to the ROV and the movement of particles in the water. This was done several times per joint, and whenever the joint showed significant change in size or condition, or where there appeared to be a hole or gap where a leak might be present.

After each joint, or series of joints, the date, time, and condition of that joint was marked on a diagram of the dam face. Areas that could not be inspected were also labeled. The diagram is intended as the primary recording of inspection data, and the only accurate reference. Wireless headsets were obtained on the second day of inspection, and some of the video contains the audio of the operators and the tether tender during the operation. If needed, this audio could be used to verify the data recorded on the diagram.

1.3. DAILY ACTIVITY SUMMARY

2012-04-19

Training was done indoors. LRBMS employees were trained on the assembly, configuration, and basic operation of the Outland ROV.

2012-04-20

Training was done in the water. LRBMS employees deployed the ROV and began practicing usage of the ROV in the water. LRBMS employees also received hands on training for the cleaning and maintenance of the ROV. Inspection of the dam was started, and inspection to the west 17 vertical (from the west bank) was completed.

2012-04-21

Inspection from the west 17 vertical to the contefort.

2012-04-22

Inspection from the contrefort to the east 05 vertical.

2012-04-23

Inspection from the east 05 vertical to the east 20 vertical.

2012-04-24

Inspection from the east 20 vertical to the east bank. Inspection of the dam face has been completed.

2012-04-25

Inspection of sensors connected to the ladder on the spillway. Video was recorded of the condition of the sensors and their location. The ROV was then moved to the west of the contrefort, where LRBMS employees continued practicing piloting the ROV.

2. RESULTS

2.1. INSPECTION RESULTS

The majority of all joints on the upstream dam face were visually inspected. LRBMS employees observed the inspection and noted no noticeable damage or features of concern. Leak detection was also performed regularly, and at no location was there a noticeable flow of water into the joints. Special attention was given to areas which previously had leaks. Again, no flow of water into the previously leaking areas was observed. This shows that the repairs carried out end of 2010 by LRA after the previous rover inspection were very effective.

Note: In several areas, debris hindered the accessibility of the joints to the ROV. In these cases, discretion was used, and the safety of the ROV was considered a priority. Because of this, some areas were not fully inspected.

2.2. LESSONS LEARNED AND IMPORTANT NOTES

In the time-frame given (about 5 days), detection of small leaks is very difficult. In order to detect small leaks, the ROV would need to stop more often and watch the silt (or dye from a dye pump) for movement into the joints. To be effective, this may need to be done every few meters. An inspection of this type would likely take 10 or more days (depending on the distance between leak checks).

A dye pump is an attachment to the ROV which puts dye (ink) of a very visible color into the water. This allows the flow of the water to be more easily observed. In the presence of a leak, the dye would flow into the joint or crack in the dam where the water is leaking. For this inspection, we did not have a dye pump available. Instead, we watched the particles (silt) in the water for movement. When there were not many particles, we would use the ROV to kick up silt from the dam. This serves a similar purpose as the dye, but takes longer and is not as good at detecting extremely small leaks. If a detailed inspection is performed in the future to detect small leaks, a dye pump would be useful to reduce the time of the inspection, and improve the sensitivity of detection.

Leaks below the sediment at the base of the dam are possible. Leaks of this type could be detected by looking for sink-holes in the sediment, and then inspecting the sink-holes for leakage (flow into the hole). On this inspection, only the first 1-2 meters of sediment at the bottom of each vertical were viewed. To properly detect leaks below the sediment, a more detailed inspection of the sediment at the base of the dam would be needed.

