Falkland Islands Demining Pilot Project: Completion of Phase 1

The United Kingdom has started to remove anti-personnel mines from the Falkland/Malvinas Islands[1] in order to meet its obligations under Article 5 of the Ottawa Convention. A pilot phase was completed in June 2010 to clear four suspected hazardous areas—a critical first step to inform future projects following the conclusion of the Joint U.K.-Argentine Feasibility Study.

by Robin Swanson [Biron Associates Ltd.]

An article in the 14.1 issue of *The Journal of ERW and Mine Action* made some observations about the completion status of the Falkland Islands Demining Program.[2] This article aims to articulate the program's objectives, the problems encountered and methodologies used, and to draw on some of the key lessons learned from the experience.

Objectives

The program's objectives were twofold: to conduct a pilot clearance program to meet the requirements of Article 5 obligations and to inform future projects about clearance challenges. For this reason, the U.K. government selected four suspected hazardous areas in close consultation with the Falkland Islands government, which would provide different types of terrain and different mine and unexploded-ordnance threats—two SHAs near Stanley were known minefields (Surf Bay and Sapper Hill), and accurate minefield documents were held for them, while the ones in Goose Green and Fox Bay East had a less well-defined threat. The U.K. government set standards in excess of International Mine Action Standards by demanding a 200-millimeter (7.87 inches) contract depth for the clearance of mine panels. In addition, mines affected by the formation of sand dunes required excavation 300 millimeters (11.81 inches) below the 1982 profile. These increased standards were designed to address concerns within the island community about the ability of a mine-clearance program to remove all of the explosive hazards.

The Threat

The Joint U.K.-Argentine Feasibility Study[3] identified the different types of landmines encountered on the islands. The majority of minefields contain plastic, minimum-metal mines, which present a challenge for conventional metal-detection technologies due to the exceptionally small quantities of metal within the mines. Some of the SHAs had been subjected to BL 755 cluster-munitions strikes, but because of their high metallic content, these did not present the same level of technical challenge to detect.

Clearance Methodologies Used

Modern metal-detection equipment struggled to detect the minimum-metal mines to the contract depth. Therefore, the demining contractor BACTEC International Ltd. used layered and full excavation techniques, depending on the expected mine threat, to meet the contract's requirements. The mines had been laid in a very formal pattern using cord and markers at intervals, and the documents recording the two minefields near Stanley soon proved to be credible records of the mine pattern.[4] Therefore, once rows were encountered, the mine patterns could be followed and fully exploited using excavation techniques. This is a slow and demanding method of clearance in normal circumstances, but additional external factors exacerbated the situation further. During austral summer 2009–10, the Island recorded the worst weather patterns on record, with conditions including cold high winds, rain, sleet and snow. Additionally, much of the contaminated ground consisted of thick, fibrous peat and heavy vegetation, which was difficult to cut. This challenged the deminers[5] to draw on exceptional levels of patience, skill, good humor, and sheer grit and determination.

The Surf Bay Minefield was the most challenging task. The dense, mixed minefield contained more than 1,000 mines (SB33 & SB81) within a relatively small area of 3.34 hectares (8.25 acres), and the terrain also varied within it. The local airport road bisected the minefield with deep peat to the west and gradually thinner peat and sandier terrain toward the beach on the east. Six mixed mine panels[6] straddled a previous track in sandy soil in the minefield's northeast part where sand accumulation demanded manual excavation of 400 millimeters (15.74 inches). Two further panels, consisting of 16 anti-vehicle mines each, had been covered by large sand dunes since 1982. Conflict-aerial photography revealed that the mines had been laid at the current beach level, which was marked by a cobbled layer of stone, but the sand dunes were between two and five meters (7–16 feet) above that level. After initially identifying the start of the first panel using manual excavation techniques, it then became a mechanical clearance task routinely operating in four to five meters (13–16 feet) of sand.

Fully excavating the access lanes on Sapper Hill before the first P4Bs were encountered.
PHOTO COURTESY OF GUY MAROT, DPO TECHNICAL ADVISER

Finding mines at these depths required systematic search procedures. One early lesson learned was that a detailed, centimeter-accurate survey, used to establish exactly what had been excavated and where the mines were located, was absolutely essential to ensure efficient use of time and resources. Fortunately, the Public Works Department on the Islands had access to Real Time Kinematic Survey[7] and its survey team supported the minefield mapping process very effectively.

Where the threat was less well-defined at Goose Green and Fox Bay, traditional non-technical and technical survey procedures were adopted. Much information still exists within the Falkland Islands local and military community and among military veterans concerning the events that took place during and immediately after the 1982 conflict. Fortunately for this pilot project, quality information was available. This may not be the case for many other areas where the minefield documents and records do not exist, and as time goes on, memories will fade, and key witnesses will be harder to track and interview.

The Environment

Concerns about the project's environmental impact were raised before it began and were a particular issue for the Falkland Islands government. The Planning Permission and consent provided by the FI government required submission of an acceptable ground remediation plan with each SHA Clearance Plan and that steps were taken to educate the deminers in the identification of rare plant species expected in the area. The Clearance Plans divided the cleared areas into three parts:

1. One area is left to recover naturally.
2. One area has the cut vegetation replaced so seeds from the cuttings can drop and germinate.

Armored excavator searching for the SB81 mines at the 1982 profile within the Surf Bay Sand Dunes.
PHOTO COURTESY OF THE AUTHOR

3. One area is left for a different approach to be specified using natural and introduced methods. A broad plan was developed to satisfy these planning conditions.

Perfectly rebuilding the sand dunes was never an aspiration, but in close cooperation with the Environmental Planning Department, BACTEC replaced the sand to the best of their abilities, stabilizing the dunes' bases where possible using geo-textiles and aggregate bags. The area was left deliberately unsmooth in order to provide relief for natural forces to work on and to catch drifting seeds for germination purposes.