3. RECOMMENDATIONS

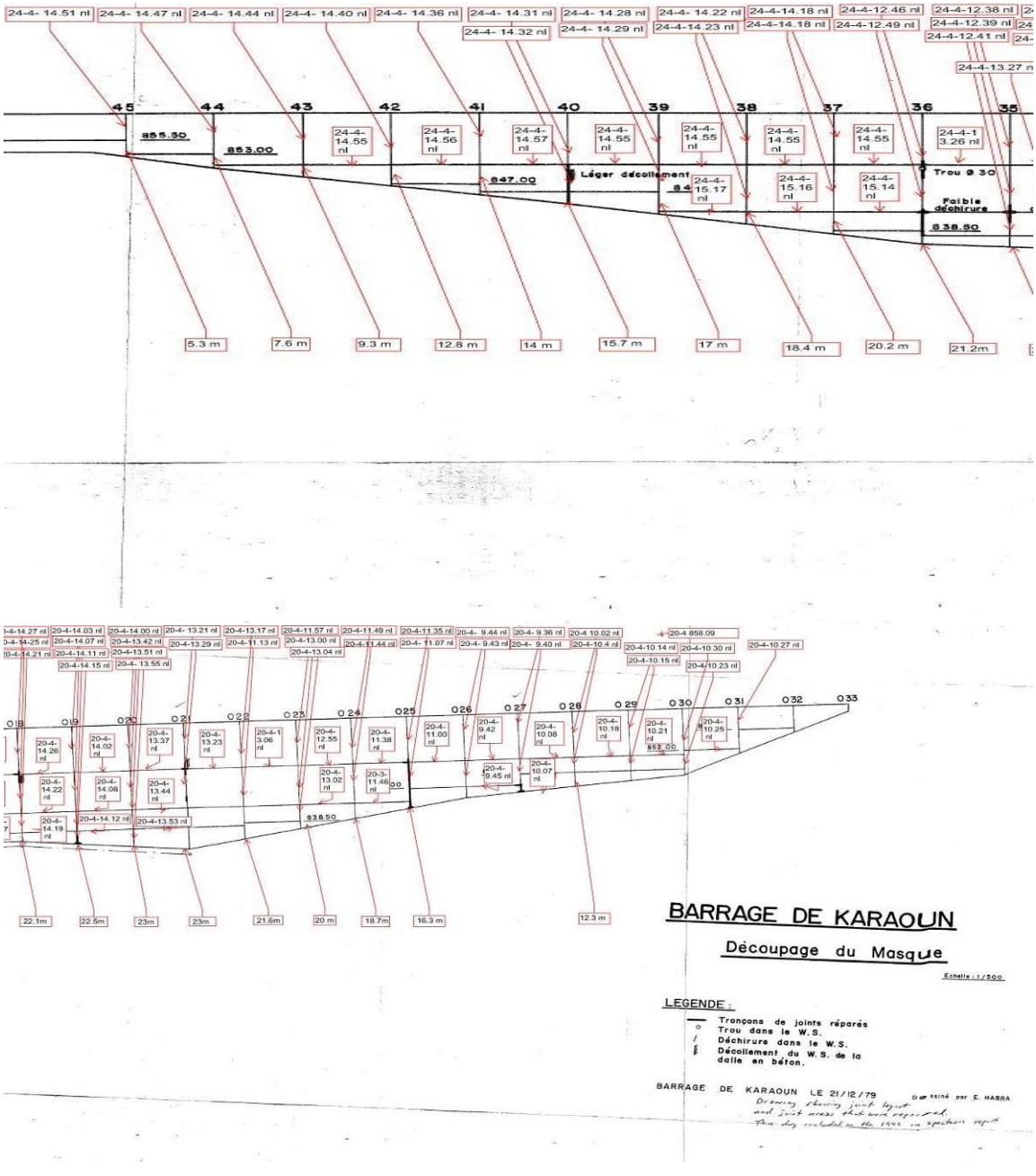
Regular inspections should be scheduled. For a detailed inspection, a schedule could be made to spread the inspection out over the year. For example, inspecting 8 verticals per month would take 1-2 days each month, but allow a full inspection over the course of a year. Since the water level is very low at certain times of the year, this schedule may need to be adjusted to fit within the period of highest water levels (for example, 2-4 days per month for 6 months a year). In addition to guaranteeing that ROV inspections are done regularly, this schedule would also serve the purpose of keeping the LRBMS employees practiced on the use of the ROV.

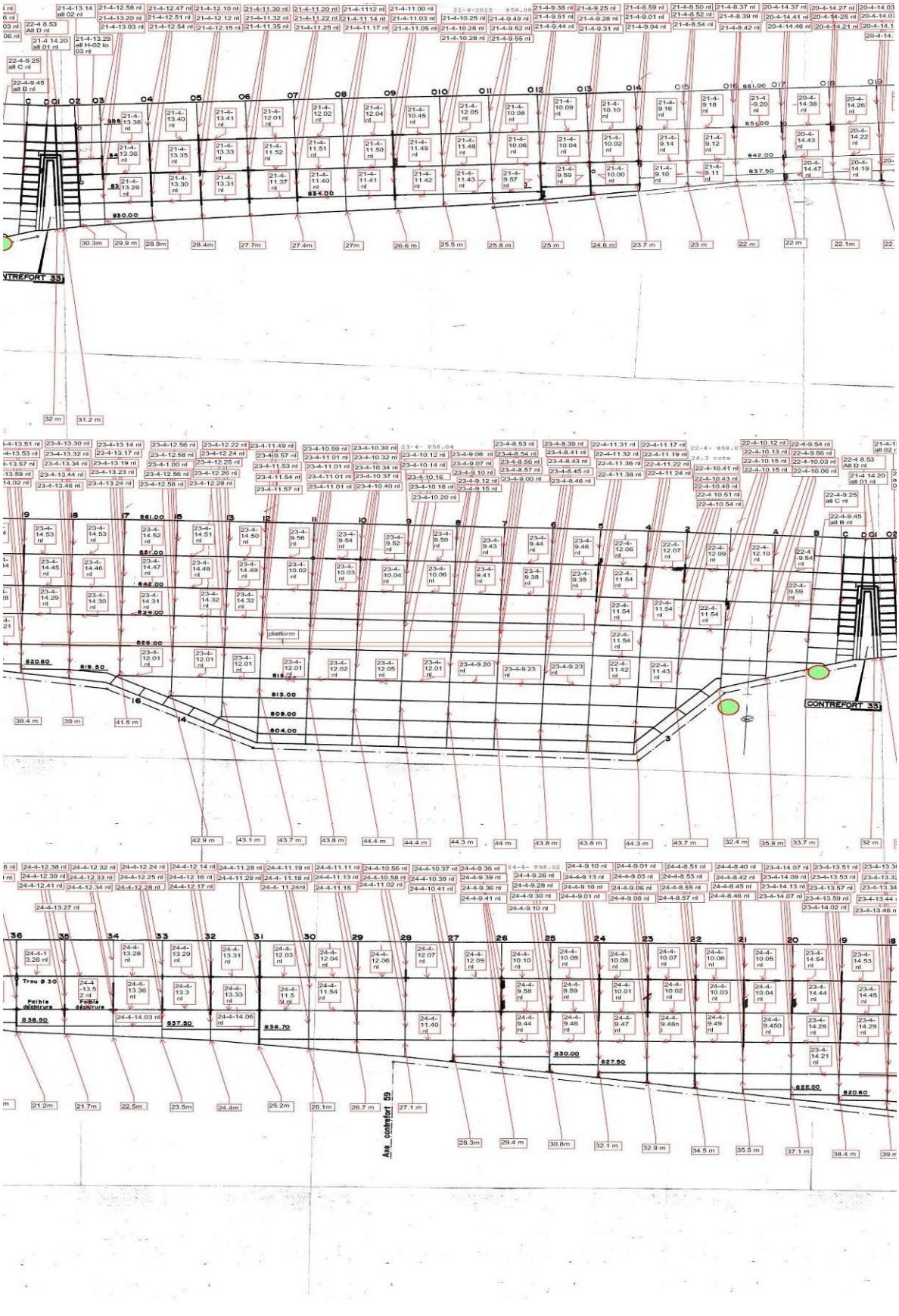
There is a lot of debris on the dam face. This includes metal protrusions at multiple levels, wooden planks placed across some of these protrusions, and trash laying across the protrusions and planks. These make certain areas difficult to inspect, and increase the risk of damage to the ROV. If these protrusions are not needed, removing them would help with future ROV inspections. If the protrusions are necessary (for use during repairs, etc), an attempt to clean away debris should be made, and the wooden planks should be removed. In the future, all planks and other materials used for repairs should be removed before the water level rises again.

If the ROV tether gets wrapped around an object underwater, a camera facing towards the rear can make it easier to find where the tether is tangled. This accessory can be obtained from Outland if desired.