Monitoring will take place over the next two years to establish the most effective approach for future programs; not only does it need to be environmentally acceptable, it needs to be a practical, relatively simple and cost-effective procedure. These additional planning requirements are not always associated with mine-action programs and provided different challenges which required close liaison with local environmental bodies.

Although the tender document had been written to discourage the use of specialist mechanical systems, at the end of the process, the final result was visually not dissimilar to what might have resulted from a mechanical approach without the advantages of immediate re-germination when earth is processed and seeds are reintroduced immediately. As a result of the pilot program, these alternative approaches may be considered during follow-up phases.

Results

The following table represents the areas actually cleared (including additional battle-area clearance tasks associated with the four SHAs) and records the mines and UXO located between 3 December 2009 and 4 June 2010:

In order to place this into context, it is useful to note that Argentina[10] declared to the United Nations

SHA	AP Mines	AV Mines	UXO	Area Cleared
Surf Bay SA-008	488 SB33	568 SB81	1 M67 Grenade + 7.62mm ammo	3.34 Ha
Surf Bay BAC (Canache Wet Area)	-	-	4 M67 Grenades + 7.62 ammo	3.44 Ha
Sapper Hil SA-025	190 P4B	-	-	0.77 Ha
Sapper Hill BAC[8] (BL755 Strike Area)	-	-	-	6.29 Ha
Goose Green GG-011	-	-	-	2.41 Ha
Fox Bay FB-008W	-	-	-	2.3 Ha
Fox Bay BAC (Headland Area)	-	-	-	1.99 Ha[9]
Total	678	568	8 UXO + 7.62mm ammo	20.54 Ha

Summary of areas cleared.

The sand was replaced in a manner to provide relief for natural forces to operate.
PHOTO COURTESY OF JOSEPHINE SWANSON

that it brought 25,000 landmines to the Falkland Islands at the start of the conflict (20,000 anti-personnel and 5,000 anti-vehicle mines) and that some 5,000 have been accounted for since the conflict ended. This means that approximately 20,000 landmines remained in the ground prior to Phase 1 clearance and that this program cleared more than 6 percent of the remaining mine contamination.

Confidence Building

An important part of any demining program is instilling confidence within the local community. On arrival, the Demining Programme Office[11] needed to reassure the community that all the mines could be removed from the areas selected, and to address a widely-held community view that the money could be better spent removing mines in other parts of the world. While this may be an honorable stance, the United Kingdom has an international obligation to clear the landmines in the Falkland Islands; therefore, the money for the Phase 1 program was allocated separately from the donations the United Kingdom provided for other international mine-action projects.

The Falkland Islands government was also concerned about the risk of injury to deminers when local demand to clear the minefields was nonexistent, no civilian injuries were sustained, and the minefields posed no humanitarian, social or economic impact to the community. Fortunately, no one sustained injuries during the program, which can be attributed to good procedures, correct protective equipment and a strong ethos for safety adopted by BACTEC and the DPO.

The FI government and the local community were also influenced by certain historical myths that had perpetuated over time, adding to the belief that full clearance was impossible. One of these myths was that mines move in peat and would not be found. Most surface layers of peat (0–300 millimeters, or 0–11.81 inches) contain fibrous peat, or at least semi-fibrous peat, in the topsoil's lower parts, with a structure displaying horizontal laminations reflecting the gradual accumulation of little-decomposed plant debris. The large surface area and light weight of the mine would make it highly unlikely to shift within the peat and, indeed, the Phase 1 clearance program found no evidence of this. Taking Sapper Hill as an example of a typical peat minefield, no P4B mine was found deeper than 120 millimeters (4.72 inches), and 97 percent were at less than 80 millimeters (3.14 inches) or were located on the surface. The program did conclude, not surprisingly, that light, plastic anti-personnel mines can be moved by wind, water or by ground slippage, particularly when the topography, such as downhill gradients, was also a factor. Most mines were discovered at their predicted location within the documented

Surface-laid P4B with lot numbers easily visible and rubber seals intact.

PHOTO COURTESY OF GUY MAROT

The manually excavated area at Sapper Hill. (Yellow pickets indicate where P4B mines were found.)

PHOTO COURTESY OF THE AUTHOR

pattern, but natural forces had moved a very small minority. What is particularly interesting is that the condition of the majority of the mines was very good despite resting in acidic soil and damp conditions for 28 years, and we assess that most would certainly have functioned given the right pressure.

The FI government, concerned about its residual liability in the event of any future incident within the cleared areas, considered a number of proposals to keep the fences and some form of warning signs in place after clearance. The DPO made many announcements through the media to keep the community fully informed of the clearance process, encouraged visits to the minefields and held briefings to explain the detail and quality procedures associated with the clearance program. In addition, a public confidence demonstration was run after the completion of each task site. Following the last demonstration at Surf Bay, spectators swarmed onto the cleared area with their children confirming their confidence in the clearance process.

By the end of the program, all mine signs were removed from the cleared sites, but the fences remained around the former minefields at Surf Bay and Sapper Hill. The fences remained in place not to mark the areas as unsafe, but to prevent unnecessary damage during the environmental remediation period and to allow proper monitoring of the regeneration process.

Conclusion

One key conclusion from this program indicates that further research and development is necessary to improve the ability of manually detecting minimum-metal mines at greater depths. The program encountered many physical and philosophical challenges; however, it was an enormous success. This pilot phase will undoubtedly inform future projects about the technical, environmental and logistical challenges associated with clearance in the Falkland Islands, and will provide more accurate planning data for follow-on phases.

see endnotes page

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