4. ANNEXES

4.1. INSPECTION LOGS




CONTREFORT 33
platform
CONTREFORT 33
Axe contrefort 59

4.2. PICTURES

Rover Shipment

Initial Training

Rover Setup

Rover deployment

Rover deployment

Control Setup

Rover operation with LRA General Director

On-Hands Training

Monitoring Screen

Rover retrieval

4.3. CHECK LIST FOR OPERATION & MAINTENANCE OF ROVER

Outland ROV Quick Reference

Pre-Dive

- Check all connections
- Lubricate tether connection before connecting (with silicone gel)
- Attach shackle and test Kellems grip
- Install protection for sonar (metal bar).
- Function tests
  - Thrusters (all directions)
  - Cameras (full rotation and switch cameras)
  - Lights
  - Compass (Calibrate if needed)
  - Auto Hover (blow on pressure sensor while enabled)
  - Auto Heading (turn ROV while enabled)
- Check ballast (make slightly light)
- Start recording

Operations

- Reminders
  - Use Auto Hover. Tap ROV up and down.
  - Smooth and slow movement of the joystick are better than fast jerking motions
  - Communicate with the tether tender. Tell them how much tether you need, and have them let you what they see and feel.
- If the tether becomes tangled:
  - Have the tether tender keep a little tension on the cable
  - Find the cable with the ROV camera, and follow it back to the problem.
  - Navigate the ROV around the obstacle
  - When the tether is free, bring everything to the surface an inspect the tether and ROV for damage.

Post-Dive

- Fresh water rinse.
- Clean all thrusters
  - Remove propeller, wave washer and water washer (blue ring)
  - Dry all parts
  - Clean all parts with silicone spray
  - Lubricate all parts with silicone spray
  - Reassemble and hand tighten screw
- Disconnect tether from ROV. Dry connector and attach dummy plugs.
- Allow all equipment to fully dry before closing containers.

For long term storage:

- Clean with mild soap water and a clean sponge or rag
- Rinse with fresh water
- Clean thrusters, but do not reassemble until the entire unit has air dried
- Allow the unit to fully air dry (at least 12 hours in dry air)
- Reassemble thrusters

Terminology

- Hand controller
- Console (top-side)
- ROV (sub-side)
- Zip-tie
- Kellems grip – Metal mesh holding shackle to the tether
- Silicone grease – Used on the rubber areas of connections to make connecting and disconnecting easier
- Silicone spray – Used to clean metal components, such as the thrusters
- Tether – The cable going from the Console to the ROV
- Tether tender – The person controlling the tether

Prepared by Alex Kaplan of SeaTrepid International LLC
for the Litany River Authority and Litani River Basin Management Support Program

4.4. DAILY LOGS

23083 US-190
Robert, LA 70455 USA
Phone: (985) 350-6299
e-mail: info@seatrepid.com
www.seatrepid.com

Daily Progress Report

Vessel / Facility:	El Wauroun Dam	**Date:**	2012 Apr 25
Location(s):	Qaraoun Lake, Beqaa, Lebanon	**Job Number:**	STJ2012002
Client:	IRG LRBMS	**PO Number**	5007-FP1-SEATREPID
Client Representative:	Eric Viala	**ROV System:**	Outland 213

PERSONNEL	POSITION	HOURS	ST OT	CLIENT OT	TOTAL
Alex Kaplan	Supervisor	12	0	0	12

SeaTrepid Equipment	Additional Equipment
	Outland # 213 and Spares

Highlight of ROV Operations:

Located sensors on the spillway. Video of the location and condition of sensors recorded. LRBMS staff spent time practicing inspecting joints with the ROV. Alex returned to Beirut.

Plan for the Next 24 Hours

Meetings at IRG offices in Beirut.

ROV Wet Time (Total):	02:11	Total Dives Today	2

Dive#	START	END	TOTAL	EVENT DESCRIPTION
	00:00	00:00	00:00	**NOTE: All times in EEST (UTC+3)**
	00:00	07:48	07:48	At Macharef Saghbine Hotel. Off shift.
	07:48	08:09	00:21	Travel to El Wauroun Dam office
	08:09	08:47	00:38	ROV equipment moved to dam and set up.
6	08:47	09:30	00:43	ROV in the water. Attempting to locate sensor attached to the spillway ladder
	09:35	10:02	00:27	ROV out of the water. Moving equipment to the west bank for training.
7	10:02	11:30	01:28	ROV in the water. Walid and Ali practicing controlling the ROV
	11:30	11:57	00:27	LRBMS staff packed up, cleaned and stored the ROV.
	11:57	12:31	00:34	Break and discussins with LRBMS staff
	12:31	12:47	00:16	Travel to Macharef Saghbine Hotel
	12:47	13:08	00:21	Paying bill at Macharef
	13:08	14:51	01:43	Travel to Beirut
	14:51	24:00	09:09	At Golden Tulip Hotel De Ville in Beirut. Off shift.

SeaTrepid Representative	Company Representative

23083 US-190
Robert, LA 70455 USA
Phone: (985) 350-6299
e-mail: info@seatrepid.com
www.seatrepid.com

Daily Progress Report

Vessel / Facility:	Mobilization	**Date:**	2012 Apr 16
Location(s):	Drexel Hill | Newark	**Job Number:**	STJ2012002
Client:	IRG LRBMS	**PO Number**	5007-FP1-SEATREPID
Client Representative:	Eric Viala	**ROV System:**	Outland 213

PERSONNEL	POSITION	HOURS	ST OT	CLIENT OT	TOTAL
Alex Kaplan	Supervisor	12	0	0	12

SeaTrepid Equipment	Additional Equipment
	Outland # 213 and Spares

Highlight of ROV Operations:

Mobilization of employee to Lebanon.

Plan for the Next 24 Hours

Continue travel to Lebanon

ROV Wet Time (Total):	00:00	Total Dives Today	0

Dive#	START	END	TOTAL	EVENT DESCRIPTION
	00:00	00:00	00:00	**NOTE: All times in EEST (UTC+3)**
	00:00	17:37	17:37	Off shift.
	17:37	24:00	06:23	Travel from home to Newark, NJ

SeaTrepid Representative	Company Representative

23083 US-190
Robert, LA 70455 USA
Phone: (985) 350-6299
e-mail: info@seatrepid.com
www.seatrepid.com

Daily Progress Report

Vessel / Facility:	Mobilization	**Date:**	2012 Apr 17
Location(s):	Newark | Frankfurt | Beirut	**Job Number:**	STJ2012002
Client:	IRG LRBMS	**PO Number**	5007-FP1-SEATREPID
Client Representative:	Eric Viala	**ROV System:**	Outland 213

PERSONNEL	POSITION	HOURS	ST OT	CLIENT OT	TOTAL
Alex Kaplan	Supervisor	17	0	0	17

SeaTrepid Equipment	Additional Equipment
	Outland # 213 and Spares

Highlight of ROV Operations:

Mobilization of employee to Lebanon.

Plan for the Next 24 Hours

Meet with LRBMS employees and travel to dam location.

ROV Wet Time (Total):	N/A	Total Dives Today	0

Dive#	START	END	TOTAL	EVENT DESCRIPTION
	00:00	00:00	00:00	**NOTE: All times in EEST (UTC+3)**
	00:00	08:20	08:20	Flight from Newark (EWR) to Frankfurt (FRA)
	08:20	11:40	03:20	Layover in Frankfurt, Germany
	11:40	15:20	03:40	Flight from Frankfurt (FRA) to Beirut (BEY)
	15:20	16:12	00:52	Arrive in Beirut, Lebanon. Travel to IRG offices.
	16:12	16:42	00:30	Brief introductions to IRG employees.
	16:42	24:00	07:18	At Part Tower Suites in Beirut. Off shift.

SeaTrepid Representative	Company Representative

23083 US-190
Robert, LA 70455 USA
Phone: (985) 350-6299
e-mail: info@seatrepid.com
www.seatrepid.com

Daily Progress Report

Vessel / Facility:	El Wauroun Dam	**Date:**	2012 Apr 18
Location(s):	Qaraoun Lake, Beqaa, Lebanon	**Job Number:**	STJ2012002
Client:	IRG LRBMS	**PO Number**	5007-FP1-SEATREPID
Client Representative:	Eric Viala	**ROV System:**	Outland 213

PERSONNEL	POSITION	HOURS	ST OT	CLIENT OT	TOTAL
Alex Kaplan	Supervisor	12	0	0	12

SeaTrepid Equipment	Additional Equipment
	Outland # 213 and Spares

Highlight of ROV Operations:

Meetings. Travel to dam location.

Plan for the Next 24 Hours

Begin training of LRBMS staff.

ROV Wet Time (Total):	N/A	Total Dives Today	0

Dive#	START	END	TOTAL	EVENT DESCRIPTION
	00:00	00:00	00:00	**NOTE: All times in EEST (UTC+3)**
	00:00	08:10	08:10	At Part Tower Suites in Beirut. Off shift.
	08:10	09:38	01:28	Meeting with IRG LRBMS employees at Beirut office
	09:38	11:38	02:00	Traveling to LRBMS offices at El Wauroun Dam
	11:38	13:40	02:02	Meeting with LRBMS staff
	13:40	13:56	00:16	Travel to Macharef Saghbine Hotel
	13:56	24:00	10:04	At Macharef Saghbine Hotel. Off shift

SeaTrepid Representative	Company Representative

23083 US-190
Robert, LA 70455 USA
Phone: (985) 350-6299
e-mail: info@seatrepid.com
www.seatrepid.com

Daily Progress Report

Vessel / Facility:	El Wauroun Dam	**Date:**	2012 Apr 19
Location(s):	Qaraoun Lake, Beqaa, Lebanon	**Job Number:**	STJ2012002
Client:	IRG LRBMS	**PO Number**	5007-FP1-SEATREPID
Client Representative:	Eric Viala	**ROV System:**	Outland 213

PERSONNEL	POSITION	HOURS	ST OT	CLIENT OT	TOTAL
Alex Kaplan	Supervisor	12	0	0	12

SeaTrepid Equipment	Additional Equipment
	Outland # 213 and Spares

Highlight of ROV Operations:

Outland training for LRBMS staff.

Plan for the Next 24 Hours

Begin inspection of the dam

ROV Wet Time (Total):	00:00	Total Dives Today	0

Dive#	START	END	TOTAL	EVENT DESCRIPTION
	00:00	00:00	00:00	**NOTE: All times in EEST (UTC+3)**
	00:00	07:54	07:54	At Macharef Saghbine Hotel. Off shift.
	07:54	08:14	00:20	Travel to El Wauroun Dam office
	08:14	09:30	01:16	Meeting with LRBMS staff. Preparing a room for training
	09:30	13:18	03:48	Outland ROV training for LRBMS staff
	13:18	13:38	00:20	Travel to Macharef Saghbine Hotel
	13:38	15:30	01:52	Getting connected to the internet. Email correspondence and sending reports.
	15:30	24:00	08:30	At Macharef Saghbine Hotel. Off shift.

SeaTrepid Representative	Company Representative

23083 US-190
Robert, LA 70455 USA
Phone: (985) 350-6299
e-mail: info@seatrepid.com
www.seatrepid.com

Daily Progress Report

Vessel / Facility:	El Wauroun Dam	**Date:**	2012 Apr 20
Location(s):	Qaraoun Lake, Beqaa, Lebanon	**Job Number:**	STJ2012002
Client:	IRG LRBMS	**PO Number**	5007-FP1-SEATREPID
Client Representative:	Eric Viala	**ROV System:**	Outland 213

PERSONNEL	POSITION	HOURS	ST OT	CLIENT OT	TOTAL
Alex Kaplan	Supervisor	12	0	0	12

SeaTrepid Equipment	Additional Equipment
	Outland # 213 and Spares

Highlight of ROV Operations:

Inspected dam from west 27 to west 17 vertical.

Plan for the Next 24 Hours

Continue inspection.

ROV Wet Time (Total):	04:51	Total Dives Today	1

Dive#	START	END	TOTAL	EVENT DESCRIPTION
	00:00	00:00	00:00	**NOTE: All times in EEST (UTC+3)**
	00:00	07:45	07:45	At Macharef Saghbine Hotel. Off shift.
	07:45	08:00	00:15	Travel to El Wauroun Dam office
	08:00	08:40	00:40	Waiting for equipment transfer and LRBMS staff
	08:40	09:11	00:31	Moving equipment to the dam. Setting up ROV.
	09:11	09:24	00:13	Ballast adjustments and final checks before dive.
1	09:24	10:30	01:06	Inspection. Starting at the west 27 vertical. Alex on the controls
1	10:30	11:28	00:58	Waleed on the controls. Hands on training and practice
1	11:28	11:52	00:24	Alex back on the controls. Continuing inspection.
1	11:52	12:30	00:38	Waleed on the controls. Continuing inspection.
	12:30	12:51	00:21	Lunch break. Resolving radio issues.
1	12:51	14:30	01:39	Continuing inspection at the west 23 vertical. Alex on the controls.
1	14:30	14:36	00:06	Alex takes a short break. Waleed on the controls.
	14:36	14:48	00:12	End of inspection for the day. Completed west #27-17 Packing up the ROV
	14:48	15:23	00:35	ROV cleaned and stowed for the night.
	15:23	15:45	00:22	Travel to Macharef Saghbine Hotel
	15:45	18:00	02:15	Emails and reports
	18:00	24:00	06:00	At Macharef Saghbine Hotel. Off shift.

SeaTrepid Representative	Company Representative

23083 US-190
Robert, LA 70455 USA
Phone: (985) 350-6299
e-mail: info@seatrepid.com
www.seatrepid.com

Daily Progress Report

Vessel / Facility:	El Wauroun Dam	**Date:**	2012 Apr 21
Location(s):	Qaraoun Lake, Beqaa, Lebanon	**Job Number:**	STJ2012002
Client:	IRG LRBMS	**PO Number**	5007-FP1-SEATREPID
Client Representative:	Eric Viala	**ROV System:**	Outland 213

PERSONNEL	POSITION	HOURS	ST OT	CLIENT OT	TOTAL
Alex Kaplan	Supervisor	12	0	0	12

SeaTrepid Equipment	Additional Equipment
	Outland # 213 and Spares

Highlight of ROV Operations:

Inspected dam from the west 16 vertical to the contrefort.

Plan for the Next 24 Hours

Continue dam inspection.

ROV Wet Time (Total):	05:06	Total Dives Today	1

Dive#	START	END	TOTAL	EVENT DESCRIPTION
	00:00	00:00	00:00	**NOTE: All times in EEST (UTC+3)**
	00:00	07:45	07:45	At Macharef Saghbine Hotel. Off shift.
	07:45	08:00	00:15	Travel to El Wauroun Dam office
	08:00	08:36	00:36	ROV equipment moved to dam and set up.
2	08:36	10:15	01:39	Begin inspection at the west 16 vertical. Alex on controls.
	10:15	10:24	00:09	Moving the van forward.
2	10:24	12:20	01:56	Continuing inspection at the west 10 vertical.
	12:20	12:45	00:25	Lunch Break.
2	12:45	13:45	01:00	Continuing inspection at the west 04 vertical.
	13:45	14:19	00:34	Moving the van forward.
2	14:19	14:50	00:31	Continuing inspection at the west 01 vertical.
	14:50	15:22	00:32	Cleaning the ROV and storing it for the night.
	15:22	15:45	00:23	Travel to Macharef Saghbine Hotel
	15:45	19:30	03:45	Completing logs. Sending email reports.
	19:30	24:00	04:30	At Macharef Saghbine Hotel. Off shift.

SeaTrepid Representative	Company Representative

23083 US-190
Robert, LA 70455 USA
Phone: (985) 350-6299
e-mail: info@seatrepid.com
www.seatrepid.com

Daily Progress Report

Vessel / Facility:	El Wauroun Dam	**Date:**	2012 Apr 22
Location(s):	Qaraoun Lake, Beqaa, Lebanon	**Job Number:**	STJ2012002
Client:	IRG LRBMS	**PO Number**	5007-FP1-SEATREPID
Client Representative:	Eric Viala	**ROV System:**	Outland 213

PERSONNEL	POSITION	HOURS	ST OT	CLIENT OT	TOTAL
Alex Kaplan	Supervisor	12	0	0	12

SeaTrepid Equipment	Additional Equipment
	Outland # 213 and Spares

Highlight of ROV Operations:

Inspected the dam contrefort and from the contrefort to the east 5 vertical.

Plan for the Next 24 Hours

Continue dam inspection.

ROV Wet Time (Total):	02:51	Total Dives Today	1

Dive#	START	END	TOTAL	EVENT DESCRIPTION
	00:00	00:00	00:00	**NOTE: All times in EEST (UTC+3)**
	00:00	07:56	07:56	At Macharef Saghbine Hotel. Off shift.
	07:56	08:10	00:14	Travel to El Wauroun Dam office
	08:10	08:47	00:37	ROV equipment moved to dam and set up.
3	08:47	10:18	01:31	Begin inspection at the contrefort D vertical. Alex on controls.
	10:18	10:39	00:21	Break
3	10:39	11:03	00:24	Continuing inspection at the east 02 vertical.
	11:03	11:16	00:13	Problems with wireless mics (dead batteries). Retrieving radios.
3	11:16	12:12	00:56	Continuing inspection at the east 04 vertical.
	12:12	13:03	00:51	Cleaning the ROV and storing it for the night.
	13:03	13:17	00:14	Travel to Macharef Saghbine Hotel
	13:17	15:15	01:58	Completing logs. Email reports.
	15:15	24:00	08:45	At Macharef Saghbine Hotel. Off shift.

SeaTrepid Representative	Company Representative

23083 US-190
Robert, LA 70455 USA
Phone: (985) 350-6299
e-mail: info@seatrepid.com
www.seatrepid.com

Daily Progress Report

Vessel / Facility:	El Wauroun Dam	**Date:**	2012 Apr 23
Location(s):	Qaraoun Lake, Beqaa, Lebanon	**Job Number:**	STJ2012002
Client:	IRG LRBMS	**PO Number**	5007-FP1-SEATREPID
Client Representative:	Eric Viala	**ROV System:**	Outland 213

PERSONNEL	POSITION	HOURS	ST OT	CLIENT OT	TOTAL
Alex Kaplan	Supervisor	12	0	0	12

SeaTrepid Equipment	Additional Equipment
	Outland # 213 and Spares

Highlight of ROV Operations:

Inspected the dam from the east 06 vertical to the east 20 vertical.

Plan for the Next 24 Hours

Continue dam inspection.

ROV Wet Time (Total):	06:22	Total Dives Today	1

Dive#	START	END	TOTAL	EVENT DESCRIPTION
	00:00	00:00	00:00	**NOTE: All times in EEST (UTC+3)**
	00:00	07:46	07:46	At Macharef Saghbine Hotel. Off shift.
	07:46	08:06	00:20	Travel to El Wauroun Dam office
	08:06	08:35	00:29	ROV equipment moved to dam and set up.
4	08:35	11:13	02:38	Begin inspection at east 06 vertical. Alex on controls.
4	11:13	11:47	00:34	Lunch
4	11:47	12:31	00:44	Continuing inspection at the east 12 vertical.
4	12:31	12:54	00:23	Break
4	12:54	14:57	02:03	Continuing inspection at the east 15 vertical.
	14:57	15:33	00:36	Cleaning the ROV and storing it for the night.
	15:33	15:46	00:13	Travel to Macharef Saghbine Hotel
	15:46	16:30	00:44	Completing logs. Email reports.
	16:30	24:00	07:30	At Macharef Saghbine Hotel. Off shift.

SeaTrepid Representative	Company Representative

23083 US-190
Robert, LA 70455 USA
Phone: (985) 350-6299
e-mail: info@seatrepid.com
www.seatrepid.com

Daily Progress Report

Vessel / Facility:	El Wauroun Dam	**Date:**	2012 Apr 24
Location(s):	Qaraoun Lake, Beqaa, Lebanon	**Job Number:**	STJ2012002
Client:	IRG LRBMS	**PO Number**	5007-FP1-SEATREPID
Client Representative:	Eric Viala	**ROV System:**	Outland 213

PERSONNEL	POSITION	HOURS	ST OT	CLIENT OT	TOTAL
Alex Kaplan	Supervisor	12	0	0	12

SeaTrepid Equipment	Additional Equipment
	Outland # 213 and Spares

Highlight of ROV Operations:

Inspected the dam from the east 20 vertical to the east 45 vertical. Completed inspection of horizontal and vertical joints of the dam face.

Plan for the Next 24 Hours

Retrieve sensors from spillway. Hands on training of LRBMS employees. Inspect spillway walls.

ROV Wet Time (Total):	06:42	Total Dives Today	1

Dive#	START	END	TOTAL	EVENT DESCRIPTION
	00:00	00:00	00:00	**NOTE: All times in EEST (UTC+3)**
	00:00	07:44	07:44	At Macharef Saghbine Hotel. Off shift.
	07:44	08:05	00:21	Travel to El Wauroun Dam office
	08:05	08:38	00:33	ROV equipment moved to dam and set up.
5	08:38	10:40	02:02	Begin inspection at east 21 vertical. Alex on controls.
5	10:40	10:56	00:16	Briefly moved ROV to spillway. Speaking with Dr. Nabil Ammacha.
5	10:56	12:51	01:55	Continuing inspection.
5	12:51	13:23	00:32	Lunch
5	13:23	15:20	01:57	Continuing inspection.
	15:20	15:56	00:36	Inspection complete. Cleaning the ROV and storing it for the night.
	15:56	16:14	00:18	Travel to Macharef Saghbine Hotel
	16:14	16:45	00:31	Completing logs. Email reports.
	16:45	24:00	07:15	At Macharef Saghbine Hotel. Off shift.

SeaTrepid Representative	Company Representative

U.S. Agency for International Development
1300 Pennsylvania Avenue, NW
Washington, DC 20523
Tel: (202) 712-0000
Fax: (202) 216-3524
www.usaid.gov